

**ВЕСТНИК
РОССИЙСКОГО
ОНКОЛОГИЧЕСКОГО
НАУЧНОГО ЦЕНТРА
ИМЕНИ Н. Н. БЛОХИНА РАМН**

УДК 616

Ежеквартальный научно-практический журнал

Основан в 1990 году

Том 17, №1 (прил. 1), 2006

**Учредитель:
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Тел.: +7-495-324-5537

Журнал зарегистрирован в Федеральном агентстве по печати
и массовым коммуникациям
Свидетельство ПИ №77-1724 от 18.02.2000

Подписной индекс в каталоге агентства «Роспечать» 46782

Отпечатано в АНО «Усия»
Объем 8,3 печ. л.
Тираж 2000 экз.

При перепечатке материалов ссылка на «Вестник Российского
онкологического научного центра имени Н. Н. Блохина РАМН»
обязательна

**JOURNAL
of N. N. BLOKHIN
RUSSIAN CANCER RESEARCH
CENTER RAMS**

A quarterly journal of oncologic science and practice

Founded in 1990

Volume 17, N 1 (suppl. 1), 2006

**Founder: N. N. Blokhin Russian Cancer
Research Center RAMS**

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Russian Federation, 115478. Tel.: +7-495-324-5537

The journal is registered at the Federal Agency of Press and
Mass-media of Russian Federation
License ПИ №77-1724 18.02.2000

Subscription index in catalogue of Rospechat Agency 46782

Printed in ANO "Usija"
Bulk 8,3 printed sheets
Circulation 2000 copies

No reproduction is permitted without reference to Journal of
N. N. Blokhin Russian Cancer Research Center RAMS

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SECTION 1

NOVEL SURGICAL APPROACHES IN THE TREATMENT OF PRIMARY AND METASTATIC BONE TUMORS

ORAL PRESENTATIONS

ID 66

A new diaphyseal anchorage for tumour prostheses

R.I. Kotz

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Introduction: After 20 years of successful implants of KMFTR and HMRS a global tumour prosthesis system has been evolved in co-operation with American colleagues. The successful cement free, porous coated anchorage fixed with screws to enable a primary stabilisation has had disadvantages in long term observation. Stress shielding occurred or stems were broken due to the holes in the stems.

Material and Methods: Therefore, the main task for the new global system was to develop a cement free, secure rotation stem which would not feature these disadvantages. The teams in Bologna and Vienna both developed preliminary stems in their laboratories, which had slanted fins and would stabilise against rotation of a straight stem in the femur and tibia. The tests showed that during the moment of turning the prosthesis a lifting out occurred. In tumour prostheses in the region of the knee, bending the knee has the effect of a large lever arm, therefore rotation stability is of great importance. Therefore, grooves were developed, which were added parallel and proximally on the stem. However, this made it necessary to develop a special implantation technique.

Results: The new diaphyseal anchorage for the GMRS system is a smooth titanium stem, 12.5 cm in length with a bullet tip. The stem has 3 parts the tip smooth middle part coating of titanium plasma spray and in addition proximal hydroxylapatite. The rotation stabilisers are in the proximal part. Using reamers diaphyses are prepared to the right size and grooves are prepared by using templates and 4 drills.

Conclusions: Due to the precision of the instruments and implants to an exactness of 0.05 mm the press fit is very taut and there is no danger the bone will be split. So far 31 patients have been provided with this stem and till now there have been no cases of rotation instability or loosening.

ID 123

Innovative surgical techniques for proximal tibia reconstruction in young sarcoma patients. 20 years experience

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Introduction: In the last 20 years, reconstructive techniques for child skeleton have dramatically improved. Proximal tibia (PT) represents the second most frequent location for children bone sarcoma and its reconstruction has challenged surgeons to search for innovative solutions. The authors reviewed their experience in children PT reconstruction focusing on new techniques used in the last decade.

Material and Methods: Functional and radiographic evolution was analyzed in a consecutive series of 102 children from 6 to 14 y/o (mean 11 yrs), surgically treated by PT resection and reconstruction for bone sarcomas (86 osteosarcoma, 13 Ewing's, 3 MFH) in the period 1982-2005. Surgical reconstructions differed along the years. In the first phase (1982-1993) 25 knee arthrodeses (AR) and 17 modular megaprotheses (MP) played the major role, while before 1994 only 7 PT tumors were removed by an intercalary PT resection through intraepiphyseal osteotomy. Osteoarticular allografts (OA) were used in 12 cases from 1991 to 1997. In the second phase (1994-2005) modular knee MP were used in 8 patients while allograft prosthetic composites were implanted in 19 patients with two technical variants: a rotating hinged knee prosthesis, cemented into a PT allograft with a long uncemented stem in the residual tibia (APC1), was used in 7 patients over age 12, while from 1997, in 12 young children (age 6-12 yrs), osteoarticular reconstruction was obtained by resurfacing a PT allograft with the tibial component of an unconstrained knee prosthesis (APC2). In the same period no AR was performed, while 15 PT tumors were removed through intraepiphyseal osteotomy and reconstructed by massive allografts associated with vascularized fibula autografts (MA/VA).

Results: At mean follow-up of 77 months, 68 patients are alive; but 42 (62%) had further surgery related to the primary implant. In long-term survivors, the percentage of surgical revision was 80% in OA, 75% in MP, 66% in APC1, 50% in AR,

40% in MA/VA and 33% in APC2. Excellent functional results were reached only in intercalary PT reconstruction by MA/VA (53%) and in APC2 (22%). Fair or Poor results were seen in 80% of AR, 70% of OA, 58% of MP, 50% of APC1, 22% of APC2 and 19% of MA/VA.

Conclusions: This series underlines the difficulty in achieving a durable reconstruction in young sarcoma patients. Resurfacing of OA and intercalary reconstruction with intraepiphyseal resection currently represent the best available options for PT reconstruction in children.

ID 165

Ankle arthrodesis with bone grafts in tumor surgery

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Introduction: Ankle arthrodesis is considered a valid reconstructive option after bone tumor resection of the distal tibia, distal fibula and of the talus. The purpose of the present study was the review of author's experience in ankle arthrodesis for bone tumors with the employ of bone grafts.

Material and Methods: Over the last 15 years, 17 ankle arthrodesis were performed in author's Institution for oncological pathologies. Twelve patients had a malignant tumor (3 osteosarcoma, 2 fibrosarcomas, 1 Ewing sarcoma, 1 emangiоendotelioma, 1 condrosarcoma, 1 pleomorphic sarcoma, 1 adamantinoma and 2 metastases from renal carcinoma) and 5 patients had a benign tumor (4 giant cell tumors, 1 condroblastoma). In 13 cases the tumor involved the distal tibia, in 2 cases the distal fibula and in 2 cases the talus. In 15 patients we performed a tibiotalar arthrodesis and in 2 patients (tumors of the talus) a tibiocalcaneal arthrodesis. Average age at the time of surgery was 41 years (4 - 75). The bone defect after resection was reconstructed with: cortical structural autografts from controlateral tibia and autologous bone chips from iliac crest in 5 patients; cortical structural autografts from controlateral tibia + cortical structural allografts + autologous bone chips from iliac crest in 2 patients; cortical structural allografts + autologous bone chips from iliac crest in 2 patients; structural autografts in 4 patients; autogenous vascularized fibula in 4 patient with cortical allograft in 3 cases and autograft in 1 case. Stabilization was obtained by intramedullary anterograde nailing in 8 patients, plate in 2, two or multiple screws in 7 cases.

Results: Three patients died before this review (1, 1.5, 7 years after surgery: 1 Ewing sarcoma, 2 patients with renal metastases). Follow-up for alive patients ranged from 14 to 146 months (average 53). Two local recurrences were observed, in a Ewing sarcoma in 1 case and in a giant cell tumor in 1 case. One patient is alive with lung metastases but no signs of local recurrence. In all patients but one the arthrodesis healed successfully. In one case a deep infection occurred (with wound dehiscence) and the arthrodesis did not heal. Complications included 1 deep infection, 1 superficial infection of the donor site (controlateral leg) and 1 fracture of the controlateral tibia (donor site of cortical autograft) treated with plaster cast. Three patients underwent a secondary surgical procedure: two partial hardware removals and one myocutaneous sural flap.

Conclusions: The low rate of local recurrence (1/5 in benign tumors and 1/12 in malignant tumors) and the high percentage of bone union (16 out of 17) together with the satisfactory functional outcome showed that ankle arthrodesis with bone grafts can be an oncologically safe and a mechanically successful procedure in bone tumor surgery.

ID 23

Investigation regarding the tribological behavior of the new inverse MUTARS® humerus tumorendoprosthesis

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Introduction: For the improvement of the functional results after resection of malignant bone tumors and reconstruction with an endoprosthesis, the Mutars inverse humerus prosthesis was developed. A significant feature of this prosthesis is a humeral concave titanium-niobium-coated articular surface which articulates against a convex glenosphere of polyethylene. The polyethylene of the glenosphere should serve as a shock absorber and avoid loosening in case of the mostly youthful patients. Tribological investigations were necessary in order to justify the employment of the new prosthesis.

Material and Methods: The investigation was carried out with a test device consisting of a slide table, an oscillating crank, an electromechanical drive and a thermostat. A simulation of the inflection, abduction, longitudinal displacement and axial load was implemented. Bovine serum solution, which consists of calf serum and bidistilled water, was employed as a testing medium. The protein content of the solution is 20 g/l (+/-2g/l). The number of cycles implemented was 5x10⁶ cycles.

Results: After the cyclical loading no visible damages could be identified on the surfaces. A mass reduction of 172 mg was determined on the glenoid. A mean abrasion rate of 28 mg/10⁶ cycles was calculated in accordance with ISO 14243. A height reduction of 0.3 mm was determined on the glenoid. In the roughness measurement, the mean roughness values at the shoulder head were 0.035 mm and on the glenosphere 0.031 mm.

Conclusions: In conclusion, the investigation carried out justifies the clinical use of the new shoulder endoprosthesis.

ID 31

Epiphysial sparing tumor resections for malignant tumors in growing children

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Introduction: Epiphysial sparing tumor resections have been promoted by the Pamplona group (Canadell, San Julian) using growth plate (physical) distraction. We have used trans-epiphysial resections and physical distraction for joint sparing resections in malignant metaphysial malignant tumors.

Material and Methods: In 8 children with open physes (2 Ewing sarcomas, 7 osteosarcomas [2 locations in one patient]) joint sparing resections have been performed either using physical distrac-

tion (2 cases) or transepiphyseal resections (6 cases) were performed. For reconstruction of the defect allograft interpositions (n=3), free microvascular fibular transplants (n=4) and a composite of allograft + fibula (n=1) were used. 5 distal femoral resections and 4 proximal tibial reconstructions were performed. Age at treatment was between 6 and 16 years, average 11.9 years.

Results: All patients remained free of local recurrence at 0.7 to 8 years f/u (average 3.3 yrs). Reconstruction failed due to infection at 4 years f/u in one patient, who had an allograft reconstruction and postoperative irradiation; this was salvaged by shortening of the lower leg. The other reconstructions continue to function well at an average f/u of 3 yrs. Leg shortening of 6 cm was corrected in the initially 6 yr old patient by callus distraction through its retained bone at the age of 14 years.

Conclusions: In metaphyseal malignant bone tumors in selected patients joint sparing resections can be performed when the tumor is reaching but not crossing the physis. Criteria for defining if the epiphysis is spared from tumor invasion must further be clarified by improved imaging techniques. Thus except shortening due to loss of the physis full biologic recovery with preservation of the joint can be achieved.

ID 113

Total femur prosthetic reconstruction: the Rizzoli Institute experience

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Introduction: Purpose of this study was to review the Rizzoli experience with total femur prosthetic reconstruction.

Material and Methods: From a series of 896 megaprotheses of the lower limb after resection for bone tumors treated at the Rizzoli between 1983 and 2004, 25 cases of total femur prosthetic reconstructions performed between September 1987 and June 2004 were studied. There were 15 males and 10 females, ranging in age from 7 to 62 years. Minimum time elapsed from total femur reconstruction was 24 months, with an average of 10 years and a maximum of 18 years. Average oncologic follow up was 66 months (5 - 215 mos.) and the average follow up of prosthetic reconstruction was 52 mos. Total femur prostheses included 4 Kotz 1 type, 20 HMRS prostheses (1 rotating hinge and 1 expandable), 1 GMRS prosthesis. These were 19 primary reconstructions and 6 secondary in revisions of 3 distal femur prostheses, 1 vascularized fibula, 1 intralesional excision. Histological diagnosis included 15 osteosarcomas, 7 Ewing's sarcomas, 1 angiosarcoma, 1 chondrosarcoma and 1 Echinococcosis. Surgical margins of the 24 tumors were wide in 23 and wide/contaminated in 1. For soft tissue reinsertion to the prosthesis different techniques were used: polyethylene plate in 5 cases, ETA in 3, Dall Miles in 1, direct reinsertion to the prosthesis and/or suture to the fascia lata in 16 cases. Usually postoperative immobilization in cast was used for 3-4 weeks and a brace for 2 more months. All patients were routinely followed in the outpatient clinic and data were obtained from

clinical charts. All imaging studies were reviewed and complications analyzed. Functional results were assessed according to the MSTTS functional evaluation system and rated excellent with a function scored over 75% of normal function, good between 51% and 75%, fair between 26% and 50% and poor below 25%.

Results: Oncologic results of 24 tumors showed 11 pts. continuously disease free and NED at an average follow up of 111 months (9 - 215 mos.), 2 pts. AWD at 20 and 32 months respectively, 11 pts. DWD at an average of 24 months (6 - 66 mos.). Complications observed included 1 infection, 3 wound healing problems requiring surgical revision, 3 cases of hip dislocation surgically treated, 1 ETA detachment and 1 trochanteric bone sleeve disinsertion. In 1 pt. a post-traumatic periprosthetic fracture occurred. Functional results were evaluated in 20 cases, while 5 pts. with a prosthetic follow up of less than 6 months were not evaluable. According to the MSTTS System results were excellent in 20%, good in 65% and fair in 15% of pts.

Conclusions: Total femur prosthetic reconstruction has selected indications. In the reported series this techniques was effective in primary reconstructions as well as in salvage procedures of failed previous reconstructions. Complication rate was relatively low and functional results were satisfactory in most pts.

ID 13

Total femoral replacement – outcomes in oncological patients

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Introduction: We have assessed the oncological and functional outcomes in patients who have undergone total femoral replacement with a hip and knee replacement after tumour excision.

Material and Methods: Patients with a total femoral replacement were identified from an oncology database.

Results: We identified 36 patients from a tumour database who underwent total femoral replacement either as a primary procedure (19 patients) or following conversion of a distal or proximal replacement (8 patients) or after inadvertent nailing of a pathological fracture subsequently found to be a sarcoma (7 patients). The age range of the patients was from 13 to 84 and the most common diagnosis was osteosarcoma. The median survival for the 10 patients with metastases at diagnosis was 9 months but for those patients with non metastatic sarcomas the survival was 57% at 20 years following the procedure. The most common complication was dislocation of the hip in five patients. Two patients had amputations for local recurrence and infection and three had complete revisions – one for stem breakage, one for recurrent dislocation, one for loosening. The overall survival of the implants without revision of any component was 89% at 10yrs and 71% at 20 years. The average functional score was 73%.

Conclusions: Total femoral replacement is a major surgical procedure which fortunately is rarely required. It produces surprisingly good functional results with an acceptable risk of revision.

ID 93

Preoperative irradiation or no irradiation in the local treatment of Ewing sarcoma

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Introduction: Local wide excision subsequent to induction chemotherapy with or without preoperative irradiation gained popularity in the local control of Ewing's Sarcoma of bones in the last decade. Surgical removal of the tumor provides not only the local control of the tumor but also prevents the late recurrence that was seen in the patients treated by local irradiation without surgery. The determination of surgical margin is controversial because the soft tissue extension of the tumor shrinks after induction chemotherapy. Preoperative irradiation could be efficient in diminishing rate of local recurrence by sterilizing the reactive zone so that enabling the surgeon to remove less soft tissue with relatively sufficient tumor control.

Material and Methods: 38 patients with Ewing's Sarcoma 10 females, 28 males with a mean age of 19.7 (4-55) were treated in our institution by chemotherapy and local wide excision in last 15 years. 17 of these patients received preoperative radiation. Reconstruction was obtained by endoprosthesis in 12, composite prosthesis in 3, allograft in 13 patients, 10 patients received resection only. 10 patients were operated by the single surgeon. Chemotherapy protocol was a modification of VACA with addition of iphosphamide and etoposide. Mean followup was 34,7 months (12-98).

Results: 23 patients were NED, 2 were AWD (lung metastasis) and 13 patients were DOD in mean 34 months followup. Overall survival rate was 65.7 percent, estimated 5 years survival according to Kaplan-Mayer. Event free survival was 58% (10/17 patients) in preoperative irradiation group and it was slightly better 61% (13/21 patients) in the patients who received chemotherapy before the operation. Regarding complications: Local recurrence was 5.8 percent (1/17) in preoperatively irradiated patients, 9.6 percent (2/21) in the patients received chemotherapy before the operation. Infection rate was 23.5 percent (4/17) and 5.8 percent (1/17), delayed wound healing was 52.9 percent (9/17) and 14.3 percent (3/21) in both groups respectively. Regarding distant metastasis 41.2 percent (7/17) lung metastasis and no skeletal metastasis versus 38 percent (8/21) lung metastasis and 14.3 percent (3/21) skeletal metastasis were observed.

Conclusions: Preoperative radiation was applied when the tumor's response to the induction chemotherapy was not sufficient, e.g less soft tissue component shrinkage or progression under chemotherapy. Eventhough the rate of local complications such as infection which resulted in loss of allgraft in 2 of 4 infected cases in the preoperatively irradiated patients; local recurrence was lower than the chemotherapy and surgery group in these relatively less sensitive tumors to the systemic therapy. Event free survival and other complications were similar in both groups. In conclusion response to the induction chemotherapy proposes the need of external irradiation. Perioperative infection prophylaxis and meticu-

lous wound care could decrease the complication rate except late fibrosis and growth plate arrest. Growing prosthesis and limb lengthening might be usefull to solve deleterious effects of irradiation in skletally immature patients.

ID 76

Reconstruction following segmental diaphyseal resection of lower limb malignant bone tumours in children

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Introduction: Reconstruction of long bones diaphysis in the lower limb yields specific issues in children. Long lasting reconstruction and preservation of the potential for growth are necessary. We present 14 reconstructions of the diaphysis of femurs and tibias with autologous bone grafting.

Material and Methods: Fourteen children with a mean age of 11 (range 7-16) had resection for a primary malignant bone tumour. There were 8 osteosarcomas and 6 Ewing sarcomas. All patients had preoperative chemotherapy and 2 had adjuvant radiotherapy. The median length of resection was 16 cm (range 11 to 26). Mechanical reconstruction was done using a plate in 4 cases, a nail in 6, an external fixator in 1 and mixed devices in 3. Biologic reconstruction (osseous) was done using strut and corticocancellous autografts in 11 patients, a free vascularised fibular autograft in 2 and a bone transport in 1. Two patients had delayed bone grafting based on the principle of the induced membrane.

Results: The median follow-up was 66 months (range 12 to 209). At last review, all patients were alive. All patients required one or more reoperations to treat mechanical or infectious complications; the median number of reoperations was 2 (range 1 to 15). Secondary bone grafting was necessary in 10 patients. Bone consolidation was obtained in all patients. The median time to free full weight bearing was 9 months (range 1 to 24).

Conclusions: Reconstruction of diaphyseal resection of long bones in the lower limb in children can be obtained through very different procedures. However, each of these procedures needs some technical experience in order to minimise complications. As secondary corticocancellous bone grafting is very likely, we propose a two-stage reconstruction with delayed corticocancellous bone grafting based on the principle of the induced membrane which appears to be an interesting procedure.

ID 170

Reconstructive surgery in bone and soft tissue tumors of extremities

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The use of plastic and reconstructive surgery makes an opportunity preservation of extremity with malignant bone/joint and soft tissue tumor. The large involvement of muscles, bones, magistral vessels and nerves usually was before an absolute indication for amputative surgery. The trends in reconstructive surgery makes possible carrying out an extensi-

ve wide excision of tumor and all involved tissues with subsequent reconstruction of created tissue defects. It is now possible to combine different methods of plasty (bone/joint and skin/soft tissue plasty). 626 patients with bone and soft tissue tumors were operated in the Republic Center of Bone Pathology (Republic of Armenia) during the period since 1998 to 2006. In 426 cases different methods of bone and soft tissue plasty was applied (using auto-, allografts and different types of implants). All the types of bone and soft tissue plasty are compatible with other components of chemo- and radiotherapy. The research of remote clinical results demonstrate that wide resections with simultaneous reconstruction of tissue defects increase 3-year recurrence-free rate both in bone and soft tissue sarcoma. The same approach is applicable in locally invasive tumors (lytic form of giant cell tumors of bones, aggressive neurofibromatosis, etc). Complications rate was very low (approximately 2 %), and usually complications occurred where inadequate surgery in general clinic was performed, often under local anesthesia, which is contraindicated in treatment of this contingent of patients. The main criteria of preservation is a functional status of the operated extremity. In our opinion the use of plastic and reconstructive surgery enables to increase the arsenal of surgical method in treatment of tumors of locomotor apparatus. We consider that all patients with tumors of bones and soft tissues should be treated only in specialized oncologic clinics where adequate combined and complex treatment according to existing protocols of treatment may be carried out.

ID 242**Indication for surgical treatment of metastatic lesions of spine**

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Introduction: Metastatic lesions of the skeleton are found in 50 - 70% of patients who died from malignant tumors, of which 40% of metastases localize in the spine. From 5 to 10% of all cancer patients suffer from compression of the spinal cord. The purpose was to determine the indications for surgical treatment of the spinal metastatic tumors.

Material and Methods: From 1995 to 2005, in the General Oncology department, 70 patients underwent surgery for metastatic involvement of the spine. The mean age of patients was 55,9 years (ranged from 34 to 69), 41 patients were male and 29 – female. The most frequent source of metastases to vertebral column were renal cancer – in 19 cases, breast cancer – in 10, lung cancer – in 8, from unknown primary origin – in 7, prostate cancer – in 5, and colorectal cancer, bone sarcomas, lymphomas and myelomas and etc. – in 21 patients. The level of vertebral column involvement was as follows: cervical spine – in 2 patients, thoracic spine – in 39, lumbar spine – in 26 and sacral spine – in 3 patients. All patients complained of pain syndrome and/or neurological deficit. Before treatment all patients were evaluated by special scales: Watkins Scale, VAS, Frankel Scale. We also used Tomita Scale and Tokuhashi Prognostic System in choosing surgical tactic.

Results: Only decompressive surgery was performed to 47 patients, with fusion – to 23 patients. Moderate decrease of pain syndrome was seen in 40% patients. Regression of neurological

deficit occurred in 30%, and quality of life improved in 70% patients. The most often complication was intraoperative bleeding especially in renal cancer metastases; infectious complications occurred in 4 patients (in 2 cases – meningitis and in 2 – deep wound infection of transpedicular spinal device). In the postoperative period, neurological deterioration happened in 2 cases which then improved, 2 patients died intraoperatively.

Conclusions: treatment of patients with metastatic lesions of the spine is multidisciplinary problem demanding the complex approach to determining the tactic of surgical treatment.

ID 52**The RPS System in metastatic lesions of the proximal femur**

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Introduction: The proximal femur is, among all sites for bone metastases, one of those most often requiring a surgical treatment. This is because it is frequently involved early in the metastatic stage, when the performance-status of the patient is still very good and the pain provoked by a lytic lesion or a pathologic fracture and the functional disability associated can severely jeopardize the patient's quality of life. Considering the increased life-expectancy of metastatic breast cancer, the diffuse medical-awareness of general population and the increasing request for effective palliative treatment, the number of potential candidates is very high. Resection and modular prostheses is the most adequate option for most of these patients but the high cost of the systems used for primary tumors would make it impractical and financially disruptive for any institution to use them for metastatic patients. It is therefore important to have available a system combining the ability to fulfil the requirements of these patients at a cost which our administrations can accept.

Material and Methods: We started using the RPS modular system in 1982 and, through December 2003, we have made 120 implants including: metastatic lesions (91%), salvage procedures for non-tumor patients in poor medical condition (6%) and primary tumors in patients with advanced disease and a short life-expectancy (3%).

Results: Prostheses survival was 97%; only 50% of the patients were alive 18 months after surgery but 18% are still alive after 8 years.

Conclusions: With its features combining adequate mechanical characteristics, easy and quick surgical technique (surgical time ranges 45-90 minutes), low complication rate and a cost which is lower than the more complex systems used for primary tumors, the RPS system has demonstrated to be the best option for these patients.

ID 94**The use of massive endoprosthesis for the treatment of bone metastases**

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Introduction: We report a series of 58 patients with metastatic bone disease treated with resection and endoprosthetic

reconstruction over a 5 year period at our institution. The recent advances in adjuvant and neoadjuvant therapy in cancer treatment has resulted in improved prognosis of patients with bone metastases. Most patients who have either an actual or impending pathological fracture should have operative stabilization or reconstruction. Endoprosthetic reconstructions are indicated in patients with extensive bone loss, failed conventional reconstructions, and selected isolated metastases.

Material and Methods: We identified all patients who were diagnosed with metastatic disease to bone between 1999 to 2003. A review of all histological reports in this period was carried out to identify these patients.

Results: 171 patients were diagnosed with bone metastases. Metastatic breast and renal cancer accounted for 47% of the lesions. 58 patients with isolated bone metastasis to the appendicular skeleton had an endoprosthetic reconstruction. There were 28 males and 30 females. 11 patients had lesions in the upper extremity and 47 patients had lesions in the lower extremity. The mean age at presentation was 62 years (range 24 to 88). At the time of writing, 19 patients were still alive, 34 patients had died and 5 were lost to follow-up. Patients were followed up and evaluated using the Musculoskeletal Society Tumour Score (MSTS) and the Toronto Extremity Salvage Score. The mean MSTS was 73% and TESS was 71%. Mean follow-up was 54.6 months (range 24 to 78). Complications included 6 wound infections, 1 aseptic loosening, 6 dislocations, 1 subluxation, and 1 prosthesis rotated requiring open repositioning.

Conclusions: We conclude that endoprosthetic replacement for the treatment of isolated bone metastases can be a useful alternative reconstruction in selected cases and achieves the aims of restoring function, allowing early weight bearing and alleviating pain.

ID 241

Different reconstructive methods in musculoskeletal oncology
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Introduction: Currently there are a lot of various reconstructive techniques for defects after resection of locally advanced musculoskeletal tumors. There is no consensus about the most appropriate reconstructive method in each individual case. In this study we defined our strategy in using of two main methods: local flap transfer or free flaps reconstruction.

Material and Methods: Our strategy based on individualized approach. The choice of reconstructive method depends on size of defect, localization, components of tissue to be reconstructed, functional and cosmetic aspects. Short term functional and cosmetic results and the complication rate were analyzed.

Results: Since 1998 168 patients with local advanced tumors were operated. In 90 patients we used regional flap transfer (Group 1). More often we used muscular and musculocutaneous flaps (68). In proximal femur tumor the standard method was recto-abdominal flap transfer. For reconstruction of extensive tissue defect in shoulder TDL flap was routinely used. The transfer of pedicled fibula was performed in 5 patients with large diafisial tibia defects. In 17 patients we

used combined bone-muscle-cutaneous flap transfer mainly for mandible reconstruction. These flaps consist of pectoralis major muscle with rib or trapezius muscle with spinae scapulae. In 78 cases (Group 2) we used free microvascular flap for defect reconstruction. There were 21 bone transplants, 35 muscle-cutaneous flaps and 22 combined bone-muscle-cutaneous flaps. We choose microvascular methods in case when local transfer is impossible or will not provide good functional and cosmetic results. Good functional and cosmetic results were obtained in 157 patients (92%). In the Group 1, there were 6 marginal skin necrosis which were managed conservatively. In Group 2 we observed 5 patients with flap necrosis. Repeated surgical procedures were performed in these cases.

Conclusions: Using of individualized approaches to choose the optimal reconstructive method allows to achieve good functional and cosmetic results with low rate of postoperative complication.

ID 120

Pelvic endoprostheses – biomechanical aspects and surgical technique

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Introduction: Large periacetabular tumor resections remain a challenge for a stable pelvic circle reconstruction with an endoprosthesis. This requires a technically and biomechanically good model.

Material and Methods: We refer our first two patients with a short term follow up after implantation of a custom made pelvic endoprosthesis Beznoska. Fifteen year old boy with pelvic osteosarcoma involving region I-IV. After a transsacral resection in 7/01 an endoprosthesis, fixed to the sacrum and short parts of pubic and ischial bones, was implanted in 4/03. Fifty seven year old man with a pelvic chondrosarcoma in region I-III received an endoprosthesis fixed to the remaining iliac wing and short parts of pubic and ischial bones in 11/04.

Results: Both models consisted of multiple parts that enabled a relatively easy component fixation to pelvis and only a slightly difficult assembling by gradual tightening of the screws. Both patients were ambulatory with two crutches from day 10 after surgery. One year after surgery they walked with one below arm crutch. First patient had a peroneal paresis after initial surgery which altered his gait. He also had repeated aseptic fluid accumulation around the endoprosthesis due to muscle irritation. Nevertheless, the sacral screws didn't fracture even with signs of aseptic loosening towards the sacrum. The second patient is without problems one year after surgery.

Conclusions: Stress-loading of the pelvic endoprostheses must be directed to the lower part of the sacroiliac joint especially when it is fixed directly to the sacrum, where it must be oblique in the frontal plane. The endoprosthesis must show some elasticity to enable "axial" loading to the sacrum and pelvic circle. The material must be smooth in order to prevent aseptic fluid production. The pelvic endoprosthesis should consist of several components to enable easy implantation, firm fixation and adequate load transfer to the adjacent bone.

ID 114

Desarthrodesis and prosthetic reconstruction of the knee after bone tumors resection: long term results*P. Ruggieri¹, G. Bosco¹, D. Donati¹, M. Mercuri¹, E. Botello²*¹ Department of Orthopedics, University of Bologna and Istituto Rizzoli, Bologna, Italy² Department of Orthopedics of the Pontificia Universidad Catolica de Chile, Santiago, Chile

Introduction: Purpose of this study was to review the Rizzoli experience with prosthetic reconstruction of the knee as a salvage procedure of failed arthrodesis performed after resection of bone tumors.

Material and Methods: Fifteen patients were operated of desarthrodesis and knee megaprosthesis at the Rizzoli between December 1983 and October 1995. There were 7 males and 6 females, ranging in age from 13 to 36 years. In all cases a resection of a malignant bone tumor of the distal femur had been previously performed and reconstruction obtained with a knee arthrodesis using Kuntscher rod and cement. Histological diagnosis was high grade osteosarcoma in 12 cases, low grade parosteal osteosarcoma in 1, malignant fibrous histiocytoma in 2. Surgical margins of resection were wide in 11 cases, wide/contaminated in 1, marginal in 2 and intralesional in 1. Causes of revision and desarthrodesis were breakage of the rod in 10 cases and infection in 5 cases. Knee megaprotheses implanted were 13 Kotz 1 type and 2 HMRS. Time elapsed from first surgery to desarthrodesis ranged from 6 to 124 mos (average 46 months). Minimum time elapsed from desarthrodesis and prosthetic reconstruction was 10 years, with an average time of 18.5 years and a maximum of 22.5 years. Average oncologic follow up was 19 years (1.5 - 23 yrs.) and the average follow up of prosthetic reconstruction was 14 years. All patients were routinely followed in the outpatient clinic and data were obtained from clinical charts. All imaging studies were reviewed and complications analyzed. Functional results were assessed according to the MSTS functional evaluation system and rated excellent with a function scored over 75% of normal function, good between 51% and 75%, fair between 26% and 50% and poor below 25%.

Results: Oncologic results showed 12 pts. continuously disease free and NED at an average follow up of 20 years (204 - 288 mos.), 3 pts. DWD at 21, 197 and 259 months respectively (in these 3 pts. margins were intralesional, marginal and wide respectively). Complications observed included 4 infections (3 had a previous infection of the arthrodesis), 1 femoral stem loosening, 2 tibial component loosening, 1 breakage of the tibial joint hinge. Four pts. had revision for wear of polyethylene components (2 pts. had 2 revisions). Functional results were evaluated in all 15 cases according to the MSTS system and were excellent in 40%, good in 33% and fair in 27% of the pts.

Conclusions: Desarthrodesis and prosthetic reconstruction of the knee has selected indications. This technique achieved satisfactory results in most cases although the time elapsed from first surgery could certainly negatively affect muscle function and strength. The posterior hinge of the prosthetic knee joint allows stabilization in hyperextension with minimum muscle strength.

POSTER SESSION

ID 212

Organpreserving treatment of bone sarcomas*A.N. Amiraslanov, A.A. Amiraslanov, E.E. Ibragimov, N.V. Kasimov*

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Background: Organ-preserving treatment was proven efficient in patients with bone sarcomas.

Materials and Methods: A total of 157 patients (106 males and 51 females) received organ-preserving surgical treatment for primary bone malignancies. Most patients (132, 84.1%) were aged 16 to 25 years. Case distribution with respect to diagnosis was as follows: 82 (52.2%) osteogenic sarcomas, 25 (15.9%) chondrosarcomas of various differentiation, 10 (6.4%) parosteal sarcomas, 28 (17.8%) osteoblastoclastomas, 12 (7.6%) malignant fibrous histiocytomas. The following surgical procedures were performed: 83 (52.9%) distal resections of the femur and proximal resections of the tibia with knee joint implant, 24 (15.2%) proximal resections of the humerus with shoulder joint implant, 21 (13.4%) interscapulothoracic resections, 25 (15.9%) resections of flat bones and the fibula, 4 (2.6%) segmental resection of bones with Ilizarov's device. Patients with osteogenic sarcoma, malignant fibrous histiocytoma and poorly-differentiated chondrosarcoma (n=108) received multi-modality treatment, the remaining patients (n=49) were given surgery alone.

Results: Of the patients receiving joint implant 7 (5.4%) developed pyoseptic complications, 2 (1.3%) had hematomas, 6 (3.8%) implant pedicle fracture and other orthopedic events, 8 (5.1%) developed local recurrence. Support ability of the lower extremity was restored in all cases. 90% of patients could move without support.

Conclusions: The 3-year survival in the total patient group was $59.1 \pm 2.1\%$, i.e. higher than after mutilating surgery ($42.2 \pm 2.4\%$).

ID 86

Outcome after extraarticular tumour resection of the knee*C. Gebert, J. Harde, B. Leidinger, H. Ahrens, A. Streitbürger, W. Winkelmann, H. Gosheger*

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Introduction: Suspicion of an intraarticular tumour involvement necessitates to an extraarticular tumour resection. Therefore the resulting bone and soft tissue defect is more extensive in comparison to intraarticular resection. The aim of this study was to examine the complication rate and functional outcome after wide tumour resection and reconstruction with a MUTARS tumour endoprosthesis.

Material and Methods: In this retrospective study 145 patients (67 female, 78 male) underwent knee reconstruction with a MUTARS® prosthesis after resection of a primary bone or soft tissue sarcoma (osteosarcoma 99, Ewing's sarcoma 13, chondrosarcoma 10, periosteal osteosarcoma 5, MFH 13, other 5). The tumour was located in the distal femur in 103 cases and in the proximal tibia in 42 cases. An extraarticular resection was done in 18 cases because of radiographically suspected intraarticular tumor extension. The mean follow-up

was 39.6 months (min. 6 months, max. 92 months). Peri- and postoperative complications were recorded; the postoperative functional status of the patients was categorized based on the MSTS functional evaluation system.

Results: We observed a significantly higher complication rate due to deep infection in extraarticular resection, but there was no significant difference in prosthetic related problems (aseptic loosening $p=0.10$, PE-wear $p=0.23$) in between both groups. The mean MSTS score was 24.2 for intraarticular and 21.9 for extraarticular resection. The 5-year survival prosthetic survival is estimated for intraarticular resection with 70.1% and for extraarticular resection with 33.3 ($p<0.04$). The goal of long term salvaging the diseased limb and preserving ambulatory capacity was successfully gained in both groups with an estimated 10-years limb survival of 93.6% (extraarticular resection) vs. 81.3% (intraarticular resection). The main reason for secondary amputation was deep infection in both groups.

Conclusions: Extraarticular resection of the knee joint with en bloc resection arthroectomy by splitting the patella is an oncological safe procedure. However, complications are more frequent than in the case of intraarticular resection. In the case of infection there is a high rate of secondary amputation. For young patients or in case of critical soft tissue conditions biological reconstructions (for example arthrodesis or rotationplasty) should be still considered as an alternative surgical option.

ID 82

The application of total femoral replacement in oncological orthopaedics – preliminary report

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Introduction: Indications for implantation of prostheses including 2 adjacent joints are currently very narrow and include tumours affecting more than 2/3 of a long bone, multifocal tumours and to a lesser extent revision procedures in cases of massive bone destruction. The purpose of this study was to review the authors experience in prosthetic reconstruction of the lower limb.

Material and Methods: The authors present the outcomes of 7 patients treated at the W. Dega Hospital in 2004-2006. All patients underwent total femoral replacement due to the neoplastic disease. Indications comprised: 5 cases of osteosarcoma, 1 Ewing's sarcoma and 1 case of aseptic loosening of the primary hip endoprosthesis with periprosthetic fracture. In 6 cases the hip joint, femur and knee joint were removed, in 1 case additionally resection of the fibula was performed. 4 Finn, 2 OSS and 1 Mutars endoprostheses were implanted.

Results: In 1 case deep venous thrombosis appeared 4 weeks postop. Response to vascular therapy was swift, no symptoms were noted after 2 weeks. All patients are currently at outpatient follow-up without any local or distant complications.

Conclusions: Although technically demanding and requiring adequate experience of the surgeon, megaprotheses are an efficient limb sparing procedure. In neoplastic disease with massive bone involvement this procedure allows for restoration of segmental skeletal defects and return to normal limb

function. In revision procedures indications for megaprotheses implantation are mainly massive bone destruction without possibility of standard revision procedure. In authors opinion megaprotheses are very effective method of tumour treatment, which allow limb salvage and excellent functional outcomes in the majority of patients.

ID 14

Endoprosthetic replacements in the 'older old'

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Introduction: The population of the UK is getting older. Patients over the age of 80 (the older old) are increasingly presenting with musculoskeletal tumours that require major surgery. We have investigated the success or otherwise of endoprosthetic replacements in this population.

Material and Methods: We looked at an oncological database to identify patients over the age of 80 who had an endoprosthetic replacement after tumour excision. This was supplemented with referral back to the original patient records.

Results: 17 patients over the age of 80 had an endoprosthesis over the past 10 years. The main indication was for metastatic disease (9 patients) but 6 had primary malignant bone tumours. The most common site was the distal femur in 9 followed by the proximal femur in 5. Most of the patients had associated co-morbidity (12 were ASA 2 or 3). There were no perioperative deaths but 2 patients had early complications with one having a paralytic ileus and one a chest infection. The median survival of the patients was 2 years with death being due to progressive metastases in most. 3 had late complications to do with the prosthesis including one infection in a proximal tibial replacement and a late dislocation at 2 years in a proximal femoral replacement. Two patients developed local recurrence treated by local excision and radiotherapy. There were no amputations or revisions.

Conclusions: Endoprosthetic replacements have a useful role to play in the surgical management of elderly patients. Although they have significant comorbidity most do well. Functional results are less good than in the younger population but most patients regain their independence and are free of pain.

ID 132

Total hip arthroplasty after previous pelvic radiotherapy

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Introduction: 43 patients who underwent primary total hip replacement after previous radiotherapy were studied to determine the risks of complications and implant survival after surgery.

Material and Methods: A retrospective review of operation notes, casenotes and in house oncology patient database with survival status cross referenced with patient's GP records.

Results: There were 28 males and 15 females. The mean age at the time of surgery was 59 years (16 to 84). Follow-up from the time of surgery to death or last review ranged from 2 to

120 months (mean 35 months). Time from previous radiotherapy to surgery was less than 12 months in 23 patients, 12-24 months in 16 and >24 months in 4 patients. The indication for radiotherapy was malignant disease in all the patients but 11 patients had osteonecrosis with no viable tumour at the time of surgery while 32 patients had residual malignancy. 11 the patients but one had cemented prostheses associated with acetabular reinforcement in 14 and long stems in 8 patients. There was no in hospital mortality. Complications are frequent particularly delayed wound healing, superficial infection and chronic pain occurring in 28%, 19% and 26% respectively. Deep sepsis occurred in 2% and dislocation in 7%. Cumulative survival of patients after surgery was 57% at 5 years. Cumulative survival of implant taking loosening as end point was 79% at 5 years. The 5-year implant survival was not statistically influenced by presence of concomitant acetabular disease (71% and 82% respectively), use of long or standard femoral stems (64% and 83% respectively) and whether residual tumour was present or not 78% and 80% respectively). Time elapsed between radiotherapy and surgery did not influence implant survival.

Conclusions: We conclude that total hip arthroplasty in patients with previous history of radiotherapy is fraught with significant risks of complications and failure.

ID 266

Hip joint stability in massive proximal femur endoprosthetic replacement

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Introduction: We studied a complex technique used to restore the muscles and the function in proximal femur reconstructive surgery and its impact in hip joint stability.

Material and Methods: Twelve patients had proximal femur excision and reconstruction with massive endoprosthesis. A modified Hardinge's surgical approach or Smith-Petersen was used. Hip abductors were detached from their insertion on greater trochanter and proximal femur was excised altogether with a muscle cuff within oncologically safe surgical margins; some muscles were detached from their insertion points. The femoral component of the prosthesis was positioned in neutral rotation, the acetabulum cup in increased anteversion and hip stability was checked. The gluteus medius was reattached on fascia lata, by the insertion of tensor fasciae latae with strong sutures.

Results: Hip joint was stable in all cases. Partial weight-bearing was permitted in a week if the patient had grade II hip abduction and good control of hip rotation; full weight bearing was permitted after scar tissue was developed, in about six weeks. There was no dislocation or clinical signs of hip joint instability.

Conclusions: Proximal femur excision and reconstruction with a massive endoprosthesis may lead to hip joint instability and dislocation due to detachment and excision of large muscle masses. Complex reconstruction of the remaining muscles aims in scar tissue formation, which holds the prosthesis firmly in its position. The surgeon should select an endoprosthesis of the proper dimensions in

order to resist longitudinal traction; the femoral component should be placed in neutral rotation to stabilize the hip and avoid dislocation.

ID 12

Difficult situations in limb-salvage for primary bone malignancy

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Limb-salvage for bone malignancy became almost the standard policy in most of the cases. The criteria of success of the strategy of preserving a functional limb in a living patient depends on many factors. The tools of early perfect diagnosis and identification of the prognostic factors are progressing. Adjuvant and neoadjuvant therapy are more promising with new drugs and different modalities of administration. Surgical techniques and improved modalities of reconstruction, whether metallurgic or biological are also solid pillars for the improved oncological and functional results. Still, in some situations, which is not uncommon, we are faced with problems which can affect the selection of the method of reconstruction modalities or even the outcome of limb-salvage concept. Late presentation, complicated cases, involvement of neurovascular bundle, unavailability of the proper reconstructive modalities are some of such problems. Though the last 15 years we came across a large number of such cases which are managed in the surgical orthopedic oncology unit, Mansoura University hospital, Egypt, the solutions we offer for such cases were conditioned by the possible calculated safety outcome. Temporary reconstruction using bone cement model intraoperatively proved to be effective in many situations. Concomitant vascular graft for excised main vessel, in limb-salvage is another solution. Extra corporeal irradiation and reimplantation of the excised segment with certain procedures to augment vascularity and assure taking of the implanted segment with the host bone gave encouraging results.

ID 17

The complete extralesional removal of the ankle joint for a malignant synovial tumor

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Introduction: The patient presented with a synovial process of the ankle joint which had been biopsied elsewhere. The pathologic examination of a large incisional biopsy showed the newly recognized entity of an acral myxoinflammatory fibroblastic sarcoma (inflammatory myxohyaline tumor of the lower extremities with virocytes and Reed-Sternberg similar cells), which according to the literature behaves locally aggressive and has the potential to metastasise and thus is considered a malignant neoplasia. So far the diagnosis always had been made in retrospect after resection and therefore no clear treatment concept is available.

Material and Methods: Case Report and Technique. The male patient was 12 years old at diagnosis. Standard X-Rays and Magnetic Resonance Imaging showed the process well

contained within the joint capsule. The distal tibial growth plate was open defining the margins around the tibia. Structures between the talar head and the navicular bone and the talo-calcaneal joint are also involved. A fully circumferential incision was performed at the malleolar level partially consisting of the Cincinnati incision for club foot release. All long flexor tendons were transected and pulled out of the retinaculum, which was resected en bloc with the tumor after carefully freeing the posterior tibial vessels and nerve and the anterior vessels. The tendo Achilles was transected for later resuturing. The ankle and subtalar joint were removed en bloc after K-wire marking and osteotomies through the distal tibial metaphysis, the calcaneum and between Chopart and Lisfranc joint lines. Osteosynthesis was performed with screws inserted from plantar and the navicular.

Results: At 30 months f/u the patient is free of recurrence. The bones have fused, osteosynthesis material is removed and the patient has undergone tibial lengthening by callus distraction one year after treatment of the tumor to correct the shortening (4cm) from the tumor resection.

Conclusions: It is technically possible to perform an extralesional resection of the upper ankle joint. The pathology is of interest as it was a rather recently recognized entity. Intra-articular malignancy is rare.

ID 26

Profilactic intramedullary nailing for monostotic fibrous dysplasia: mid-term results in 10 cases

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Introduction: Introduction: In the present study, 7 cases with monostotic fibrous dysplasia who have functional pain, active lesions (evaluated by radio-nucleid bone scanning) and pathological fractures risk, were treated by intramedullary nailing. We aimed prophylaxis for pathological fractures and relief of functional pain.

Material and Methods: Four of the cases had lesion in femoral diaphysis, two cases had lesion in humeral diaphysis, and the other one cases had lesion in tibial diaphysis. 5 of the cases were male and 2 of them were female with age mean of 24 (19-30) years. Mean follow-up period was 22 (18-32) months. All cases were treated with unreamed intramedullary nailing which can be inflated.

Results: We had good clinical results in all patients. We evaluated functional pain in accordance with visual analogue scale and relief of pain was clearly noticed at the end of two years. There was no radiological progression in lesions. Except one case, none of them had pathological fracture. One case who had a nondisplaced femoral fracture because of traffic accident, was treated conservatively. There was only acceptable nail bending in that case.

Conclusions: In the present study, we reviewed the usage of reamed intramedullary nailing in patients with fibrous dysplasia who have functional pain and pathological fracture risk. Our prophylactic nailing relieved functional pain, reduced the risk of fracture or prevented comminuted fractures during a trauma.

ID 169

Surgical treatment of pathologic fractures of long bones in primary and metastatic bone tumors

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Recently great attention is given in contemporary literature to bone metastatic involvement complicated by pathologic fracture. If ensuing adjuvant therapy is required, fixation of the fracture will help oncologic management of the patient. There are so-called "bone-seeking tumors" (cancer of the breast, lung, kidney, prostate, thyroid gland etc). Careful examination of these contingent of patients will help to operate them before fracture takes place. This approach will improve the oncologic prognosis and functional results of treatment. Treatment of pathologic fracture is specific depending on primary tumor and it's localization, involvement of visceral organs, individual prognosis of the disease, biologic peculiarities of the neoplastic process. Occurrence of the pathologic fracture makes impossible the conduction of the specific oncologic treatment. In our opinion, the approach to these patients should be individual. If patient's general condition is satisfactory, orthopedic fixation or bone replacement should be performed. This approach makes possible early mobilizing patient and allows conduction of the specific anti-tumor treatment in comfortable conditions. 75 patients with pathologic fractures of long bones were operated in the Republic Center of Bone Pathology (Republic of Armenia) during the period since 1998 to 2006. According to the Karnofsky scale patients' score rised from 30-40 to 70-80 (mean 62,3). In primary bone tumors occurrence of pathologic fractures usually is an absolute indication to ablative surgery. But in our opinion there are some chemo- and radiosensitive tumors (Ewing sarcoma and reticulosarcoma) where significant effect of neoadjuvant treatment may justify the performance of limb-saving operation in case of minimal initial displacement and complete resorption of soft tissue component.

ID 171

Replacement of large bone defects in surgical treatment of bone and joint malignant tumors

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The working out and application of the method of endoprosthetic replacement of large joints to clinical practice enables to improve the results of surgical treatment of bone and joints malignant tumor. The use of this method in onco-orthopedy is possible only after adaptation of the method to the peculiarities of this contingent of patients taking into consideration premorbid condition and presence of neoplastic process, as well as conservative treatment (chemo- and radiotherapy). The use of limb-saving surgery in general and endoprosthetic replacement in particular doesn't contradict with principles of radical excision of the tumor, making possible adequate removal of the tumor with subsequent replacement of bone defects, thus preserving functioning extre-

mity. 67 operations of massive replacement of bone and joint defects were performed in the Republic Center of Bone Pathology (Republic of Armenia) during the period since 1998 to 2006. The use of neoadjuvant and adjuvant chemotherapy doesn't worsen reparative condition of the bed of the resected tumor in case of minimal trauma of the operated tissues. Also we are making more precise the indications to these operations depending on individual biologic peculiarities of the neoplastic process, stage of the tumor and prognosis of the disease. The criteria of the assessment of functional status of the operated extremity are working out. In our opinion now one of the most actual problem is careful examination of the patient at high risk (patients suffering from so-called "bone-seeking cancer" – breast, lung, kidney cancer) for early detection of metastatic bone lesions those may lead to fracture in future if left untreated. It enables to operate them before fracture takes place. This approach will improve prognosis for these patients and functional results of operations.

ID 95**Distal tibial replacement for primary bone tumours**

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Introduction: The distal tibia is an uncommon site for primary malignant bone tumours and the treatment of choice for most patients is a below knee amputation. Patients who decline an amputation may be offered an endoprosthetic replacement.

Material and Methods: We report the clinical and functional outcome of limb salvage surgery and endoprosthetic reconstruction of the distal tibia and ankle joint in 5 patients. Over 25 years at our centre, 5 patients underwent distal tibial replacements.

Results: Two had osteosarcoma, one had a recurrence of Ewing's sarcoma, one had malignant fibrous histiocytoma, and one had an adamantinoma. The mean age was 37 years (range from 13 to 69 years). There were no tumour recurrences. Four patients developed complications with wound infection. Two of these resulted in below knee amputations. Average follow-up was 31.2 months with 1 patient lost to follow-up. Patients were evaluated using the Toronto Extremity Salvage Score (TESS) and the Musculoskeletal Tumour Society (MSTS) score. Patients who underwent a distal tibia replacement averaged a TESS score of 88.5% and an MSTS of 88%. Patients who later had a below knee amputation and who were using a prosthesis averaged a TESS score of 89.3% and an MSTS score of 86.3%.

Conclusions: For those patients who are unwilling to undergo an amputation for malignant tumours of the distal tibia, endoprosthetic reconstruction is an alternative, but at the cost of increased risk of significant complications, functional deterioration and morbidity. There was little difference between functional scores for patients who proceeded to have a below knee amputation compared to patients who still had their endoprosthesis.

ID 246**Limb sparing treatment in tumors of proximal femur**

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Introduction: Efficacy of salvage operations is based upon the use of modern medical technologies which enable to decrease the risk of complications and improve treatment results. Purpose of study – to evaluate the efficacy of proximal femur tumors treatment using modular MATI-CITO hip endoprosthesis, arterial embolization, intra/postoperative blood reinfusion.

Material and Methods: Limb sparing operations were performed in 48 patients (17 – 74 years) with malignant tumors of the proximal femur. Modular MATI-CITO prosthesis was used. Angiographic examination and selective arterial embolization with Gianturco coils and polyvinylalcohol granules was performed preoperatively. Intraoperatively blood reinfusion and postoperatively reinfusion of drainage blood was performed. Follow up was from 4 months to 6 years.

Results: At arterial embolization it was possible to achieve subtotal and total reduction of pathological arterial blood flow in the majority of cases. Subsequent operations showed the interrelation between the blood flow reduction within the tumor and intraoperative blood loss. Arterial embolization enabled to decrease the risk of intensive hemorrhage and 1.5-2 times diminish the volume of blood loss. During manipulation no complications developed. Intraoperative and postoperative reinfusion enabled to avoid massive blood loss as well as to decrease the volume of hemotransfusion in the absolute majority of cases. Clinical results by ISOLS were excellent (20.8% of cases) or good (79.2%). Up to 6 years radiologic signs of prosthesis loosening were not observed in any case. Deep infection in the early postoperative period was noted in 2 patients (4.2%). Local recurrences were diagnosed in 5 patients (10.4%) and required repeated operations. Those complications did not influence the long-term results.

Conclusions: Use of modern medical technologies (modular prostheses, arterial embolization, blood reinfusion) at limb sparing operations for tumors of the proximal femur enabled to improve the treatment results and increase the patient's quality of life.

ID 173**The first experience of using expandable endoprosthesis in Russia**

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Introduction: Bone cancer is commonly treated with removal of the segment of affected bone and reconstructed with an endoprosthesis. Bone cancer is primarily found in the ends of long bones like those found in the knee, hip, and shoulder. The end of these long bones also contains the growth plate or the epiphysis which allows that bone to grow. Therefore, when

a skeletally immature child has a bone cancer that necessitates the removal of the growth plate, the unaffected limb will continue to grow and create a limb length discrepancy.

Material and Methods: From 2004, endoprosthetic replacement of major joints was carried out by using the expandable endoprosthesis (Wright Medical Technology, USA) at the institute of paediatric oncology allied with N.N. Blokhin Russian Cancer Research Center. Histological diagnosis included: In 3 patients — osteosarcoma of the distal femur, in 1 patient — Ewing's tumor of the proximal tibia and in 1 patient — osteosarcoma of the proximal humerus. The median age of the patient was 11 — 14 years. Resection of metadiaphysis with replacement of expandable endoprosthesis of knee joint was done in 3 patients who had osteosarcoma of the distal femur. In 1 patient with the diagnosis of Ewing's tumor, resection of proximal tibia was made and replaced with expandable endoprosthesis. Resection of proximal humerus was made in 1 patient with osteosarcoma of the proximal humerus and replaced with the expandable endoprosthesis.

Results: When exposed to periodic treatments of electromagnetic fields, a compressed spring is allowed to expand, lengthening the "bone" in small increments 5-15 mm in 3-8 seconds, carried out 1-2 times a year.

Conclusions: Since it is noninvasive, it allows children to have their "replacement bone" grow with them without repetitive and traumatic surgeries, hospital stays, and rehabilitations. An expandable Endoprosthesis will allow the operated limb to maintain limb equality through a noninvasive procedure.

ID 267

The role of hip and proximal femur angiographic mapping in tumour excision and endoprosthetic reconstruction

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Introduction: This study displays the hemorrhage risks during limb salvage surgery. We studied the anatomy of the vessels of the hip and proximal femur and we suggest a method to prevent uncontrollable intraoperative bleeding.

Material and Methods: We did preoperative angiograms in 17 patients who had proximal femur excision and complex reconstruction with massive endoprosthesis. The investigation focused on mapping the vessels of the affected area in order to prevent critical intraoperative hemorrhage. We studied arterial, capillary, and vein phases of the angiograms.

Results: The proximal femur is supplied with blood from the medial side of the bone, by three circumflex branches of the deep femoral artery. The capillary phase showed various amount of vascularity depending on the histological type of the lesion. Usually there are five small veins also located medially, not corresponding to arteries. These finding led us to the decision to start excision from the medial side of the bone with ligation of the main vessels, before any other surgical action, in order to gain full control of any intraoperative bleeding.

Conclusions: Any pathology of the hip extended to the shaft of the femur can be treated with excision of a large segment of bone and surrounding soft tissue. These lesions have the risk of massive bleeding, especially if the lesions have rich vascularity. The recognition and ligation of the vessels that

supply the bone and the tumor from the medial side, it is of great importance for the bleeding prevention and control.

ID 38

Treatment of grade I-II medullary chondrosarcoma with cryosurgery and internal fixation

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Introduction: Grade I-II intramedullary chondrosarcomas may be treated by wide resection but in this situation a significant bone gap may occur and need major surgery for correction (bone graft, allograft or a prosthetic replacement). The other option is to perform an intralesional surgery with adjuvant therapy (phenol, cryosurgery etc.). Our presentation will show that fenestration, curettage and cryosurgery achieved excellent results in treating low grade chondrosarcomas.

Material and Methods: From 1988-2004 we treated 75 intramedullary grade I-II chondrosarcomas using curettage, burr drilling, cryosurgery and internal fixation using Hardwax and PMMA. There were 42 females and 33 males age ranged from 8-78 years (mean 53 years). Anatomic location included The Humerus and Femur in most of the cases and few cases in the Feet, Hands, Tibia, Fibula and the Pelvic bones including Sacrum. All patients received oral antibiotics for two weeks. Lower limb patients were non weight bearing for 6 weeks.

Results: The majority of the cases healed without complications or local recurrence. We had two local recurrences both turned out to be a high grade chondrosarcoma and needed wide resection with prosthetic replacement. There were 5 wound infections all recovered by conservative treatment. There were 3 fractures treated by POP and healed. 3 patients with lesions in the proximal Humerus developed arthritic changes in the shoulder joint and needed a prosthetic replacement. No local recurrence was found in the grade I-II patients. One patient with a high grade tumor died of metastatic disease.

Conclusions: Cryosurgery is an excellent solution for treating grade I-II intramedullary chondrosarcomas. Internal fixation and PMMA is mandatory to prevent fractures.

ID 49

Free vascularized fibular graft after resection of upper extremity lesions

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Introduction: The Fibula is almost a complete dispensable bone since it is a rudiment throughout evolution from quadrupedal ancient ancestors. It almost does not contribute to weight bearing or strength of the leg. The head of the Fibula is almost a perfect substitute for the distal Radius, distal Humerus, Olecranon, and may replace the proximal Humerus. Its process of ossification is the latest in the skeleton so its epiphysis remain open until the age of 18. The peculiar blood supply of the Fibula with its multiple alternatives makes it the ultimate treasure for the microvascular transfer options.

Material and Methods: From 1/1999 to 8/2004 15 patients with upper extremity lesions were operated in our department. The age range was 4-58 years, most of the patient were in the second decade of life. There were 6 females and 9 males. Anatomical location included: 8 distal Radius, 3 mid shaft Humerus, 2 distal Humerus, 1 proximal Ulna and 1 proximal Radius. Pathology included Ewing's and osteosarcoma in 11 patients, giant cell tumor in 2 patients and osteomyelitis in 2 patients. 4 patients underwent resection with a temporary spacer and a definit reconstruction after 1-2 years. 9 patients received a definit reconstruction at the time of resection and 2 patients are with a temporary spacer waiting for definit surgery. We used an intercalary Fibula in 6 patients and osteoarticular Fibula using the fibular head to replace the Radiocarpal joint or the Elbow joint in 7 patients.

Results: There was one infected non union that needed surgical debridment and bone grafting, we had one transient radial palsy that resolved and one permanent radial palsy. All 13 patients with the early or late reconstruction healed and united to the hosting bones. Function is good to excellent in 11 patients. Moderate in 3 patients and poor function in 1 patient. Oncological status: No local recurrence was noted so far. All patients are without systemic disease except one patient that developed a single lung metastasis and underwent a thoracotomy.

Conclusions: Fibular microvascular graft is a perfect solution for upper extremity defects created after wide bone resections due to tumoral or other conditions. This solution is cheap and may be available in every institution that deals with creating big bone defects.

ID 44

Proximal humerus fixation to the chest wall with the Trevira® tube after Tikhoff-Linberg resection

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Introduction: Today, most of the patients with a soft tissue or bone sarcoma of the shoulder girdle can be treated by limb-sparing resection. The Tikhoff-Linberg procedure and its modifications are limb-sparing options for tumors in this location. In cases, in which the axillary nerve and the periscapular muscles can not be preserved at the time of surgery because of large tumor volumina, a scapular prosthesis is not possible, because sufficient muscle coverage and a good function can not be achieved. In the past, the shoulders were left flail resulting in a poor cosmetic result with an instable shoulder. Stabilizing the proximal humerus or a proximal humerus replacement directly to the distal clavicle or the ribs with heavy sutures, artificial ligaments or wires often resulted in shoulder instability and complications as sutures or wires rupturing. However, even if the shoulder function can not be restored in these patients, the aim of the reconstruction should be to achieve a stable shoulder. The goal of this study was to assess, if the fixation of the proximal humerus by using a Trevira® tube put around the proximal humerus with refixation to the ribs by Mitek® superanchors would result in a stable shoulder function allowing a normal elbow and hand function.

Material and Methods: 4 patients with a chondrosarcoma grade I-II (mean age 59 years) were treated with a modified Tikhoff-Linberg resection with a refixation of the proximal humerus to the chest wall by using the Trevira® tube. An intraarticular scapular resection with preservation of the proximal humerus was performed in 2 patients, 2 patients received an extraarticular resection with a proximal humerus replacement (Mutars®). In all patients a scapular prosthetic reconstruction was impossible because of large tumor volumina. The followup ranged from 6 to 19 months. At final followup all patients were alive without evidence of disease. By clinical and radiographic examination a possible shoulder instability was determined. Functional outcome was assessed according to the Enneking score.

Results: 1 patient suffered a rib fracture after putting in one of the Mitek® anchors. Another patient developed a conservatively treated superficial wound healing complication. A stable fixation of the proximal humerus was assessed clinically and radiographically. The Enneking score was in mean 20 of 30 points.

Conclusions: In patients, in whom a scapular reconstruction is not possible because of loss of periscapular muscles or the axillary nerve, the fixation of the proximal humerus with the Trevira® tube to the ribs by Mitek® superanchors achieved a stable shoulder in all cases allowing a normal elbow and hand function. Muscle coverage is almost always possible with the serratus anterior muscle and the remaining parts of the periscapular muscles after tumor resection.

ID 151

Results of an autopsy after implantation of 3 silver-coated tumor-endoprosthesis

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Introduction: The antiinfective properties without relevant side-effects of silver-coated megaendoprosthesis have been proven in an animal trial. Therefore these results had to be assured in a prospective clinical Phase 1 study (Reg. No. 2Vwin2, ethic commission). In one of these participants material could be taken in an autopsy to assess possible local and systemic side-effects and deposition of silver for the first time.

Material and Methods: Specimens were taken from a 76y old patient (172 cm, 65 kg) suffering from hypernephroma since 1984 (pT2N1M0). After left nephrectomy and polychemotherapy the patient developed metastasis of the left femur, both lungs and right kidney 19 years after primary treatment. The bony lesion was treated with radiation therapy and osteosynthesis after pathological fracture of the left proximal femur in 2003. Because of a deep infection (S. epidermidis), proximal femur was resected and after spacer implantation, a silver-coated Mutars® Megaendoprosthesis was implanted in 10/2003. Further metastasis required resection of left proximal tibia in 02/2005 and right proximal femur in 03/2005. Therefore both defects have been reconstructed with silver-coated Mutars® megaendoprosthesis. The pati-

ent died of tumor cachexia 10/2005 without any clinical obvious side effects (i.e. local or systemic argyria) due to the silver coated surfaces. Samples were taken from surrounding tissue of right and left femur, left tibia, the right and left sciatic nerve, pancreas, kidney, liver, brain, hearth, lung, testicles, spleen and skin.

Results: Though poor soft-tissue condition after radiation and infection there was no infection seen. F-up blood level after total follow-up of 23 months was 20,8 ppb. Highest silver concentrations were found next to the implants (right femur 981.2 ppb, left femur 9759 ppb, left proximal tibia 1465 ppb), the liver (1722 ppb) and the skin (2782 ppb) without histological signs of damage or inflammation. Others contained: testicles 193.3 ppb, right sciatic nerve 108.7 ppb, left sciatic nerve 523.3 ppb, pancreas 154,4 ppb, right kidney 128.2 ppb, lung 179,8 ppb, hearth 40,1 ppb, spleen 112,2 ppb, brain 496,6 ppb. Local or systemic argyria and microscopical depositions could not be found.

Conclusions: Even after implantation of three silver-coated Megaendoprosthesis after nephrectomy and the high amount of metallic silver surface, no clinical side effects or organ damage could be noticed. Further results from other patients are pending.

ID 98

Tikoff Linberg procedure of the superior extremity for tumors in the scapulo-humeral space

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Introduction: In recent years, conservative surgery has replaced the amputation as main treatment for sarcomas of the bone and soft tissue. The objective of our study was to show the experience of the Instituto Nacional De Cancerologia, in the management of scapulo-humeral region of the superior extremities tumors with conservative surgery (interscapulo-humeral resections).

Material and Methods: Retrospectively were reviewed the clinical records of patients that underwent an interscapulo-humeral resection for tumors either benign or malignant (locally aggressive) in that region from 1978 to 2004. Information about tumor, patients characteristics, neoadjuvant and adjuvant treatment was collected. Events related to the surgery, type of reconstruction, follow up and functionality of the extremity were recorded. The descriptive analysis was made with Stata 7 statistical software employing central tendency and dispersion measures.

Results: In a period of 25 years a total of 25 patients had an interscapulo-humeral space resection and were included in the study. Males were 18 (72%) and 7 (18%) female with age ranging from 13 to 78 years. The nature of the tumor was benign in 7 and malignant in 18. Localization of tumors was 14 in the humerus, 10 in the scapula and one in soft tissues. The mean surgical time duration was of 232.2 minutes. The mean blood loss was of 642.2 ml (100-2000 ml); hospital stay had a mean of 4.5 days (2-99). The complications were: bleeding in four patients (16%), three of those required reintervention, two deep infections that were managed with surgery, two patients presented neuropraxia (8%). In eight pati-

ents a bone continuity restauration had to be performed, from those five were with peroneal grafts, one with prosthetics and two with orthopedic nails; a patient that suffered loss of the graft later received a prosthetic. No operative mortality was observed and none of the patients required amputation. Mean follow up was of 57.1 months. A local recurrence at seven months after surgery was observed and two systemic relapses (9 and 12 months). One patient had persistence. Three patients (12%) required the use of narcotic analgesics. Almost half of the patients 12 (48%) have an acceptable functionality and only three (12%) limited.

Conclusions: The interscapulo-humeral resections are a safe procedure, it does not compromise the survival of the patients with tumors of the scapulo-humeral space, it provides an adequate local control and is useful in all the subgroup of patients studied.

ID 85

Lateral malleolus en bloc resection for malign hemangioendothelioma and treatment with distraction osteogenesis

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Introduction: Lateral malleolus is crucial for ankle stabilization. In the treatment of tumors of distal fibula, instability is inevitable after en bloc resection. In this paper an 18-years-old patient whose Lateral Malleolus was resected due to a malign hemangioendothelioma is presented. Instability after resection was managed with bone transport and lateral ligamentous reconstruction.

Material and Methods: Case Report: 18-year-old male patient applied for a treatment with the complaints of swelling and pain in the left ankle. He had had two curettage and bone grafting operations for simple bone cyst of left distal tibia. He had swelling and tenderness on the lateral malleolus. Hematological tests were normal. On the x-ray, sclerosis in distal tibial metaphysis, lysis and erosions in distal fibula were seen. Sclerosis in the distal tibia and a mass lesion in the distal 1/3 fibula were detected in MRI. e took biopsies of the distal tibia and fibula. There was normal and sclerotic bone and fibrotic tissue in the distal tibia and malign hemangioendotelium on the fibula.

Results: Surgical Technique: Anterior and posterior talofibular and calcaneofibular ligaments were identified using with lateral ankle incision, marked with nonabsorbable sutures and cut close to the lateral malleolus. Then 11 cm distal fibula was resected with the tumor tissue covering it. After resection, a 0.5 mm soft cerclage wire was fixed to the distal edge of the remaining proximal fibula while the other end of the wire was pulled out from the heel. Then the wound was closed. A circular frame with 3 rings was constructed and the proximal tibia, distal tibia and the foot were fixed. Percutaneous corticotomy was performed 5 cm proximal to the resection line. Fibula was carried via internal transport to the distal area by pulling out the cerclage wire 1 mm/day (we call this technique is "bone only method" and it was published at 18th annual meeting of EMSOS). In the 5th month, the fixator

was removed and a lateral ankle incision was opened. The ligaments marked beforehand were sutured to the lengthened fibula which was fixed to the tibia with two screws. Per-op instability was not detected with the full range of movements of the ankle. An 8-weeks protective cast was done.

Conclusions: Bone transport and ligament reconstruction was successful in treating a defect and ankle instability due to distal fibular resection. After the treatment, a radiologic and functionally stable ankle was created.

ID 179

Functional outcomes of hindquarter amputation versus the use of pelvic spacers and radiotherapy in tumors

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Introduction: Malignant tumours of the pelvis are difficult to manage. Hindquarter amputations are indicated in primary bone sarcomas of the pelvic girdle and soft tissue sarcomas in the pelvic region. These operations are mutilating, with high morbidity and mortality rates. Overall survival is poor and there may be a place for less mutilating treatment which achieves the aim of pain relief and restoring function by improving or preserving mobility. Patients who have an inoperable tumour or who refuse amputation may have a pelvic spacer inserted to displace bowel and allow a high dose of radiotherapy. We report a series of patients who presented with malignant tumours of the pelvis and compare the functional outcomes of patients who had a hindquarter amputation with patients who had a pelvic spacer inserted to facilitate high dose local radiotherapy.

Material and Methods: All patients who underwent an insertion of a pelvic spacer and local high dose radiotherapy were identified. They were matched as closely as possible with respect to age, sex, diagnosis, tumour stage, and follow up period to patients who had a hindquarter amputation. Available patients were followed up and evaluated using the Musculoskeletal Society Tumour Score (MSTS) and the Toronto Extremity Salvage Score (TESS).

Results: 9 patients had an insertion of a pelvic spacer and radiotherapy. 5 had Ewing's sarcoma, 3 had osteosarcoma and 1 had alveolar soft part sarcoma. 7 tumours arose in the ilium, 2 in the ilium and sacrum, and 1 in the retroperitoneum. 2 patients had primary metastases on presentation. These patients were matched with patients who had a hindquarter amputation. The average follow-up was 21 months. Patients with pelvic spacers and radiotherapy averaged an MSTS score of 51.5% and a TESS of 60%. Patients with hindquarter amputations averaged an MSTS score of 57% and a TESS of 52%.

Conclusions: Hindquarter amputation for malignant pelvic tumours is a mutilating operation that has high morbidity and mortality. Patients invariably have a poor prognosis and there may be a role for management with high dose local radiotherapy which provides palliation and preserves function. Patients who have an inoperable tumour or who refuse an amputation can be treated with local radiotherapy. The

functional outcomes for this group of patients are comparable to those who had hindquarter amputations, with the advantage that they do not have such mutilating operations.

ID 250

Surgical resection and reconstruction for malignant chest wall tumors

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Introduction: Radical resection is optimal variant of treatment of malignant chest wall tumors. Improvement of reconstruction techniques is very important in patients with wide chest wall defects. Nowadays there are no common standards of reconstruction of chest wall tumors. Purpose was to analyze our experience in surgical treatment of patients with malignant chest wall tumors.

Material and Methods: From 1990 to 2005, 51 patients underwent surgical treatment for malignant chest wall tumors. There were 32 males and 19 females with a median age of 42 years old (range 15-70 years). 2 patients underwent sternectomies, 9 patients subtotal resection and 4 patients partial sternal resection. Resection of one or two ribs was performed in 15 cases, 3 ribs and more in 18 cases. Resection of ribs and sternum was performed in 3 cases. The involved lung and mediastinal structures were excised en bloc. Reconstruction of the thoracic wall was performed in 12 patients. Prosthetic materials covered by flaps of myocutaneous or muscle tissue were used in 6 patients, prosthetic material alone in 2, myocutaneous or muscle flaps alone in 4.

Results: The resection was radical in all cases. No complications after reconstruction techniques were observed. All patients after reconstruction had satisfactory postoperative respiratory activity.

Conclusions: Large sternal defects resulting from wide resection of malignant chest wall tumors can be safely reconstructed with a musculocutaneous flap and prosthetic materials. There are well functional results after surgical procedures.

ID 47

Rotationplasty over the age of 60 functional outcome and an analysis of complications

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Introduction: Before the era of endoprosthetic devices, rotationplasty, which was introduced in 1974 by Salzer in the surgery of malignant bone tumors and modified by Winkelmann, protected many patients from an amputation. Despite many authors favor limb saving procedures today, rotationplasty obtained excellent functional and psychosocial results. Rotationplasty can be still recommended in tumors with a great soft tissue component, as a salvage procedure in the case of a failed limb salvage procedure and in very young children as an

alternative to growing prostheses. A rotationplasty in patients over the age of 60 years is a rare procedure and to our knowledge no data about the complication rate and functional outcome have been reported in the literature.

Material and Methods: 3 patients with an age over 60 years (mean 65, range 62-70) were treated with an AI rotationplasty. The indications for rotationplasty were: 1 dedifferentiated liposarcoma of the ventral thigh with an intraarticular tumor involvement, 1 malignant schwannoma grade III of the quadriceps muscle (received adjuvant radiation therapy) and 1 malignant fibrous histiocytoma of the popliteal fossa (received adjuvant chemotherapy). The follow up ranged from 6 months to 13 years. At final followup 2 patients were alive without evidence of disease. The patient with the malignant schwannoma died of disease due to lung metastasis 12 months postoperatively. Functional outcome was assessed according to the Enneking score.

Results: The patient with the MFH developed a thrombosis of the femoral vein 6 months postoperatively resulting in a moderately lymph oedema. 2 patients needed a cane for a gait distance of more than 200 meters. The walking distance even with support was reduced. The range of motion of the ankle joint was not markable restricted. No patient had pain. The mean Enneking score was 19 of 30 points.

Conclusions: Rotationplasty is a good alternative to an above-knee amputation even in older patients because they have a "neo" knee joint without a functional relevant restriction in the range of motion. Furthermore, no phantom pain occurred and they have no loss of proprioception. However, the functional results are not comparable to younger patients, who regain mainly normal walking and sporting abilities.

ID 141

External hemipelvectomy

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Introduction: Despite the development of successful therapeutic modalities for local sarcomas control and advances in limb-sparing surgery around the pelvis and hip, the hemipelvectomy often remains the optimal surgery treatment in primary tumors or recurrences of the upper thigh, hip and pelvis.

Material and Methods: Retrospective review of 78 external hemipelvectomies performed at National Cancer Institute Mexico, during the period 1978-2003 mainly for bone and soft tissue sarcomas. Overall survival was calculated using the method of Kaplan and Meier and differences were calculated using the log-rank test.

Results: There were 78 patients, 49 were males and 29 females. The mean age was 36 years (range 16-80 years), the most frequent tumors were osteosarcoma 12 patients, synovial sarcoma and chondrosarcoma 11 patients respectively. The posterior flap was performed in 61 and anterior flap in ten cases, 6 patients died within 30 days of the operation because hypovolemic shock, cardiac failure and sepsis, one patient die 51 days after surgery. These 7 cases were not entered in analysis for complications and survival. The mean tumor size was 18 cm, the mean blood loss was 1677 ml (range 0.25-8 L) and mean duration of proce-

dures was 3.93 hours (2.10-9.45 hours), negative margin was obtained in 55 of 71, postoperative complications occurred in 54 patients, including wound infection 44%, dehiscence 22% and flap necrosis 11.5%, 36 patients had local complications and other complications in 18. The surgical mortality was 8.9%, fifty percent were dead at 7.5 months. 5 years survival is 12%.

Conclusions: The external hemipelvectomy is a rare procedure with considerable morbidity and mortality. Must be considered as a palliative surgery even without metastatic disease. It offers a chance of palliation and possibly cure.

ID 62

Free and advancement autografting in the treatment of locomotor tumors

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Background: Application of flaps with axial blood supply enlarges indications of radical surgery in locally advanced locomotor malignancies. The purpose of this study was to analyze efficacy of free and advancement vascularized autografting for bone and soft-tissue defects in the multi-modality approach.

Materials and Methods: Single-step reconstruction using vascularized autografts in combination with intraoperative radiotherapy (IORT) and distant gamma-therapy (DGT) has been applied at the Department of General Oncology since 2004. Multi-modality treatment was given to 13 patients (pts) aged 19 to 69 years including 6 cases with soft-tissue sarcomas (malignant fibrous histiocytoma, rhabdomyosarcoma, fibrosarcoma), 2 cases with osteogenic sarcoma, 1 case with cutaneous melanoma, 1 case with cutaneous cancer, 1 case with pseudocarcinomatous epithelial hyperplasia and 2 cases with lytic bone osteoblastoma. Lesion sites were soft tissues of the chest wall (2), foot (2), leg (1), hip (2), arm (2), hand (1), radial bone (1), femoral bone (2). All pts underwent removal of the tumor by wide dissection (10) or segmental bone resection (3). Plasty for soft-tissue defects was made with free or advancement fasciocutaneous flaps (pectoral, thoracodorsal, radial flaps) while bone defects were corrected using free vascularized fragments of the fibula (2) and ilium (1). Intraoperative irradiation was given to 6 pts immediately after tumor removal at a single tumor dose 10 – 15 Gy using a MIB-6E betatron. Additional DGT by standard fractions was given to 6 pts.

Results: 3 pts developed early postoperative morbidity as partial flap necrosis resulting from intraoperative technical errors. In 10 cases postoperative course was uneventful, cosmetic and functional results were assessed as perfect or good. One patient developed soft-tissue recurrence outside the IORT zone.

Conclusions: First outcomes of free and advancement autografting in combination with various radiotherapy approaches in multi-modality treatment for locomotor malignancies have demonstrated good tolerance of the technique.

ID 134**Postresection defect correction with titanium nickelide in the treatment for bone tumors**

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Background: The study was performed in 159 patients (pts) with bone tumors. Pts from the test group (85) with sarcomas (19, 22.4%) or benign tumors (66, 77.7%) had their postresection defects corrected with porous titanium nickelide. Control pts (74) with sarcomas (16, 21.6%) or benign tumors (58, 78.4%) received bone autografting.

Results: Early postoperative morbidity was practically equal in the test and control groups (5.9% vs 6.7%). Suppuration was reported in 2/85 (2.35%) pts from the test group, both with sarcoma (2/19, 10.5%), and in 2/74 (2.7%) control cases, both with sarcoma (2/16, 12.5%). Time to bone callus formation at the bone-porous implant borderline in test group pts was 11-12 mos vs 10.5-12 mos at the bone-autograft borderline in the control pts. Porous implant fracture was observed in 2/85 (2.3%) cases. Control pts presented with events related to remodeling of the graft and mother bone as fracture in 2/74 (2.7%) cases with sarcoma (12.5%) who received combination therapy with IORT at 15 Gy. Follow-up complications were reported in 4/85 (4.7%) pts from the test group vs 3/74 (4%) in the control, differences in the number or structure of the events were not statistically significant.

Conclusions: Two of 85 (2.4%) test group pts underwent amputation at 2 to 4 months following surgery. Complete function recovery of the affected bone was achieved in 78/85 (91.7%) test group vs 68/74 (91.8%) control group pts and in 13/19 (68.4%) vs 11/16 (68.8%) sarcoma pts respectively.

ID 213**Applying of orthopaedic cement in surgical treatment of bone tumors and tumor-like formations**

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Background: We studied efficacy of orthopedic cement in postresection defect replacement in cases with bone tumors and tumor-like lesions.

Materials and Methods: A total of 208 surgical operations for primary bone tumors and tumor-like lesions were performed using orthopedic cement at the AMU Cancer Clinic during 1992 through 2005. Patient age ranged from 4 to 50 years, there were 115 males and 93 females. Case distribution with respect to diagnosis was as follows: 62 (29.8%) osteogenic sarcomas, 12 (5.8%) chondrosarcomas, 6 (2.9%) parosteal sarcomas, 5 (2.4%) malignant fibrous histiocytomas, 24 (11.5%) solitary bone cysts, 28 (13.5%) aneurysmal bone cysts, 22 (10.6%) fibrous bone dysplasias, 19 (9.1%) eosinophilic granulomas, 20 (9.6%) osteoblastoclastomas and 10 other bone tumors and tumor-like lesions. The disease sites were femur (58, 27.9%), tibia (45, 21.6%), humerus (47 (22.6%), forearm bones (24, 11.5%), pelvic bones (15, 7.2%), other bones (19, 9.1%). The following 3 operation types were performed using orthopedic cement supplied by Palakos and an antibiotic (gentamycin): segmental bone resection with large joint

implant to follow (103, 49.5%); excochleation and/or marginal bone resection with autoplasty using orthopedic cement (combined plasty) (45, 21.6%); excochleation and/or marginal bone resection with plasty using orthopedic cement alone (60, 28.8%).

Results: There were no implant rejections or allergic reactions. A small number of patients (6.7%) presented with hyperthermia within the first 24 hours postoperatively. Function recovery of the extremity was observed from week 2 to month 6 following surgery, bone tissue remodeling was detected by x-ray 6 to 12 months following surgery. We used orthopedic cement to replace bone defects because convenient bone plasty techniques have certain disadvantages. Autografting provides good results but increases considerably extent of surgical intervention and adds to patient trauma (particularly in children and adolescents). While allografting is associated with immunity havoc and increased risk of infection.

Conclusions: Orthopedic cement can be used successfully instead of conventional auto- and allografting, improves immediate and follow-up functional outcomes of large joint implant, reduces the risk of allergic and infectious complications, reduces considerably extent and severity of surgical intervention.

ID 268**Surgery for osteolysis in multiple myeloma**

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Introduction: We studied the results of surgery of pathological fractures in patients with multiple myeloma to show the best treatment options.

Material and Methods: We treated 14 patients with multiple myeloma complicated with pathological fractures. They had multiple osteolytic lesions that resulted in active and impending fractures of hip, proximal humerus, femoral and humeral shafts and pelvis. The cases with lesions close to joints were treated with arthroplasty; the lesions of the shaft of long bones had interlocking intramedullary nailing. In a subtrochanteric fracture we did ORIF with double plates. All the cases had external irradiation and chemotherapy.

Results: The nailing of the shaft of the humerus was difficult in active fractures due to the extent of osteolysis. We had severe, expected, intraoperative bleeding in two hip reconstructions. Although platelets count was normal, obviously their function was deficient and caused the hemorrhage. Bleeding was managed with transfusion of platelets and trauma volume reduction. All the patients were mobilized out of bed soon after surgery. All they were examined on follow up (average 12 months) except for one patient who died due to the disease. All reconstructions were stable and the patients were satisfied. The patients with impending fractures had no complications and they had full restoration of function soon.

Conclusions: Patients with multiple myeloma and fracture present specific problems. They need surgical management, provided that the proper measures for dangerous complications, such as bleeding, are taken. Preventing operative treatment of impending fractures in selected cases has the best results and less complication rates.

ID 261

Plasmacellular myeloma with unusual clinical debut: when it may simulate an orthopedic pathology

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Introduction: Plasma cell myeloma is a bone marrow-based multifocal plasma cell neoplasia, in monofocal type plasmacytoma (cytologically and immunophenotypically identical). The diagnosis is based on a combination of well-known pathological, radiological and clinical features. Our purpose is to describe as the myeloma diagnosis still today represents a diagnostic challenge whenever the clinicians observe an osteolytic lesion in patients with clinical history and suggestive imaging of orthopedic pathology.

Material and Methods: Three patients, from 35 to 68 years, come to the clinical observation for persistent painful since a great deal of time and with different clinical histories. Any trauma was referred. In a patient, with previous diagnosis of melanoma, the clinical suspect was of bone metastasis. In the other patients, without particular anamnestic data, the suspect was about orthopedic non neoplastic pathology. CR and CT noticed an osteolytic area with different features: in a patient it was on the iliac wing (the suspect was an aneurismal bone cyst), in the second one on the tibia and in the third, on the humerus (with wide invasion of the soft tissue). In 2/3 of the patients was performed CT-guided biopsy while, in the patient with suspects metastasis was performed resection of the pathological bone.

Results: The histological diagnosis in all the patients was of myeloma; two with secretion of lambda chains, one of k chains. Only 2 patients had a monoclonal peak.

Conclusions: The biopsy represents the "gold standard" to define the etiology of an osteolytic lesion, often asymptomatic, in patients with clinical-radiologic data not simple and myeloma, above all in non-secretory variants, goes always considered in differential diagnosis. Our multidisciplinary group think it's also important extend the diagnostic checks to ample ray even in those patients that have a focal osteolytic area.

ID 251

Intraoperative radiotherapy (IORT) in multi-modality treatment of patients with bone sarcomas

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Background: Intraoperative radiotherapy (IORT) may replace extended amputation with plasty and preservation of extremities in patients (pts) with locally advanced bone sarcomas in whom all conventional approaches have been ineffective.

Material and Methods: 21 pts with osteogenic sarcomas (OS) underwent extracorporeal irradiation replants. A bone fragment was resected with a 5-6 cm margin from the tumor to be exposed to extracorporeal irradiation after removal of all detectable tumor mass, replanted and fixed by osteosynthesis. Replant irradiation was made with an electron beam using a

Miscrotron-M medical accelerator at a single dose 60 Gy. IORT to tumor bed was made in 12 pts prior to defect correction with an electron beam at a single dose 15-20 Gy. Muscular mass, fascias, bonesaw line, neurovascular bundles were exposed to irradiation. The following palliation procedure was developed and applied as an alternative for amputation: after denudation of the tumor extraossal tumor mass was removed as much as possible and the bone was exposed to intracorporeal irradiation with an electron beam at a single dose 20-25 Gy (72-101 Gy isoeffective) without resection.

Results: There was no disease recurrence in any pts group. Follow-up outcomes were reported in the replant extracorporeal irradiation group with a 5-year survival $58.7 \pm 11.2\%$.

Conclusions: Organ-preserving surgery with IORT is a new approach to replacement of large bone defects in OS pts that ensures effective local control.

ID 29

The use of massive endoprosthesis for the treatment of isolated bone metastases

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Introduction: The recent advances in adjuvant and neoadjuvant therapy in cancer treatment has resulted in improved prognosis of patients with bone metastases. Most patients who have either an actual or impending pathological fracture should have operative stabilisation or reconstruction. Endoprosthetic reconstructions are indicated in patients with extensive bone loss, failed conventional reconstructions, and selected isolated metastases.

Material and Methods: We identified all patients who were diagnosed with metastatic disease to bone between 1999 to 2003. A review of all histological reports in this period was carried out to identify these patients. 171 patients were diagnosed with bone metastases. Metastatic breast and renal cancer accounted for 47% of the lesions. 58 patients with isolated bone metastasis to the appendicular skeleton had an endoprosthetic reconstruction.

Results: There were 28 males and 30 females. 11 patients had lesions in the upper extremity and 47 patients had lesions in the lower extremity. The mean age at presentation was 62 years (range 24 to 88). At the time of writing, 19 patients were still alive, 34 patients had died and 5 were lost to follow-up. Patients were followed up and evaluated using the Musculoskeletal Society Tumour Score (MSTS) and the Toronto Extremity Salvage Score. The mean MSTS was 73% and TESS was 71%. Mean follow-up was 54.6 months (range 24 to 78). Complications included 6 wound infections, 1 aseptic loosening, 6 dislocations, 1 subluxation, and 1 prosthesis rotated requiring open repositioning.

Conclusions: We conclude that endoprosthetic replacement for the treatment of isolated bone metastases can be a useful alternative reconstruction in selected cases and achieves the aims of restoring function, allowing early weight bearing and alleviating pain.

ID 228**Choice of tactic and optimal method of surgical treatment in patients with long bone metastatic lesions***V.V. Teplakov¹, V. Karpenko¹, M.D. Aliev²*¹ P.A. Hertsen Moscow Cancer Research Institute² N.N. Blokhin Russian Cancer Research Center, Moscow, Russian Federation

Introduction: Develop and introduce main factors to choice tactic and method of surgical treatment patients with bone metastases complicated by pathologic fractures.

Material and Methods: 84 patients with bone metastases were operated. We used segmental resections with endoprosthesis replacement at 25 patients, immovable osteosynthesis (IO) at 23 patients and transosseous osteosynthesis (TO) at 36.

Results: The functional results evaluated at 65 survived patients. Perfect results were received at 23 (36%), good – 30 (48%), satisfactory – 12 (16%) patients. When we analyzed enumerated patients group we found the main determine factors to choose the optimal treatment tactic. We made algorithm contain seven factors in summation the point of these factors is possible to determine a tactic of treatment for everyone patients. Active surgery tactic is need 0 – 8 point; surgical treatment is possible 9 – 10 point; surgical treatment not uses 11 – 14 point. To choose the priority method of surgical treatment, in addition to algorithm, we developed a plate. She considered eight factors which help determined a priority method of surgical treatment for patients.

Conclusions: The problem of surgery treatment patients with pathological fracture and their menace under dissemination neoplastic process in long bones is actual. Main obstacles lay in algorithm selection tactic and optimal methods of surgical treatment this serious group of patients. Therefore, the selected showings grouped with multiple classification should help a doctor done a right choose the tactic and method of operative treatment patients with bone metastases complicated by pathologic fractures or with menace of it.

ID 53**"Biologic" surgery of skeletal metastases: open nailing and freezing by liquid nitrogen***V. Ippolito, M. Saccalani, L. Ianni*

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Introduction: Surgical treatment of bone metastases should have two goals: restoring the bone mechanical strength and prevent local progression of the tumor lesion. The first problem is best solved by intramedullary fixation enhanced with cement or by prosthetic replacement of the affected bone. The second problem is generally approached by postoperative radiotherapy. Radiation therapy, however, is not always effective in preventing local progression. Furthermore, Rubin had demonstrated that radiotherapy, blocking the chondroblastic phase of callus formation, prevents pathologic fractures from healing. For this reasons, applying to pathologic fractures the principles of trauma surgery exposes to a high risk of failures. A correct, "biologic" treatment of pathologic fractures has to remove the viable tumor tissue

in the metastatic site, restore immediately the bone mechanical strength and last as much as the patient's residual life. Such "biologic" treatment of metastases can be effectively achieved only by an open intralesional procedure, with a thorough curettage, the use of effective local adjuvants (we use liquid nitrogen), intramedullary nailing and cementation, or by a resection.

Material and Methods: In our Unit of Orthopedic Oncology this "biologic" surgery is our standard since 1981. Over 1000 metastatic lesions (impending or pathologic fractures and painful lesions) have been treated this way.

Results: Pain control is close to 100%; local control has been achieved in 94% and 85% of those who were able to walk before surgery regained weight bearing.

Conclusions: Applying the conventional techniques of trauma surgery to metastatic lesions exposes to many failures and can jeopardize the patient's residual life. A "biologic" procedure including curettage, cryosurgery with liquid nitrogen, intramedullary nailing and cement, is an effective way to solve the patient's problem for all his residual life.

ID 243**Treatments in spine metastases of renal cell carcinoma***E.R. Musayev, A.K. Valiev, E. Sushentsov, M.D. Aliev*

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Introduction: analysis of patients with renal cell carcinoma lesions of the spine, which underwent surgical treatment and/or vertebroplasty.

Material and Methods: Between 1999 and 2005 29 patients were treated (surgery/vertebroplasty) with renal cell carcinoma metastases in General Oncology Department of N.N. Blokhin Cancer Research Center. There were 23 male and 6 female, with a mean age of 55,9 years (range 34-69 years). The metastases was located in 21 cases in the lumbar spine, in 9 cases in the thoracic spine, in 2 cases in the sacral spine and one cases in the cervical spine. Mean free disease interval was 13 months (from 0 to 126 months). Pain syndrome was in all patients and neurological deficit – 14 patients. All patients were assessed by Karnofski scale, Watkins scale, Visual Analog scale, Frankel scale, Tomita scoring system Tokuhashi prognostic scale.

Results: 19 patients had surgery, 10 – had vertebroplasty. Moderate decrease of pain syndrome was seen in 90% patients, improvement of quality of life in 69%. The most often complication was intraoperative bleeding, mean level was 2300 ml (200-13000 ml). In the postoperative period, neurological deterioration happened in 2 cases which then improved, one patient died during operation, because intraoperative bleeding. Extravertebral leakage of bone cement without clinical presentation is not a complication in patients with cortical defects of vertebral body. One patient underwent urgent decompressive surgery, because of cement leakage with cord compression.

Conclusions: Orthopedic support affords to improve the quality of life and to decrease pain syndrome of patients with renal cancer metastases to the spine.

ID 209

The role of vertebroplasty in treatment of tumoral lesions of spine. Medical trial

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Introduction: Tumoral lesion of the spine is a complex many-sided problem, lying on the edge of different specialties, such as oncology, orthopedy and neurosurgery. This problem is of great importance, because of high incidence of tumoral lesions of the spine and serious affection quality of life of these patients. Primary benign tumors (hemangiomas) are meet in 40% of popularity, and clinical presentations are meet only in 5-10%. 15% of all primary malignant bone tumors located in the spine. As to metastatic lesions of the spine they occurs in 5-33% of cancer patients. The first and most often complaint of patients with tumoral lesions of the spine is pain syndrome, which moderately affect to patients quality of life. The pain syndrome occurs in 70% of these patients.

Material and Methods: In this article is presented clinical experience of treatment of 70 patients with tumoral lesions of the spine to whom was performed 89 vertebroplasties. There were 32 (46%) men and 38 (54%) women. Mead age was 53 years (16 to 74). Benign tumors were in 20 (29%) patients, primary malignant and metastatic in 45 (64%) patients. Nontumoral lesions — in 5 (7%) cases. The level spread was: cervical — 1 (2%), thoracic — 43 (62%), lumbar — 26 (36%) patients. Three (4%) had minor sensory disturbances. Pain syndrome, measured by Watkins scale was present in 69 (98%) patients. Mean cement volume injected in the thoracic spine was 3,2 ml and 5,2 ml in lumbar region. Vertebroplasty as mono treatment was used in patients with benign tumors and nontumoral lesions. And as a part of combined treatment - in metastatic lesions.

Results: Moderate decreasing or disappearance of pain syndrome was in 62 (88%) patients. The level of pain didn't change in 6 (9%), and increased in 2 (3%) patients. Mean analgesic period consisted 27 hours (2 to 84). Clinical complications were seen in 2 (3%) patients, and to one them was used urgent decompressive surgery.

Conclusions: Vertebroplasty is effective small invasive treatment procedure in patients with osteolytic lesions of the spine, affording moderately decrease pain syndrome in 86% patients and thus to improve the quality of their life.

ID 58

Organ-preserving methods of surgical treatment of long bone metastatic lesions in patients with kidney cancer

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Introduction: Demonstration the modern ability of organ-preserving treatment the patients with kidney cancer.

Material and Methods: 21 operations were performed in 18 patients. Menace of pathological fracture was at 5 patients, at 13 it happened. Solitary metastatic lesion of long bones was detected at 6 (34%), and multiple at 3 (17%) patients. Segmental resection with endoprosthetic replacement (SRE) was done at 9 (50%) patients. The three of these patients had the menace of pathological fracture. Immersible osteosynthesis (IO) was used at 3 (17%) patients with pathological fracture. Transosseous osteosynthesis (TO) was used at 6 (33%). Two of these patients had the menace of pathological fracture.

Results: Follow-up period was 2 — 36 month. The regress range of pain (by R.G. Watkins) was registered at 11 (61%). The improvement of condition by Karnofski was registered at 8 (44%). Positive dynamic in anatomic-functional status by Enneking at 13 (73%). Follow-up period after operation was consisted of 36 months, 11 (62%) live longer (calculated by Kaplan-Meier). Medial probability of survival operated patients with metastatic lesion of long bones on conditions with eliminated is consist 13,5 months, with primary tumor - 8.

Conclusions: Operative organ-preserving methods: SRE and IO can control or diminish the pain, in short period of time restore the function of involved limb, improve quality of life and meet the requirements of palliative help. TO can be used only how the stage of fixation with following SRE.

SECTION 2

NEW DEVELOPMENTS IN BASIC AND TRANSLATIONAL RESEARCH

ORAL PRESENTATIONS

ID 90

Enhanced tumor cell kill by combined treatment with Nutlin and adenoviruses encoding p53

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Introduction: The tumor suppressor p53 is the central coordinator of cellular responses to stress signals. It is often mutated in bone and soft tissue tumors. p53 function can also be compromised by inhibition of the p53 protein. The major negative regulator of p53 is the mouse double minute 2 protein (MDM2). The highest incidence of MDM2 amplification is found in soft-tissue sarcomas and osteosarcomas. Reactivation of the p53 pathway to control tumor growth is therefore an interesting approach to treat osteosarcoma. Possibilities to reactivate p53 range from expressing an exogenous p53 gene in p53 mutant cancers to antagonizing a p53 inhibitor in p53 wild type cancer cells. Recently, a novel class of highly potent and specific MDM2-antagonists, the Nutlins, was identified. We envisioned that Nutlins could protect both endogenous and exogenous p53 from MDM2-mediated inactivation.

Material and Methods: We selected six cancer cell lines (4 osteosarcoma cell lines) and analyzed p53 and MDM2 expression via western blotting. Effect of combination treatment was studied with WST-1 assay or crystal violet staining. Apoptosis induction was measured via cell cycle analysis. Viral replication and burst was studied with the adenoX rapid titer kit.

Results: Combination treatment of exogenous p53 expression and Nutlin resulted in a significant increased cell kill of p53-negative and p53 wild type cancer cells expressing high or low levels of MDM2. Cytotoxicity was associated with profound cell cycle checkpoint activation and apoptosis induction. We also tested Nutlin in combination with a replicating oncolytic adenovirus expressing p53. Nutlin treatment accelerated lysis of oncolytic adenovirus-infected cancer cells

and viral progeny burst, which augmented the eradication of p53 wild type osteosarcoma cancer cells up to 1,000-fold.

Conclusions: These findings suggest that Nutlins are promising compounds to be combined with p53 gene therapy and oncolytic virotherapy for cancer such as osteosarcoma.

ID 74

CD99 and caveolin1: new anticancer proteins for osteosarcoma

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Introduction: CD99 is expressed in a variety of solid tumors and is a diagnostic marker of Ewing's sarcoma. Osteosarcomas, however, have never been studied. We report that in 11 different cell lines and 17 clinical samples CD99 expression is either undetectable or very low. Since in osteoblasts CD99 expression is under control of the osteoblast-specific transcription factor Cbfa1 (RUNX2), we tested the hypothesis that CD99 downregulation may have a role in osteosarcoma development and progression.

Material and Methods: Gene transfection of U-2 OS and Saos-2 cell lines was performed to induce forced expression of CD99 and caveolin. The clones obtained were analyzed for in vitro parameters related to malignancy as well as for in vivo behavior. Gene profile of the transfected cells was used to identify critical genes strictly connected to CD99. Functional studies were performed to prove the in vitro involvement of caveolin and c-src.

Results: CD99 forced expression in two osteosarcoma cell lines significantly reduced resistance to anoikis, inhibited growth in soft agar and cell migration and led to abrogation of tumorigenic and metastatic ability. CD99 gene transfection induces caveolin-1 up-regulation and the two molecules were found to co-localize on the cell surface. Treatment with antisense oligonucleotides to caveolin-1 abrogates the effects of CD99 on migration. On the other hand transfection of cells with caveolin 1 clearly show how the molecule acts as an oncosuppressor for osteosarcoma. C-src appeared to be negatively regulated either by CD99 or caveolin1.

Conclusions: CD99 and caveolin should be downregulated in osteosarcoma to express full malignancy. It is very likely that

CD99 acts by enhancing caveolin-1 and its association of Src to caveolae, therefore leading to subsequent inactivation of Src.

ID 110

Post operative infection and increased patient survival. Is there a link?

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Introduction: Despite the advances in adjuvant chemotherapy and surgical techniques, malignant sarcomas involving bone have a significant mortality. Recent basic science and animal studies have shown survival advantages following infections for some tumour types. This study investigates the effect of post operative infection in patients treated for a malignant primary tumour involving bone using endoprosthetic replacement (EPR).

Material and Methods: A consecutive series of 1264 patients underwent endoprosthetic reconstruction between 1966 and 2000. Patients were excluded from the study for insufficient follow up data (24 patients, 1.9%), reconstruction following excision of a benign tumour (73 patients, 6%) or metastasis (134 patients, 10.6%), death due to causes unrelated to their original tumour (11 patients, 0.9%, mean 9.2 years from the diagnosis). Previous studies showed that 70% of deep infections occur within 1 year from reconstruction. Therefore landmark analysis was performed; all patients infected after 12 months of reconstruction were excluded (32 patients, 2.5%) and those who died within 12 months from diagnosis were excluded (122 patients, 9.7%), leaving 868 patients in the study group. Any survival advantage early infection conveyed could be analysed by Kaplan-meier survival analysis from this landmark point.

Results: Overall population survival was 63.3% at 5 years, 58.8% at 10 years and 53.9% at 20 years from landmarking. There were 89 patients (10.3%) who endured an infection within 1 year of implantation. These patients had significantly better survival ($p=0.04$) than those without infection. This held true only for the diagnoses of osteosarcoma ($p=0.017$) and myeloma ($p=0.01$). The 10 year survival for patients with osteosarcoma with infection was 73.5% compared to 53.6% in the non infected group after landmarking.

Conclusions: There was evidence for increased survival after deep post-operative infection in osteosarcoma patients, in keeping with other research. The authors feel this warrants further investigation.

ID 127

Prometastatic role of NG2 proteoglycan-collagen type VI interaction in sarcomas

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Introduction: Recent evidence suggest that NG2 proteoglycan, previously demonstrated to be a marker associated to

primary malignancy and metastasis in melanoma, promotes tumour dissemination through growth factor sequestering and interaction with collagen type VI that evokes specific intracellular signals.

Material and Methods: In human primary sarcomas and metastases we analysed mRNA level and protein immunoreactivity of NG2 and collagen type VI to relate gene expression to cell metastatic potential. Paired normal tissue was available. Quantitative PCR reaction was performed on cDNA after reverse transcription of mRNA and protein immunoreactivity was assessed with immunological assays.

Results: In all tumors NG2 gene was up-regulated with $2^{-\Delta\Delta ct}$ values ranging from 90 to 32591 and mRNA median value was significantly higher compared paired normal tissue ($p=0.0005$). Moreover, the marked difference between primary and metastases ($p=0.001$) was consistent with the median increase of 11-fold in the latter. Distribution of collagen type VI within tumour population followed a similar trend and a moderate to strong protein expression was associated to high mRNA levels. Experimental sarcoma models in mice confirm the prometastatic role of NG2-collagen type VI interaction by demonstrating that tumour model cells expressing higher levels of NG2 reveal a higher metastatic potential. Ectopic expression of NG2 also confers to cells a higher metastatic ability, but when inoculated into Col VI-deficient mice, metastasis formation is strongly reduced, confirming a direct interplay between molecules in the metastatic process.

Conclusions: Positive involvement of NG2 pathway in malignancy progression may have a potential biological value in discriminating high risk patients, with important clinical implications for cancer prognosis and therapy.

ID 79

Telomere biology in giant cell tumor of bone

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Introduction: Giant Cell Tumor of Bone (GCTB) is a benign tumor known for its unpredictable clinical behavior of local recurrences and in rare occasions distant metastases. GCTB is composed of uniformly distributed osteoclastic giant cells in a background of mononuclear rounded and spindle-shaped cells. Cytogenetically, telomere associations (TAS) are the most common chromosomal aberrations. TAS in general are nearly exclusively found in high-grade malignancies. GCTB has been defined as a polyclonal tumor, but more recently a recurrent aberration was reported which suggests a possible role for a disturbed telomere maintenance. The aim of this study was to further investigate telomere maintenance in GCTB.

Material and Methods: 19 samples from 19 patients were studied. A combination of immunofluorescence and FISH was performed applying antibodies directed against PML and hTERT and telomere-PNA-probes. TRAP assay and telomere length assay were performed for functional detection of telomerase activity and alternative telomere lengthening (ALT).

Results: All samples showed positivity for hTERT-PML immunofluorescence. The giant cells, next to the spindle shaped cells, also expressed both markers. The TRAP assay demonstrated a heterogeneous telomerase activity while telomere length assay showed telomere lengths within normal limits indicating the absence of ALT. Confocal microscopy confirmed colocalization of hTERT with PML in association with telomeres.

Conclusions: GCTB demonstrates remarkable telomere maintenance of activated telomerase and inactivated ALT in the presence of normal telomere lengths. 'Active' hTERT and 'inactive' PML co localize at the end of chromosomes in association with telomeres. These findings strongly suggest that the hTERT-PML aggregates are part of a structural telomere protective capping mechanism rather than of a telomere lengthening mechanism. The telomere maintenance in GCTB could be considered as an important key factor in its pathogenesis.

ID 80

Osteoclastogenesis in giant cell tumor of bone

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Introduction: Giant Cell Tumor of Bone (GCTB) is a benign tumor notorious for its unpredictable local recurrences and rare distant metastases. Microscopically uniformly distributed osteoclastic giant cells (OCG) are embedded in a background of mononuclear rounded and spindle shaped cells. OCGs are speculated to originate from the fusion of monocyte-macrophage lineage cells. Some reports revealed the expression of several cell markers like CD14 or CD68 in the mononuclear rounded cell population, but none of these are also expressed on OCGs. Recently the expression in both cell types of CXCR4, a unique receptor for SDF-1, was described, indicating chemotaxis of monocytes-macrophages in the process of osteoclastogenesis. CD14+, CD33+ or CD14+/CD33+ blood monocytes are destined as pre-osteoclasts. The macrophage marker CD33 is expressed earlier than CD14, while CD14 is expressed longer compared to CD33 during macrophage development. The aim of this study was to investigate the CD14 / CD33 expression profile in GCTB.

Material and Methods: 19 samples from 19 patients were studied. A double immunofluorescent staining was performed with monoclonal antibodies directed against CD14 and CD33.

Results: All samples showed similar expression profiles. The mononuclear rounded cell population was positive for CD14, CD33 or both cell markers. Only large cells with a single round large nucleus were only positive for CD33. These cells were found in the vicinity of OCGs. The OCG subpopulation was positive for CD33 only.

Conclusions: Our immunohistochemical results suggest: 1) that osteoclastogenesis in GCTB is the exclusive result of fusion of blood-born CD33 expressing pre-osteoclasts and that osteoclastogenesis is not the result of fusion of intra-tumoral CD14+ macrophages; 2) expression of the early marker CD33 by OCGs

suggest that the CD14 + infiltrating subpopulation could be a non-specific phenomenon secondary to the stromal cell induced chemotaxis of blood-born pre-osteoclasts.

ID 188

High grade central chondrosarcoma versus chondromyxoid fibroma

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Introduction: The presence of polygonal - atypical cells in Chondromyxoid fibroma (CMF) creates difficulty in the differential diagnosis with High Grade Central Chondrosarcoma (HGCCS), especially in biopsy specimens. No specific diagnostic tools have been developed to help such a differential diagnosis, neither the molecular mechanisms behind this overlapping morphology have been thoroughly studied.

Material and Methods: RNA isolated from 7 CMF and 12 HGCCS was hybridized on a 9k - cDNA microarray enriched for cartilage specific genes and printed in duplicate. For data analysis Linear Model for Microarray Analysis was used. Immunohistochemistry allowed for verification of differentially expressed genes on a larger series of CMF (n = 20) and HGCCS (n = 39).

Results: Fourty-two genes showed to be differentially expressed (p<0.01 after false discovery rate correction). CD166 and Cyclin D1 were higher expressed in CMF versus HGCCS, which was immunohistochemically verified (p<0.05). p16, known to be lowly expressed in high grade chondrosarcomas was also evaluated, because of its inhibitory effect on Cyclin D1. Its expression was significantly higher in CMF (p<0.01).

Conclusions: We have identified and validated 3 possible markers for the differential diagnosis of CMF versus HGCCS, which can be used on a routine basis: Cyclin D1, CD166 and p16. Higher expression of Cyclin D1 is present in CMF, which is unusual for a benign tumor. However its co-occurrence with high p16 expression might balance their antagonistic actions. The crucial role for loss of p16 expression in HGCCS is confirmed. Down-regulation of adhesion molecules might play a role in malignant progression.

ID 48

Biological reconstruction of bone defects

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Introduction: The definition of a situation which describes discontinuity of a normal bone has many synonyms: loss, gap, incontinuity etc. In this review the term Defect will be used. 3 types of bone defects are defined Envelope defects-loss of the soft tissue and periosteum. Partial defect-loss of all bone components in a part of the bone circumference. Complete defect-loss of all the bone components of a whole bone circumference. According to the length dimension 5 types of bone defects are defined. Intercalary defects, Extended intercalary defect, Osteoarticular defect, Complete whole

bone defect and Osteoarticular defect with the whole adjunct joint (after an extraarticular resection).

Material and Methods: The causes of bone defects are: Congenital absence, Post trauma, Post acute or chronic infections, After tumor resection, After local bone disease and post revision surgeries in joint replacement. Reconstruction of a bone defect is depended upon the following factors. Age, nature of the cause, the need for post operative adjuvant therapy (chemo or radio therapy), the size of the defect, the anatomical location, the general health condition of the patient, the cost benefit of the procedure and the availability of the procedure.

Results: Reconstruction options and techniques: No materials-using scar tissue or callus. Autogenous bone graft: Free microvascularized bone, non vascularized bone such as tibial strut or non vascularized fibula or iliac crest, cancellous bone graft or cancellous-cortical bone graft. Pasturized or heated bone, cryosurgically bone. Allografts of all types such as intercalary or osteoarticular. Synthetic bone substitutes. Improved implants composed of hardware and PMMA. Endoprostheses of all kinds. Combinations of all the above.

Conclusions: This review stresses few major problems in this complicated subject. The age of the patient plays a major role, the extent of the defect also plays a key role in the decision making. It is obvious that no artificial material may last for ever which means that every prosthesis will need a revision in the future. Biological solutions should be the future for filling most of the bone defects including osteoarticular defects such as Gleno-Humeral joint, Radio-Carpal joint, Elbow joint, the Knee and the Hip joint.

ID 91

Intravenous administration of Ad5-delta24RGD induces regression of osteosarcoma lung metastases

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Introduction: A major problem in the treatment of osteosarcoma is the frequent occurrence of metastases in the lungs. Consequently, an effective treatment of lung metastases would be of great benefit for osteosarcoma patients. The purpose of the present study was to determine whether systemic administration of a conditionally replicative adenovirus, Ad5-delta24RGD could suppress the growth of human osteosarcoma lung metastases. For this purpose, we used the established SaOs-lm7 osteosarcoma lung metastases model.

Material and Methods: In vitro studies were performed with SaOs-lm7 osteosarcoma tumor cells and cytotoxicity was assessed using WST-1 assay. Animal experiments were performed on athym/nu/nu mice. The SaOs-lm7 lung metastasis model was obtained from Dr. Kleinerman.

Results: Oncolytic activity of Ad5-delta24RGD on SaOs-lm7 cells was clearly demonstrated in vitro. Furthermore, in vivo toxicity studies in nude mice revealed that repeated intravenous administration of this oncolytic virus did not cause severe weight loss or liver damage. SaOs-lm7 osteosarcoma lung metastases bearing mice were treated at week 1,2 and 3 (group I; 12 mice) or at week 5, 6 and 7 (group II; 12 mice) post tumor cell injection with 1x10⁹ plaque forming units (pfu) Ad5-delta24RGD or PBS. Animals were analyzed ten weeks after tumor cell injection. In group I, mice treated with Ad5-delta24RGD did not significantly differ from PBS injected controls. In contrast, mice treated at weeks 5-7 with Ad5-delta24RGD showed a significantly reduced lung weight (decrease of tumor mass, p<0.05), a significant increase (10%) of total body weight (decrease of disease symptoms, p<0.05) and a reduced amount of lung tumor nodules (median 60 versus at least 174) compared to PBS treated control animals.

Conclusions: These findings suggest that systemic administration of Ad5-delta24RGD might be a promising new treatment strategy for metastatic osteosarcoma and is dependent on an established tumor vasculature.

ID 191

Cell cycle regulation in central chondrosarcoma: CDK4 amplification associated with tumor progression

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Introduction: Central chondrosarcomas (CCS) are malignant cartilage forming tumors in the medullary cavity. CCS is mostly primary, but can be secondary to enchondroma, especially in Ollier disease, demonstrating multiple enchondromas. Amplification of 12q13 and deletion of 9p21 are two of the few consistent genetic aberrations in CCS. Previously, we correlated amplification of 12q13, analysed by array-CGH, with an increase in expression of CDK4 by cDNA array analysis. Moreover, loss of p16 expression is associated with tumour progression. We therefore hypothesize that progression of central chondrosarcoma occurs by upregulation of CDK4, promoting the cell cycle from G1 to S phase. Expression profiling also demonstrated a slight difference in cMYC expression between Ollier disease-related and solitary chondrosarcoma.

Material and Methods: mRNA levels of CDK4 and cMYC were studied using quantitative Real Time PCR in phalangeal enchondromas (n=7) and CCS (grade I n=11, grade II n=7 and grade III n=9). Normal cartilage and growth plates were used for comparison. Immunohistochemistry was performed for CDK4 on 30 CCS.

Results: Tumors with amplification of 12q13 by array-CGH (n=4) showed higher expression levels than tumors without amplification (n=8) (p=0,001). Tumors showed up-regulation of CDK4 compared to growth plates (p=0,001). mRNA levels increased with increasing histological grade (p=0,003). This association could also be demonstrated at protein level (p = 0.060). In contrast, no correlation of cMYC expression levels with histological grade could be found. Ollier disease related tumors show significantly higher expression of cMYC (p = 0.011).

Conclusions: Although expression of the oncogene cMYC does not seem to be important for chondrosarcoma progression, it is

higher expressed in Ollier disease related tumors. In addition to loss of p16, increased CDK4 expression is associated with increasing histological grade, underlining the crucial role of these cell-cycle regulating molecules in CCS progression.

POSTER SESSION

ID 55

Desmoid tumors: analysis of PDGF, PDGFR and gene mutations

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Introduction: Therapy with imatinib mesylate (Gleevec) has been proposed as an option for patients with desmoid tumors. Recent reports, however, indicate that desmoid tumors are c-kit negative. The cause for a possible effect of this other tyrosine kinase inhibitors might be based on expression of PDGF α , PDGF β , PDGFR α or PDGFR β . The aim of the present study was to study this pathway by immunohistochemistry.

Material and Methods: We performed immunohistochemical analysis on 124 archived samples of 81 patients with desmoid tumors using antibodies against PDGF-alpha, PDGF-beta, PDGFR-alpha and PDGFR-beta according to standardized procedures. Furthermore mutational analyses were performed on frozen material from 14 patients.

Results: All desmoid tumors showed a positive reaction with antibodies against PDGF-alpha and PDGFR-alpha (> 80% of the tumor cells strong membranous and cytoplasmic staining). With antibodies against PDGF-beta and PDGFR-beta none of the 124 cases showed a specific reaction. Mutational analysis of PDGFR-alpha (exon 11, 12, 17 and 18) and PDGFR-beta (exon 12) on frozen material from 14 patients with desmoid tumors were performed, but no mutations leading to amino-acid changes in the mature protein could be detected.

Conclusions: Desmoid tumors might be regarded as mainly PDGF-alpha and PDGFR-alpha positive and PDGF-beta and PDGFR-beta negative tumors. However, as mutational analysis revealed no mutations leading to amino-acid changes the possible effect of imatinib mesylate should be attributed to another pathway.

ID 172

Surgery vs radiation therapy for nonmetastatic

Ewing's sarcoma: experience of a single institution

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Introduction: The treatment and prognosis of Ewing's sarcoma has substantially changed during the past 30 years and the role of surgery for local control in the multimodal manage-

ment of disease has remarkably increased over the last 2 decades. However, selection bias due to location (extremities vs axial skeleton) and relatively non-homogeneous treatment received by patients in multi-institutional trials may limit objective evaluation and comparison of the relative role of surgery and radiation therapy in this setting. Purpose of this study was to review a large series of patients homogeneously treated at a single institution.

Material and Methods: Between 1979 and 1999, 512 patients with a nonmetastatic ESFT of bone entered 4 different adjuvant and neoadjuvant studies performed at a single institution. 335 patients were treated with surgery alone (196) or surgery followed by reduced doses (44.8 Gy) of radiotherapy (139). The outcome of this group of patients was compared with 177 patients who were locally treated by full-dose (60.8 Gy) radiotherapy.

Results: Local control (88.8% vs 80.2%, $p < 0.009$) and 5-year DFS (63.8% vs 47.6%, $p < 0.0007$) were significantly better in patients treated with surgery. In this group of patients surgically managed, those with adequate surgical margins were associated with better results in terms of local control and 5-year DFS (96.6% vs 71.7%, $p < 0.0008$, and 69.6% vs 46.3%, $p < 0.0002$). Nevertheless, better results were essentially only observed in patients with tumor located in the extremities.

Conclusions: Surgery is better than radiotherapy in case of respectable ESFT of the extremities when adequate surgical margins can reliably be achieved, while in case of inadequate surgical margins adjuvant reduced-dose-radiotherapy is ineffective. If inadequate margins can be anticipated, patients are treated more effectively with full dose radiotherapy.

ID 193

Array-CGH analysis of chondromyxoid fibroma complements conventional cytogenetics

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Introduction: Chondromyxoid fibroma (CMF) is a rare benign cartilaginous tumor of bone mainly occurring in the second decade and affecting long bones. Chromosome banding analysis of CMF has revealed recurrent involvement of 6p23-25, 6q12-15, and 6q23-27 in balanced as well as unbalanced rearrangements. We have used array comparative genomic hybridization (array-CGH) to detect genomic imbalances associated with CMF.

Material and Methods: In the setting of EuroBoNeT, a European network of excellence on rare bone tumours of children and adults, it was possible to collect a relatively large number of frozen samples of CMF. DNA was isolated from 10 tumor samples containing >70% tumor cells. Samples were hybridi-

zed on an array-CGH containing a set of >3500 PAC/BAC clones from the Wellcome Trust Sanger Institute. Chromosome banding analysis was performed on 5 of the 10 cases.

Results: Cytogenetics showed chromosomal alterations in 3 cases: 46,XX,del(6)(?q21?q23),add(7)(q21) (case L1789); 46,XX,t(6;17)(q23;p13) (case L1788) and 46,XY,del(6)(q15der(6),t(6;6)(q15;q27),inv(6)(p25q13) (case L1787). Array CGH showed complex interstitial deletion patterns in two cases, involving chromosomes 3 and 6 (case L1765) and chromosomes 6 and 7 (case L1789), respectively. Deleted regions ranged from 1.6 to 14 Mb. Confirmatory FISH confirmed that these deletions were not constitutional. At chromosome band 6q23 there was a small region of overlap in both cases. Intriguingly, this region was involved in a balanced translocation also in case L1788.

Conclusions: Array CGH and chromosome banding analyses showed recurrent balanced as well as unbalanced rearrangements of chromosome band 6q23, indicating a crucial role for one or more genes in this region for CMF pathogenesis.

ID 87

Expression of β -catenin and p53 are prognostic factors in deep aggressive fibromatosis

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Introduction: Aggressive fibromatosis is a rare fibroblastic, mesenchymal tumour, characterized by a locally highly destructive growth pattern without the formation of distant metastasis. Up to date the treatment of these tumours is based on a wide surgical resection followed under certain circumstances by an adjuvant radiotherapeutic and/or chemotherapeutic treatment. Unfortunately, at the present state the local recurrence rates are rather high. The overexpression of β -catenin is frequently seen in aggressive fibromatosis. However, the prognostic value of β -catenin overexpression is unclear. Also, little knowledge exists about potential molecular markers for new targeted therapies.

Material and Methods: A tissue array of 37 cases of deep aggressive fibromatosis was constructed and subjected to immunohistochemical analysis for β -catenin, p53, SMA, desmin, Ki-67, c-erbB2, EGFR, c-kit, CD34 and S-100. For 23 patients a complete clinical follow-up was available.

Results: Nuclear β -catenin expression was associated with an increased rate of local tumour recurrence (60.0% 1-year and 0% 5-year-event free survival; $p < 0.05$). Furthermore, p53 expression was associated with an increased risk of tumour recurrence (50% 1-year event free survival rate and 0% 5-years event free survival rate $p < 0.05$). The coexpression of p53 and β -catenin was significantly correlated ($p < 0.05$). A statistically significant association between Mib-1 and p53 or β -catenin expression could not be seen, respectively. An expression of EGFR, c-erbB2 or c-kit could also not be observed.

Conclusions: Our results show for the first time that the overexpression of β -catenin and p53 are associated with a decreased event-free survival and an increased rate of tumour recurrence in deep aggressive fibromatosis. The potential value of this molecule for a more exact definition of the resection margins remains an issue of further research.

ID 69

Fas-antigen (sFas) in patients with bone tumors

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Introduction: The goal of this study was the analysis of sFas concentrations in the blood serum of healthy peoples and patients with osteosarcoma and benign bone tumors.

Material and Methods: We examined 32 untreated patients with osteosarcoma, 11 - with benign bone neoplasms (osteoblastoma - 2, chondroma - 1, chondroblastoma - 2, osteochondroma - 3, lipoma - 1, aneurismal bone cyst - 2) and 25 practically healthy subjects. sFas was measured by enzyme immunoassay in the serum using tests created in Russian N.N. Blokhin Cancer Research Centre of RAMS and in M.M. Shemjakin and Ju.A. Ovchinnikov Institute of Bioorganic Chemistry RAS.

Results: All samples from patients with benign bone neoplasms contained sFas. Frequency of sFas disclosure in the serum from healthy donors comprised 36%, from patients with osteosarcoma - 87%. sFas levels in healthy donors ($0,86 \pm 0,30$ ng/ml) were lower than in patients with osteosarcoma ($3,72 \pm 0,89$ ng/ml), and benign bone tumors ($4,86 \pm 1,50$ ng/ml). Maximal concentrations of sFas were found in osteoblastoma (11,2 ng/ml), lipoma (11,5 ng/ml) and chondroma (15,6 ng/ml) There were no significant differences in sFas concentrations between patients with osteosarcoma and benign bone tumors. Initial sFas levels were higher in the serum of osteosarcoma patients with metastasizing ($4,83 \pm 0,56$ ng/ml) than in patients without disease progression in the follow-up period ($1,55 \pm 0,17$ ng/ml).

Conclusions: These findings suggest that pretreatment sFas levels in the serum of osteosarcoma patients can provide additional prognostic information for the evolution of the disease.

ID 71

sVCAM-1 in the serum of some bone tumors patients

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Introduction: The aim of the study – comparative analysis of sVCAM-1 concentrations in the serum of practically healthy persons and patients with bone neoplasms.

Material and Methods: We studied sVCAM-1 in the serum obtained from 65 untreated bone tumor patients (34 - osteosarcoma, 19 - chondrosarcoma, 12 - Ewing's sarcoma) and in the serum of 25 practically healthy subjects. sVCAM-1 was measured by enzyme immunoassay in the serum using tests from "Bender MedSystems" (Austria).

Results: All samples contained sVCAM-1. sVCAM-1 levels in healthy donors ($242,5 \pm 23,2$ pg/ml) were lower than in patients with osteosarcoma ($537,3 \pm 81,2$ pg/ml), Ewing tumor ($399,2 \pm 56,5$ pg/ml) and chondrosarcoma ($340,1 \pm 58,1$ pg/ml). There were no significant differences in sVCAM-1 concentrations in patients with various types of affected bone. Serum sVCAM-1 levels did not depend on the size of tumor. As demonstrated by statistical analysis, sVCAM-1 levels in bone tu-

mor patients at the generalization stage ($549,6 \pm 153,9$ pg/ml) were higher than in patients with localized stage ($418,8 \pm 39,8$ pg/ml). But bone tumor patients with sVCAM-1 level < 400 pg/ml had poorer prognosis for disease-free survival (less 12 month), than patients with sVCAM-1 level > 400 pg/ml.

Conclusions: These findings suggest that sVCAM-1 levels may be related to bone tumor pathogenesis.

ID 72

Vascular endothelial growth factor (VEGF) in the sera of bone neoplasms' patients

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Introduction: Aim of the study: comparative analysis of VEGF content in blood serum of bone tumor patients and control healthy subjects.

Material and Methods: 110 primary bone tumor patients (70 male and 40 female) aged 5 - 66 years were enclosed in the study. In all patients clinical and radiographic diagnosis was confirmed by histologic examination. The following morphologic variants were distinguished: osteosarcoma (40), juxtacortical osteogenic sarcoma (1), periosteal osteosarcoma (1), chondrosarcoma (20), secondary chondrosarcoma (4), malignant fibrous histiocytoma (7), giant-cell bone tumor (6), Ewing's tumor (22), osteochondroma (3), aneurismal bone cyst (3), bone fibrous dysplasia (3). The patients were presented at first diagnosis and did not receive any specific treatment before biochemical investigation. Sera of practically healthy persons aged 5 - 60 years (32 male and 20 female) were used as control. VEGF in blood sera was measured by standard ELISA using «R&D» (USA) kits.

Results: VEGF was detected in all serum samples studied – both in bone tumor patients and in the control group. Highly statistically significant difference in VEGF levels ($p = 0,000001$) was revealed between the patients ($377,8 \pm 35,1$ pg/ml) and control group ($100,0 \pm 7,5$ pg/ml). At the same time, VEGF levels in patients' sera varied in the range from 50 to 2700 pg/ml. No differences were found between VEGF levels in male and female sera, both in control and in the total bone tumor patients' group. No significant differences were revealed depending on malignant and benign tumors' localization either in tubular ($451,8 \pm 47,5$ pg/ml), or in flat ($288,6 \pm 67,2$ pg/ml) bones. VEGF level in the sera of osteosarcoma patients comprised $392,2 \pm 51,4$ pg/ml, in the sera of primary chondrosarcoma patients - $384,3 \pm 83,2$ pg/ml, in secondary chondrosarcoma - $284,9 \pm 144,8$ pg/ml, in Ewing's tumor - $455,5 \pm 144,5$ pg/ml, and were significantly higher than in the control group. The lowest VEGF levels were detected in the sera of giant-cell bone tumor patients ($242,8 \pm 73,4$ pg/ml). VEGF levels in patients with benign tumors and tumor-like bone lesions ($320,8 \pm 37,4$ pg/ml) were slightly lower than in patients with malignant tumors, but significantly higher than in the control group. No associations were found

between pretreatment serum VEGF levels and the degree of therapeutic pathomorphosis in osteosarcoma patients ($p = 0,8$). Thus, at grade 1 pathomorphosis (10 patients) median VEGF levels comprised 150,5 pg/ml, at grade 2 (20 patients) – 280,7 pg/ml, at grade 3 (8 patients) – 227,8 pg/ml, and at grade 4 (4 patients) – 299,2 pg/ml. In osteosarcoma patients a 2-fold increase in relapse-free survival was observed if initial serum VEGF level was lower than 200 pg/ml.

Conclusions: Increased VEGF concentration was detected in the sera of patients with primary malignant and benign bone tumors as compared to healthy persons. In osteosarcoma patients relapse-free survival was two-fold worse if initial serum VEGF level exceeded 200 pg/ml.

ID 81

Biochemical markers of bone turnover in cancer patients with metastatic bone disease

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Introduction: The osteoclast-specific tartrate-resistant acid phosphatase 5b (TRAP 5b) and osteoblast-specific bone alkaline phosphatase (BAP) have been considered as biochemical markers of bone resorption and formation. This study was undertaken to evaluate the utility of bone metabolism markers TRAP 5b and BAP in breast and prostate cancer patients with bone metastases.

Material and Methods: Bone resorption (TRAP 5b) and bone formation (BAP) markers were studied in 178 breast and 102 prostate cancer patients with and without bone involvement. Serum levels of TRAP 5b and BAP were measured using the enzyme immunoassay Bone TRAP («Medac Diagnostika») and BAP EIA kit («BCM Diagnostics»).

Results: Pre-treatment levels of TRAP 5b were significantly higher in breast and prostate cancer patients with bone metastases than in healthy women and men and patients without clinical signs of metastatic spread to bone. TRAP 5b elevation was associated with the extent of the metastatic bone disease in breast carcinoma patients ($R = 0,529$; $p = 0,00001$). Serum levels of TRAP 5b gradually decreased in patients with positive clinical response to Bondronat therapy and in patients with progression of disease. Serial TRAP 5b values increased progressively. Diagnostic sensitivity of TRAP 5b for breast and prostate cancer patients was 78,9% and 64,6% (specificity 92,8% and 92,6%); sensitivity of BAP – 60,0% and 84,4% (specificity – 96,3% and 89,5%) respectively.

Conclusions: Measurement of TRAP 5b may be used in the detection of bone metastases and for the evaluation of bisphosphonates treatment effects on bone in breast cancer patients and BAP in combination with TRAP 5b – in prostate cancer patients.

SECTION 3

PERSPECTIVES IN THE CHEMOTHERAPY AND BIOLOGICAL THERAPY OF BONE AND SOFT TISSUE SARCOMAS

ORAL PRESENTATIONS

ID 214

Is it possible to evaluate the risk before and during preoperative chemotherapy in osteosarcoma?

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Introduction: Tumor necrosis rate is the standard criteria for risk assessment in osteosarcoma patients, included in neoadjuvant protocols. In order to evaluate the risk at early stages, we have investigated several tumor and treatment related characteristics, which were assessed at diagnosis and during induction chemotherapy.

Material and Methods: The database included 593 osteosarcoma patients. Between 1979 and 1986 preoperative treatment comprised one 72-hour IA infusion of DOX 90 mg/m² and radiotherapy 40 Gy. From 1986 to 1999, preoperative chemotherapy consisted of 3-5 monthly cycles of IA DOX 90 mg/m² or CDDP 120 mg/m². In the last protocol, induction consisted of 3-4 cycles of DOX and CDDP in similar doses. After local treatment, response adapted adjuvant chemotherapy was administrated. The clinical, radiographic, angiographic, perfusion, scintigraphic and biochemical characteristics were monitored during induction. Cox regression and SWS method were used in multivariate analysis.

Results: At presentation, stage IIIB, tumor volume >150 ml, growth rate >80 ml/mos. and elevated ALP level were predictive for higher progression risk in univariate and multivariate analysis. Overall and disease-free survival were significantly related to early tumor response, characterized by disappearance of clinical symptoms, tumor volume less than 300 ml, tumor regression, radiographic bone healing, decreasing of tumor vascularity, low level of tumor perfusion, low ⁹⁹Tc uptake or decreasing of its level and normalization of ALP activity. The degree of tumor regression, the radiographic and

biochemical responses after 2 cycles entered in the multivariate prognostic model, which allowed to predict the course of disease at this stage of treatment. The same criteria were predictive after completion of preoperative chemotherapy.

Conclusions: The use of modern imaging methods allows predicting the course of disease in osteosarcoma before and during induction chemotherapy. It permits to make appropriate therapeutic decisions before definitive surgery. The impact of risk and response adapted treatments on the local effectiveness, limb-salvage rate and survival has to be evaluated in prospective trials.

ID 220

Treatment results for patients with high-risk Ewing's sarcoma family tumor (HR ES)

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Introduction: The purpose of the current research is to study treatment results for patients with high-risk ES/PNET.

Material and Methods: From January 1995 to January 2006 103 pts (45 male, 58 female) with disseminated (28), poor prognosis (75) ES (72) or PNET (31) were included in research. Induction chemotherapy (CT) consisted of vincristine 1,5 mg/m²/d, days 1,8,15, adriamycin 37,5 mg/m²/d, days 1,2 as a 24-h infusion, cyclophosphamide 2,1 gr/m²/d, days 1,2 (1, 3, 5 cycles), and ifosfamide 2,4 gr/m²/d, days 1 through 5, VP-16 100 mg/m²/d, days 1 through 5 (2, 4 cycles). All patients achieved PR after 2 CT courses with 82% (52-98%) decrease in tumor volume. All patients underwent through a complex treatment in the following volume: polychemotherapy, X-ray therapy in summary focal dose 36-57 Gy on necessity large pole X-raing of the lungs in summary focal dose 12 Gy and surgical interference of organs saving character. 50 pts received HD CT with support of peripheral blood stem cells, harvested after second course of polychemotherapy in the condition of full sanation of the marrow.

Results: 5-year disease-free survival was $75,6 \pm 5,2\%$, 5-year disease-free survival without HD CT was $76,1 \pm 6,9\%$, 5-year disease-free survival with HD CT was $59,3 \pm 7,2\%$.

ID 43

Oncological outcomes following treatment of soft tissue sarcomas of the hand and wrist

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Introduction: Soft tissue sarcomas (STS) in the hand are rare tumours treated by surgical excision often combined with radiotherapy. Anatomic constraints make it difficult to achieve wide margins due to limited expendable soft tissue. Sacrifice of important structures to allow adequate margins can result in significant functional loss. Controversy still exists on whether limb-sparing surgery or amputation provides the best overall treatment in this location. This study compares oncological outcomes following treatment of hand and wrist soft tissue sarcomas from two regional centres of the UK.

Material and Methods: 64 patients with new primary, non-metastatic, STS in the hand and wrist diagnosed between 1990 and 2001 were identified from the centres' local databases. Further clinical details were extrapolated from patient clinical notes.

Results: There were 44 male and 20 female patients, with ages ranging from 11 to 92 years (median age 44 years). The three most common diagnoses were synovial sarcoma, clear cell sarcoma and epithelioid sarcoma. 17 patients had amputations and the rest limb salvage. The period of follow up ranged from 3 to 180 months. The overall survival was 79% at 5 years and was related to the grade and size of the tumour. There was a 25% risk of local recurrence almost all arising in patients with limb salvage. These patients had no worse a prognosis than those having amputations primarily.

Conclusions: This large series of hand and wrist STS has shown that survival is not affected by radical surgery or adjuvant treatment however local control can be compromised with limb sparing surgery. Inductive two-drug chemotherapy improves 2-year EFS from 35% to 68%. Limb salvage surgery didn't decrease EFS vs. amputation.

ID 207

Taurolidine: A novel anti-neoplastic agent induces apoptosis of osteosarcoma cell lines

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Introduction: Osteosarcoma (OS) is an aggressive bone malignancy that primarily affects children and adolescents. Presently, treatment of osteosarcoma involves surgical resection and multi-agent neo-adjuvant chemotherapy. The addition of neo-adjuvant chemotherapy to surgical resection has increased OS patient 5 year survival rates by over 50% compared to surgery alone. However, the increase in survival has reached a plateau despite the use of the most active chemotherapeutic agents. Furthermore, current chemotherapeutic agents, which include cisplatin, methotrexate and doxorubicin,

are all associated with high toxicity and numerous side effects. Consequently, the discovery of novel treatments for osteosarcoma is essential. Taurolidine, the active agent of Taurolin, is a broad spectrum antibiotic that has been used clinically to reduce post-operative infections for over 15 years. Recently, Taurolidine has also been shown to have in vitro and in vivo anti-neoplastic properties against a variety of cancers including glioblastoma and malignant melanoma.

Material and Methods: We examined the effect of taurolidine on osteosarcoma cell lines, U2OS, SaOS and sublines (LM3, LM5, LM7), MG-63 and sublines (M6, M8) and HU-09 and sublines (L13, M112), using cytotoxicity, apoptosis and migration assays.

Results: Although these cell lines possess different genetic defects and/or different metastatic potential, Taurolidine treatment inhibited the growth of M and induced all osteosarcoma cell lines tested with an IC50 range of 35-50 apoptosis in a dose-dependent manner. Taurolidine-induced apoptosis has previously been reported to be caspase-dependent. Of note, pre-treatment of osteosarcoma cells with Z-VAD-fmk, a general caspase inhibitor, prevented Taurolidine-induced apoptosis.

Conclusions: We conclude that Taurolidine induces apoptosis of OS cell lines in a caspase-dependent manner and that Taurolidine may have potential as a novel OS chemotherapeutic agent.

ID 205

Immunogene therapy with GM-CSF/B7-1 in the treatment of fibrosarcoma

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Introduction: Gene therapy induced expression of immunostimulatory molecules at tumour cell level may evoke antitumour immune mechanisms by recruiting and enhancing viability of antigen processing cells and specific tumouricidal lymphocytes. The anti tumour efficacy of a plasmid coding for Granulocyte Macrophage Colony Stimulating Factor (GM-CSF) and B7-1 costimulatory immune molecule, delivered into growing murine fibrosarcoma by electroporation was investigated.

Material and Methods: JBS fibrosarcomas were induced subcutaneously in Balb/C mice and were randomised at 80 mm³ to control and treatment groups. One day prior to treatment, the portal circulation was seeded with tumour cells. Gene delivery was assessed by in vivo imaging, cytokine measurement and anti-tumour cytotoxicity (in vitro and in vivo). Responses were determined by liver examination.

Results: Anti-tumour responses were found only in those treated by GM-CSF/B7-1 electroporation, with complete tumour regression in greater than 60%, and significant slowing of growth in remaining animals. Complete responders, when rechallenged, failed to develop tumours with the same tumour cell type but developed tumours with an alternative tumour cell type (CT-26). In vitro cytotoxicity was increased and a modified Winn Assay showed effective adoptive transfer of tumour specific immunity. When

tumours were surgically excised following immunogene therapy, these animals were rechallenged with a tumorigenic dose of JBS, to mimic minimal residual disease. It was found that 100% of these animals resisted rechallenge, indicating the potential for this therapy to be used in a neo-adjuvant setting. Using a liver metastatic model, effective cure of distal metastases was achieved following treatment of the primary subcutaneous tumour.

Conclusions: We conclude that immunogene-therapy of a murine fibrosarcoma model, by electroporation with GM-CSF/B7-1 plasmid induces effective local and systemic anti-tumoural immune responses which are durable. This treatment strategy could be applicable in the clinical setting for effective elimination of both primary tumours and associated metastatic disease.

ID 68

Predictive value of 8 candidate genes on osteosarcoma therapy outcome

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Introduction: Osteosarcoma is the most common primary tumor of the bone, typically affecting the long tubular bones of children and adolescents. The introduction of adjuvant and neoadjuvant chemotherapy markedly improved the outcome with long term relapse free survival rates ranging from 55 to 75%. However, the remainder of patients poorly respond to chemotherapy with an increased risk of relapse and the development of metastasis. Histologic response to chemotherapy is currently the strongest prognostic factor in high-grade osteosarcoma, but it can only be assessed after several weeks of therapy. Thus, detection of chemosensitivity at the time of diagnosis would be of great clinical importance. The aim of this study was the evaluation of the predictive value of 8 drug-regulated genes by the correlation of gene expression data with clinical parameters.

Material and Methods: Paraffin sections from 35 osteosarcoma biopsies were analyzed (18 good responder and 17 poor responder). The response to preoperative chemotherapy was assessed histologically according to the six-grade scale of Salzer-Kuntschik. Tumor cells were isolated by Laser-Microdissection followed by gene expression analysis using quantitative real-time PCR.

Results: Out of the 8 genes analyzed, the expression of rhoA, impdh2 and pro1959 was significantly elevated in tumors that poorly respond to chemotherapy (2.1-, 2.3- and 6.0-fold, respectively) ($p=0.017$, $p=0.019$ and $p=0.012$). A significant negative correlation of gene expression and disease-free survival could be detected for prohibitin, ferritin light-chain and pro2000, respectively.

Conclusions: This study suggests a possible role of rhoA, impdh2 and pro1859 as prognostic marker for the early detection of chemoresistance in osteosarcomas. In addition, the correlation of prohibitin, ferritin light-chain and pro2000 gene expression with the disease-free survival may indicate a more aggressive malignancy. Together, these candidate mar-

kers may be of clinical importance, in order to stratify patients at diagnosis into low and high-risk groups improving the outcome of high-risk patients and minimizing the toxicity of therapy for low-risk patients by means of a risk adapted therapy.

ID 245

The perspectives in combined treatment of soft tissue sarcomas

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There is no common opinion on advantages of different approaches in the treatment of soft tissue sarcomas. Heterogeneity of clinical groups makes the comparison of the results difficult because of rarity of such tumors and using different methods. Searching the new treatment methods in soft tissue sarcomas is still going on. Studying tumor markers is a new direction in disease outcome prediction and selection of individual chemotherapy. The number of characteristics which pretend to be of prognostic value is increasing constantly. Tumor location, size, depth, histological type, grade, surgical margins, distant metastases, local recurrence are usually used by us as prognostic factors. In order to improve the outcome prediction and individualization of treatment new factors were studied. They were Bcl-2, p53, MDM2, Ki-67, pRB, FAS, p27, MMP2, MMP9, TIMP2, bFGF, VEGF, Skp2. In this study we made an attempt to analyze their prognostic value and contribution to individualization of soft tissue sarcoma treatment.

POSTER SESSION

ID 238

Chondrosarcoma in children – chemotherapy and/or only surgery?

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Introduction: Authors present own experiences in treatment of chondrosarcoma in children. In the courses of 13 years, i.e. from 1992 to 2005 in Clinic 44 pts. with diagnosed chondrosarcoma have been treated. In majority of cases there were primary bone tumors with stage of G2, G3.

Material and Methods: 44 patients has been hospitalized, of age 6 to 21 years. 27 girls and 27 boys. In 38 pts. it was a localized form. Evolution of type and histological grade of tumors malignancy enable to choose the proper therapy methods, including the extend of operative treatment, introduction of chemotherapy. 31 limb-sparing operations have been done, multilative were carried out in 9 pts. Chemotherapy has been diagnosed. Additionally in 5 pts. radiotherapy was used.

Results: Good functional score we observed in 30 pts. Local recurrences were in 4 cases. In 6 pts. the metastasis foci in lungs have been found. In the discussed group of pts. alive 37 pts., two pts. is out of observed group.

Conclusions: In majority of cases there were tumors of low and medium stage of histopathological malignancy (G1, G2) more often giving local recurrences than distal metastases.

ID 194**Combined treatment of pediatric osteosarcoma: twenty-year experience**

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Introduction: we review our experience of combined treatment of pediatric osteosarcoma.

Material and Methods: From 1980 to 2003 one hundred and thirty eight patients (median age 10,8 years) with osteosarcoma(OS) were treated in our institute.135 patients underwent surgery. 129 patients had limb salvage surgery. All patients retrospectively divided into two groups according to scheme of chemotherapy: basis group and group of control. Forty two patients (38 with localized OS and 4 (9,5%) with metastatic OS) of control group were treated with monochemotherapy (cisplatin or doxorubicin) and surgery. Ninety six patients (87 with localized OS and 9 (9,3%) with metastatic OS) of basis group were treated according to the following scheme: primary two-drug chemotherapy (cisplatin plus doxorubicin), surgery and maintenance alternating chemotherapy (ifosfamide and etoposide were added).

Results: The efficacy of preoperative chemotherapy was 30% in the control group. Complete response (CR) was registered in 7,5% of patient and partial response (PR) – in 22,5%. Nine percent of patients of basis group achieved CR, 48 % patients of basis group had PR. The summary efficacy of two-drug regimen in basis group was 57%.Two-year event-free survival (EFS) of patients of control group was 35%.2-year EFS of patients of basis group was 68%.

Conclusion: Inductive two drug chemotherapy improves 2-year EFS from 35% to 68%. Limb salvage surgery did not decrease EFS versus amputation.

ID 218**Pediatric malignant tumors of the rib: results of multimodality**

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Introduction: We sought to establish the outcome and optimal therapeutic sequence for patients with primary malignant tumors of ribs.

Material and Methods: a retrospective analysis of institutional experience between 1976 and 2005 was performed. Seventy nine patients with primary malignant tumors of ribs were identified. The age is ranged from 3 to 16 years. 47 patients were male, 37 - female. 74 patients had a Ewing sarcoma (ES), three patients - osteosarcoma (OS) and two - chondrosarcoma (CS). Localized disease was diagnosed in 60 patients with ES and 2 with CS. Other patients had metastatic disease. 92% of patients with ES were included in high risk group (tumor volume over 100 ml or/ and metastatic disease at presentation). 47 patients (64%) underwent surgery. Since 1998 the treatment of patients with ES included intensive chemotherapy (adapted to

risk group) with 5-drug regimen (vincristin, adriamicin, cyclophosphamide, ifosfamide and etoposide) and local control (surgery and radiation therapy in 100 % cases). 21 patients (28%) were treated in this new study. 7 of these had metastatic disease and underwent megatherapy with peripheral blood stem cells transplantation. 53 patients with ES were included in control group.

Results: In the new protocol 5-year event-free survival (EFS) of patients was 72%. In the control group EFS at 5 years was 28%.

Conclusions: Surgery is absolutely necessary in the treatment of malignant tumors of ribs. New treatment protocol with intensive risk-adapted chemotherapy increase 5-year event-free survival from 28% to 72%.

ID 221**Overcoming of hematological toxicity by small doses of PBSC in high-risk pediatric ST sarcomas**

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Introduction: The purpose of the current research is to study toxicity of the intensive polychemotherapy including 8 courses on the following scheme: Etoposide + Cyclophosphamide + Carboplatin.

Material and Methods: The methods starting from 1999 until present time in the Research Institution of Pediatric Oncology in the Russian Cancer Center. 36 patients in the age from 2 to 14 years old (17 males and 19 females) with soft tissue sarcomas of high risk group including rhabdomyosarcomas (19) and synovial sarcomas (17) underwent through a complex treatment in the following volume: polychemotherapy, X-ray therapy on initial tumor in summary focal dose 45-50 Gr on necessity large pole X-raing of the lungs in summary focal dose 12 Gr and surgical interference of organs saving character. On the stage of consolidating all the patients were made reinfusion of subtransplantational doses of autological stem cells of peripheral blood.

Results: When holding consolidating therapy with hematopoietic support of PBSC the number of heavy leukopenia stayed on the level of 94,0%, thrombocytopenia on the level of 79,1%, but the length of the neutropenic fever decreased from $5,56 \pm 1,59$ days to $3,42 \pm 0,45$ days. When holding chemotherapy course, following after X-ray therapy, the support by PBSC might reduce the severity of thrombocytopenia and decrease the frequency of development of organotoxic complications. 2-year event-free survival was 52%, overall 2-year survival – 53,5%.

ID 140**Complementary treatment for chemotherapy-induced nausea and vomiting**

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It is a well known fact that nausea and vomiting are the most frequent, and often experienced as the worst side effects from chemotherapy-treatment. These adverse side effects can in

large scale alter a patient's quality of life, and worsen cancer-related problems such as cachexia and fatigue. It is therefore very important to achieve satisfactory relief from nausea and vomiting. The department of Physiotherapy at the Norwegian Radium Hospital has during the last few years introduced electrotherapy i.e. transcutaneous electrical nerve stimulation (TENS) as a complementary treatment for preventing and minimizing nausea and vomiting due to chemotherapy drugs. Patients of all ages and sexes treated for high-graded sarcoma have been offered this treatment if they have not achieved satisfactory relief from antiemetic medication. The patients have been very interested in the use of TENS and some report a subjective feeling of getting less nauseated. Most important is the feeling of control and management. Studies comparing TENS and acupuncture have shown that the latter is expected to be even more effective on nausea and vomiting than TENS. As a result of this we have just prepared a protocol on a pilotproject where we plan to use acupuncture against chemotherapy-induced nausea and vomiting. The preliminary results will be presented at the conference. We would also like to present the patients' and our experience with these complementary treatments.

ID 216
Neoadjuvant chemotherapy protocol without high-dose methotrexate in osteosarcoma

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Introduction: The purpose of this study was to evaluate the local response and long-term results in osteosarcoma patients, treated with neoadjuvant chemotherapy without high-dose methotrexate.

Material and Methods: From December 1999 to December 2005, 101 patients were included in this study. Most of them had IIB extremity osteosarcoma. Induction chemotherapy consisted of 3-4 cycles of DOX 90 mg/m² and CDDP 120 mg/m² IV or IA. Surgery was performed at week 20. Adjuvant chemotherapy in good responders comprised the drugs used preoperatively. In poor histological responders, IFO 9 g/m² and VP-16 500 mg/m² were added to DOX and CDDP.

Results: Limb-salvage rate was 91%. Fifty-four of 82 patients (66%) had > 90% of tumor necrosis. Overall survival (OS) and disease-free survival (DFS) at 5 years was 48±9%, and 45±8%, respectively. The response to induction chemotherapy was related to initial ALP level. The rate of good responders was 94% (16/17) in patients with normal marker level versus 48% (30/63) in patients with elevated ALP level, p=0.0006. The following factors were predictive for outcome in univariate analysis: stage (p=0.007), ALP level (p=0.015), tumor necrosis (p=0.006), and completeness of adjuvant chemotherapy (p=0.0006). Stage and initial ALP level retained their significance in Cox regression. In IIB osteosarcoma the predicted 3-year OS was 91% in patients with normal ALP level, and 74% in alternative group. In IIIB osteosarcoma with elevated ALP level the probability to survive 3 yrs was only 28%. DFS was also related to initial ALP level. The predicted 3-year DFS in patients with normal ALP level was 74% compared with only 24% in patients with elevated ALP level.

Conclusions: We conclude that this protocol is effective in terms of limb-salvage rate and percent of good histological responders. The most impressive long-term results can be expected in IIB osteosarcoma with normal ALP level at presentation.

ID 197
The primary treatment results by using of high doses of methotrexate for the children with osteosarcoma

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Introduction: the purpose of the current research is to study toxicity of the intensive chemotherapy including high doses of methotrexate and to increase the survival of children with osteosarcoma.

Material and Methods: the methods starting from 2003 until present time in the Research Institution of Pediatric Oncology in the Russian Cancer Center. 22 patients in the age from 5 to 16 years (13 males and 9 females) with osteosarcoma (localized disease - 12 patients, 10 - metastatic disease) underwent through a complex treatment in the following volume: poly-chemotherapy consisted of adriamicin, drugs of platinum, ifosfamide and etoposide, and also high doses of methotrexate – 12 mg/m² per infusion. Surgical interference was priority of organs saving character. The maximum dose of methotrexate was 20 g per infusion, 40 g was summary dose per cours.

Results: all patients achieved partial response with decrease in tumor volume. 16 patients are alive without disease now, 4 were died of progressive disease and 2 patients are alive now with progressive disease.

Conclusions: the modern chemotherapy with using high dose methotrexate improve survival patients with osteosarcoma.

ID 217
Intravenous versus intra-arterial chemotherapy in osteosarcoma of the extremities

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Introduction: The aim of this study was to compare the local response and long-term results in osteosarcoma patients treated with intravenous and intra-arterial preoperative chemotherapy.

Material and Methods: Chemotherapy consisted of 3-4 monthly cycles of DOX 90mg/m² as 96-hour CI and CDDP 120 mg/m² as 4-hour IA infusion (arm A) or 2-hour IV infusion (arm B). Surgery was performed at week 20. The histological response was evaluated according to Huvos score.

Results: The rate of good responders (grade III-IV by Huvos) was 81% (35/45) and 49% (19/39) in arms A and B, respectively, p=0.002. Complete tumor necrosis occurred in 23% of arm A patients and in 8% of arm B patients, p=0.05. At minimal follow-up time 12 mos, 33% (3/9) of patients from arm B developed local recurrence after limb-salvage surgery compared with only 6% (1/16) of patients from arm A, p=0.076. For the moment, we have no evidence that the CDDP administration way could influence the overall and metastases-free survival.

Conclusions: In this two-drug induction chemotherapy regimen, the intra-arterial administration of CDDP was more advantageous in terms of tumor necrosis rate and local control, especially after limb-salvage surgery. The impact on the long-term results has to be analyzed after a longer follow-up period.

ID 281

Chemotherapy efficacy in patients with bone sarcomas and soft-tissue sarcomas

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A total of 43 patients (pts) aged 23 to 59 years received treatment for sarcoma during 2003 through 2005 including 31 cases with osteogenic sarcoma, 8 cases with soft-tissue sarcomas and 4 cases with bone chondrosarcoma. The treatment was given on an outpatient basis and included combination

chemotherapy by CAP or CVDIC schedules. All the pts underwent specific treatment as surgery (40%), chemoradiotherapy (15%) or multi-modality approach. All pts had advanced disease with large tumors or recurrence, lung metastases, 7 pts presented with marked pain (used narcotic analgetics). Therapy was repeated at a 3 – 4 week interval. Adverse effects of chemotherapy included nausea and vomiting (45%), hemopoiesis suppression of various degree (74.5%), nephrotoxicity (12%), alopecia (83.5%), stomatitis (23%). Assessment of efficacy was performed after every two polychemotherapy cycles. Amelioration of pain syndrome was detected already after the first cycles, 5 (13.5%) pts presented with sustained analgesia through all cycles. Response was achieved in 11 (25.6%) cases including complete response in 6 (>50%) and partial response in 5 (<50%) cases; 9 (20.9%) pts had stable disease and 23 (53.5%) had disease progression. Response to chemotherapy lasted for 4 to 8 months on the average. In conclusion, second-line chemotherapy increases efficacy of multi-modality treatment and improves quality of life in cases with bone and soft-tissue sarcomas.

SECTION 4

LONG-TERM SURVIVORS (>10 YEARS): PREDICTION, QUALITY OF LIFE, COMPLICATIONS

ORAL PRESENTATIONS

ID 102

Limb salvage in malignant proximal humeral tumors

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Introduction: Results of prosthesis and osteoarticular allografts. Limb salvage procedures in primary bone tumors of the proximal humerus, if oncological adequate, offer attractive prospects regarding function of shoulder elbow and hand.

Material and Methods: From 1984-2005 184 patient were operated for proximal humeral malignancies. 55 had reconstructive shoulder joint surgery: chondrosarcoma (16), Ewing sarcoma (7), grawitz (2), MFH (3), osteochondroma (1), GCT (8), fibr. dysplasia (1), histiocytoma (1), NHL (1). Patient gender: male (32), female (23). Mean-age 45y (14-91y). Mean follow-up 8y (3m-21y).

Results: Resections were reconstructed with prosthesis and allografts (12), prosthesis (17), intercalary allografts (14) and osteoarticular allografts (1). 20 patients received neo-adjuvant chemotherapy or radiotherapy; osteosarcoma (9), Ewing sarcoma (6), MFH (3), NHL (1). 12 patients have died. 16 patients had a recurrence or metastasis. Procedures were complicated by infections (7), pseudarthrosis (3), luxations (2), bone resorption (1), and osteolysis round the stem (1). All could be treated with revision operations. No amputations were performed due to complications. Procedures with intercalary allografts had all good function. Pseudarthrosis (3) was successfully treated with bone grafts. Infections (3) in osteoarticular reconstruction as well as in prosthetic infections were revised after treatment of the infection. Allograft-prosthesis and osteoarticular allografts had all but one stable joints, restricted motion in abduction and elevation and good hand/elbow function.

Conclusions: Limb salvage in humeral bone tumors is an acceptable procedure. Despite complications of allografts all upper limbs could be saved. The functional outcome shows restricted but stable shoulder functions.

ID 280

Clinical analysis of infectious complications after endoprosthetic replacement in primary and metastatic bone tumours

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Aim: To analyze the infectious complications after endoprosthetic replacement in patients with primary and metastatic bone tumours.

Materials and Methods: Between 1992 and 2004, 275 patients who underwent segmental bone resection with subsequent endoprosthetic replacement for primary and metastatic tumours, were analyzed retrospectively. Infectious complications were manifested in 39/325 (12%) patients. There were 27 men, 12 women, between the age group of 13 to 53 years. The mean age was 23.1 years. We observed the infectious complications in 34/275 (12.36%) patients after the endoprosthetic replacement for the primary and metastatic bone tumours and in 5/50 (10%) patients after the revisional endoprosthetic replacement. Histological diagnosis included: 19 – Osteosarcoma, 6 – Malignant fibro histiocytoma, 2 each – Ewing's tumour & Paraosteal sarcoma, 4 – Periosteal sarcoma, 1 each – Chondrosarcoma & Giant cell tumour and 3 – Metastatic bone tumours.

Results: Infectious complications observed in the following: after humeral replacement – 2 patients, after femoral resection with subsequent endoprosthetic replacement – 14 patients, after tibial resection with subsequent endoprosthetic replacement – 14 patients, after total hip replacement – 7 patients, after total femoral replacement – 2 patients. Neoadjuvant and/or adjuvant polychemotherapy was carried out in 31/38 (81.6%) patients. Early, late and delayed infection was observed in the following order: 23/39 (59%), 14/39 (35.9%) & 2/39 (5.1%). Identification of the pathogen-sensitivity to antibiotics was carried out on the semi-automatic microbiological analyzer ATB-expression (Bio-merieux). In all 39 patients antibiotic treatment was carried out for 2 or more weeks depending on the pathogen. Besides that, in 21 patients (75%) diffe-

rent operative interventions were performed: removal of endoprosthesis – 1/39 (2.6%) patient, revisional endoprosthesis replacement – 6/39 (15.4%) patients, amputation of extremities – 18/39 (46.1%) patients, removal of endoprosthesis with installation of cement spacer 3/39 (7.7%). In 11/39 (28.2%) patients, infections were treated only conservatively.

Conclusion: We observed the infectious complications very frequently (21.5%) after the tibial resection with endoprosthesis replacement (Fisher's exact criteria $p < 0.05$). As an independent method of treatment, antibiotic therapy was effective only in 28.2% of patients.

ID 100

Endoprosthetic reconstruction for orthopaedic oncology: A minimum of 10 year follow up

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Introduction: Endoprosthetic replacement (EPR) is the limb salvage treatment of choice following resection of bone tumours in the UK, having been used for 39 years in our institution. This study investigates the fate of the reconstruction in the long term.

Material and Methods: Between 1966 and 1995 776 patients underwent EPRs. Growing endoprostheses were excluded as they invariably require revision to adult prostheses, leaving 667 replacements. Insufficient data was available in 6 cases, leaving 661 patients in the study. Information was reviewed concerning the diagnosis, implant and patient survival, subsequent surgery, complications and functional outcome. Kaplan-Meier survival analysis was used for implant survival with end points defined as revision for mechanical failure (aseptic loosening, implant fracture, instability, avascular necrosis, periprosthetic fracture, pain and stiffness) and revision for any cause (infection, local recurrence and mechanical failure).

Results: Patient survival was 52.7% at 10 years and 45.7% at 20 years. For those patients who survived their original disease, the mean follow up was 15 years (range 10-35 years). 227 (34%) patients underwent revision surgery, 75 patients for infection (33%), 36 patients for locally recurrent disease (16%) and mechanical failure in 116 patients (51%). With revision for mechanical failure as the end-point, implant survival was 75% at 10 years and 52% at 20 years. With revision any cause as an end-point implant survival was 58% at 10 years and 38% at 20 years. There was a significant difference between survival of implant between implantation sites, with the proximal humeral implant survival being the best and tibial reconstructions being the worst.

Conclusions: Our results are comparable with other series of long term follow up. We feel the results justify the long term use of endoprostheses in the reconstruction of limbs following excision of tumours.

ID 208

Osteosarcoma of the pelvis: outcome of surgical treatment

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Introduction: Pelvic osteosarcomas belong to the most challenging tumors for the orthopedic surgeon to treat. To better define patient and tumor characteristics as well as therapy results, the outcome of patients with osteosarcoma of the pelvis whose treatment strategy included surgical resection of the tumor at one single large institution was analyzed.

Material and Methods: 48 patients were retrospectively analyzed. At the time of diagnosis, the mean age was 36 (11-66) years. Most of the osteosarcomas were located in the ilium (18), and acetabulum (12). 20 patients underwent internal hemipelvectomy. In 29 patients, a wide surgical margin was achieved.

Results: At the mean follow-up of 5.6 (0.2-21) years, 20 patients (42%) were alive without disease. The 5- and 10-year survival was 48% and 42%, respectively. 15 patients (31%) developed local recurrences at a mean of 17 (2-63) months. The 5- and 10-year recurrence free-survival was 56% and 43%, respectively. No patient with local recurrence was alive. Local recurrence was directly related to margin, but not to tumor size and location. 27 patients (56%) developed subsequent metastasis at a mean of 16 months. Patients who developed metastasis at diagnosis fared worse compared to those who developed metastasis subsequently. The metastasis-free survival at 5- and 10-years was 52% and 42%, respectively.

Conclusions: The survival of patients with pelvic osteosarcoma does still not compare with extremity osteosarcoma. Margin is related to local recurrence; if there was local recurrence, the patient ultimately died. Metastasis may develop independent of local surgical control, and the outlook for these patients is particularly bad if present at diagnosis.

ID 139

Composite prosthesis in proximal tibia reconstruction: artificial and biological components outcome

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Introduction: The Authors (AA.) reviewed all reconstructions of the proximal tibia performed in their Oncology-Orthopaedics Department in Milan with a composite prosthesis, with adequate follow-up. The review focuses on the artificial-biological assembly outcome.

Material and Methods: 15 knee prosthesis assembled with an allograft to replace the articular segment of the proximal tibia were implanted between 1995 and 2002 in Istituto Ortopedico Gaetano Pini in Milan. The AA. consider the continuous series starting from the first implant in 1995 and they stop files revision at December 2002 in order to have a considerable follow up. All prosthesis were products of the same manufacturer whereas allografts were provided from two different European Bone Banks. In the youngest patient's case only the tibial front of the knee was replaced with the composite prosthesis to obtain a new knee, leaving the original femoral side articulating with the new tibial prosthetic surface.

Results: Twelve of fifteen implants are still in place. Two patients died of disease: an adult died of osteosarcoma, during the adjuvant chemotherapy period; a girl, 14 years of age, died of osteosarcoma too, in three years from the diagnosis. One more device failed, due to the recurrence of a leiomyosarcoma treated by an amputation above the knee. Of the group of 12 surviving prosthesis, one patient had a new surgery to replace the previous allograft that fractured. One other patient needed an implement with autograft at allograft-host junction, fifteen months after the primary surgery. One patient's knee developed invasive ossification of soft tissues with consequent complete loss of motion.

Conclusions: 15 composite prosthesis implanted, 12 surviving of the disease. Two patient underwent a new operation due to a complication (1 fracture of the allograft and 1 non-union). Only one patient obtained poor functional result, because of peri-prosthetic ossifications. The Authors consider such implant a good device to recover the knee after oncological resection of the proximal tibia.

ID 22

Quality of life and coping in sarcoma patients

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Introduction: It has often been claimed that quality of life depends on the kind of coping that patients use. The purpose of the study was to assess the relations between overall quality of life and coping efficacy in three major domains.

Material and Methods: The participants were 20 patients diagnosed with sarcoma within the past 6 months. They included 12 women and 8 men. Their mean age was 32.5 years. They were administered on one page two questionnaires (both developed by Kreitler & Kreitler in the Psychooncology Unit of the Tel-Aviv Medical Center): the multidimensional quality of life questionnaire (revised version) that includes 22 items to which the patient is asked to respond by checking one of 4 response alternatives (a lot, moderate, a little, not at all); and the coping questionnaire (short version) that include 22 items to which the patient has to respond by checking how true each was (very true, true, not true, not all true). The coping questionnaire provided three scores: emotional coping, cognitive coping and behavioral coping.

Results: The results showed that the high scores of overall quality of life were obtained by patients who scored highest on emotional coping. The second best kind of coping was the behavioral and the last the cognitive.

Conclusions: The findings suggest that in order to improve quality of life it is important to focus on emotional coping.

ID 24

The long term follow-up results of massive endo-prosthesis of TMTS

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Introduction: Considering patient survival and functional advances, limb salvage surgery has been performed in our department with the proper indications Massive endo-

prosthetic reconstruction of the limbs after the limb salvage surgery for the benign aggressive and malignant tumors has been indicated and performed for 47 cases in our department. We presented our clinical ten-years-results of the massive endoprosthesis of TMTS from the year of 1990 to 1997.

Material and Methods: Five cases with benign aggressive bone tumors and forty-two cases with malignant bone tumors were reconstructed with TMTS after the primer en-bloc resection surgery. Thirty-seven patients were diagnosed as osteosarcoma. Lesions were located in distal femoral for 21 cases, in proximal femoral for 3 cases, in femoral diaphysis for 4 cases, in proximal tibial for 7 cases and in proximal humeral for one case. The other case had both distal femoral and proximal tibial lesion. Two patients were diagnosed as chondrosarcoma. One of them had lesion in distal femoral and the other one had lesion in proximal femoral. The two cases with tumor in distal femoral were diagnosed as leiomyosarcoma and lymphoma. The mean age was 23 (11-66). The mean length of en bloc excision was 11 cm (7-48 cm).

Results: We didn't notice acute vascular injury, venous thrombosis and pulmonary embolism during peroperative and post-operative periods in all patients. Common peroneal nerve sacrifice was performed in two patients because of involvement. Femoral stems in five cases and tibial stems in three cases were revised because of aseptic loosening. One cases who had local recurrence was treated with high above knee amputation. ECF was applied in other two cases for distraction osteogenesis.

Conclusions: TMTS has been used for massive endoprosthesis reconstruction after en-bloc resections. Our 10-years-follow-up of TMTS reconstruction revealed that aseptic loosening was the main problem for the revisions free from the local recurrence rates. Despite its early and late complications, the functional advances for the patients' daily life improving with the massive prosthesis was undeniable.

POSTER SESSION

ID 192

Instability of the endoprosthesis in bone tumors.

A retrospective analysis

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Introduction: To analyze the frequency and the reasons of the instability of the endoprosthesis after endoprosthetic replacement of major joints in bone tumours.

Material and Methods: From 1992 — 2004, 275 endoprosthetic replacements (142 men & 133 women) of major joints were performed. The median age was 27.3 years (10 to 80 years). 34 (12.3%) out of 275 patients had instability of the endoprosthesis after primary endoprosthetic replacement, and in 5 patients, instability of the endoprosthesis was observed after revisional endoprosthetic replacement. Totally, instability of the endoprosthesis was diagnosed in 44 (16%) patients out of 275 operative interventions. We analyzed the instability of the endoprosthesis in various joints after endoprosthetic replacement. These are the following: 2/31 (6.4%) cases at the humeral joint, 2/44 (4.2%) cases at the hip joint, 11/65 (16.9%) had instability of the endoprosthesis after proximal tibial resection, 28/170

(16.4%) had instability of the endoprosthesis after distal femoral resection and 1/15 (6.6%) had instability of the endoprosthesis after total endoprosthetic replacement of femur. The Retrospective analysis of cases has shown, that the reasons of instability were the following: Aseptic loosening of the stem of the endoprosthesis in 12/44 (27.3%) cases, destruction of the endoprosthesis in 17/44 (38.6%) cases, migration of the endoprosthesis in 6/44 (13.6%) cases, destruction of the plastic bush in 7/44 (15.9%) cases and periprosthetic fracture in 2/44 (4.5%) cases.

Results: The time required for the development of instability of the endoprosthesis ranged from 6 days to 12.5 years. The mean required time was 26.1 months. Instability of the endoprosthesis most often seen (16.9%) after proximal tibial resection and less often seen after proximal femoral resection with endoprosthetic replacement (4.2%).

Conclusions: The most frequent reason (38.6%) resulting instability of the endoprosthesis was destruction (wear & tear) of the endoprosthesis.

ID 116

Resection arthrodeses of knee after tumor resection – different surgical techniques

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Introduction: Purpose of this study is to evaluate long term results of different techniques of resection arthrodeses (RA) for bone tumors around the knee.

Material and Methods: From 1975 until 1995 we performed 77 RA. Patients were evaluated according to the oncological outcome, functional and psychological compliance and complications. Possibility for conversion into endoprosthesis is discussed together with present rare indications for RA.

Results: Most patients (57) had an osteosarcoma. Surgical techniques were fibular grafts with bone chips, massive allograft fixed with rod or plate, split ipsilateral femur or tibia autograft combined with bone chips and temporary cement spacers. From 5 fibular grafts only one survives with good functional results. Massive allografts did better when fixed with plates as valgus and slight flexion could be achieved. Standard long nails showed higher rates of fracture failures. Chemotherapy and especially irradiation increases the infection rate mainly in the tibia. Initial use of cement spacers is an option. Best results were achieved by splitting and rotating half of the ipsilateral bone, adding bone chips and stabilizing with plate. Complications were osteosynthesis failures, bone graft resorption, fracture or non union, infection and local recurrence. Conversion into endoprostheses is feasible in cases of mechanical failures. Salvage of an infected tumor endoprosthesis through arthrodesis is also possible.

Conclusions: RA after tumor resection has high risk of complications that can be improved through a correct surgical technique. Graft incorporation depends on adjuvant treatment, age of patient, type of graft and osteosynthesis. If healed, RA enables a stable and fully weight-bearing extremity with good long term results. Indication for RA has greatly decreased with the improvement of large tumor endoprostheses, but it still keeps its indication in small children or cases were lack of soft tissue doesn't enable the use of non-constrained or semi-constrained endoprostheses.

ID 18

Long term survival (> 10 years) of patients with osteosarcoma and multiple synchronous metastases

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Introduction: Few patients with osteosarcoma and multiple synchronous metastases survive longer than 10 years after first diagnosis. We have been able to follow 9 patients from the COSS study who survived for more than 10 years with multilocal metastatic disease at diagnosis. Two of the patients were treated in our institution. We feel it is important to realize that some patients with multiple synchronous metastases may survive for long time.

Material and Methods: Patients registered in the COSS study with osteosarcomas and involvement of at least 3 sites were included. Skip lesions and multiple lesion in one lung lobe were excluded as each compartment was considered one site. The diagnosis of multilocal OSA was assumed, if at least at 2 sites histology proved typical OSA. There were 7 male and 2 female patients. Average age at primary tumor biopsy averaged 20.2 years and ranged from 7.5 to 44.7 years. Primary tumor site was the distal femur in five patients, proximal femur in one patient, femur metaphysis in one patient proximal femur and pelvis in one patient and multiple pelvic locations in one patient. All patients had synchronous pulmonary metastases. Five patients had multiple metastases in both lungs, one patient showed one metastasis in each lung, one patient had one metastasis in each lung and metastases in the 9th rib on each side, one patient showed two metastases in the right lung and one metastasis in the left acetabulum and one patient showed multiple metastases in both lungs with one additional metastasis in the 11th thoracic vertebra, the right femur, the right iliac bone and the right pubic bone.

Results: Two patients were lost to follow up after complete remission was stated. They averaged 15.6 years without relapse before they were lost to follow up. Complete remission was achieved in four patients with an average of 16.2 years without relapse. One patient with initially diffuse synchronous lung metastases is alive without complete remission after 15.6 years but is currently treated with high dose MTX because of metastases in the 11th thoracic vertebra and one rib. One patient with multiple synchronous pulmonary metastases and multiple skeletal metastases now reach 10.1 years without additional secondary metastases. One patient died 14.4 years after osteosarcoma with multiple synchronous pulmonary metastases was diagnosed for the first time.

Conclusions: Long term survival (over 10 years) of OSA patients with progressive disease have not been specifically addressed in the literature. In metastatic disease frequently a short term life expectancy is assumed. However even in progressive tumor disease prognosis has been improved with treatment and support to maintain quality of life. The data presented herein are not intended to give the impression of a generally good long term prognosis but should indicate that some patients may survive for long term. We have no clear factors to explain the slow progress in some patients. Aspects may be stable psychology allowing the patient to repeatedly undergo

f/u examinations and consequently managing problems, even so this may be only symptomatic or locally curative.

ID 122

Long term functional outcome and quality of life after treatment for extremity bone sarcoma

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Introduction: The purpose of this study was to evaluate the functional outcome and the quality of life (QoL) in survivors of extremity localized osteosarcoma and Ewing sarcoma (EBTSs) min 5 y after treatment.

Material and Methods: One hundred and thirty three (75 males) EBTSs (>15 y of age) are included in this study. The function was evaluated according to Enneking's system and Toronto Extremity Salvage Score (TESS) and QoL by Short Form 36 (SF-36) in addition to demographic data. SF-36 findings have been compared to an age and gender adjusted norm data.

Results: The median age at follow up was 29 y (15-57). Median time since diagnosis was 13 y (6-25). For 98 EBTSs the follow-up was > 10 y. Limb sparing surgery was performed in 60%. Fifty two percent were married/cohabitant, and 42% had completed a college/university degree. Sixty seven percent were working full or part time, and 19% were studying. The median Enneking score was 70% (17-100), and the median TESS 89% (43-100). The amputated had significant lower Enneking score, and those being amputated > 10 years ago had a significant lower score than the other amputated. No significant differences were seen in TESS. The EBTSs had lower scores in all the physical dimensions of SF-36 compared to their norm sample (p<0.001). The males had also significant lower scores in two of the mental dimensions (Social Functioning, p=0.04 and Role Emotional, p=0.008). There were no differences between the amputated and the limb sparing EBTSs except in physical functioning (p=0.003).

Conclusions: The EBTSs are doing well, but have a reduced physical functioning compared to the norm. Being amputated > 10 y ago gives a lower Enneking score, but do not influence the TESS and SF-36.

ID 54

Third primary osteosarcoma in a 22-year interval

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Introduction: Only few reports on patients who develop metachronous skeletal osteosarcoma exist. In these patients a metachronous osteosarcoma subsequently developed in another site without evidence of pulmonary metastases.

Material and Methods: We report an extremely rare case of a patient with a third primary osteosarcoma resulting in a rotationplasty on one and a tumorendoprosthesis on his other lower extremity.

Results: In 1983, an 18-year old male Caucasian received a rotationplasty due to a G3 osteosarcoma of his left distal femur, followed by an adjuvant therapy (Rosen T10 protocol). Ten years later, in 1993, a second primary G3 osteosarcoma of his twelfth thoracic vertebral body was detected. An en bloc resection was performed, followed by adjuvant chemotherapy. In July 2005, 12 years after his last operation, the patient was admitted to our department due to swelling and pain in his distal right femur. A biopsy was taken, again showing a G3 osteosarcoma. Staging revealed no metastases. After neoadjuvant chemotherapy a wide resection and reconstruction with a tumorendoprosthesis was performed. As a complication 2 months after the final operations the patient fell due to difficult weight bearing in combination with his rotationplasty and an open luxation of the operated knee occurred. At the moment, 3 months after the last resection the patient is free of recurrence or metastases and is still receiving chemotherapy.

Conclusions: The precise etiology of conventional osteosarcoma still remains unclear. In cases like the one described a genetic component is obvious. As the patient did not give his content for a genetic analysis yet, the identification of the genetic factor remains elusive. Rare cases like this, however, strengthen the need for a further molecular research leading to a better understanding of the factors causing osteosarcoma.

ID 103

Long time follow-up Kotz prostheses

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Introduction: The files of the patients treated between 1984 and 1994 who received Kotz modular prosthesis for reconstruction after resection of primary bone tumors are analyzed.

Material and Methods: 27 patients (17 male, 10 female) age 14-76 mean 37,1 years. Diagnosis osteosarcoma 11, chondrosarcoma 7, Ewing 4, MFH 3, synoviosarcoma 1, GCT 1. The used Kotz prosthetic device was: femur distal 16, proximal 7, tibia proximal 3.

Results: Oncological results: 8 Patients died (tumor related 7, other cause 1). There was one local recurrence. One patient had progressive recurrent disease (GCT to osteosarcoma). All 19 other are alive tumor free. Three amputations were performed; two for infection and one for local recurrence. Of the 19 long term survivors: 5 patients had no complication except for osteolysis around the stem and have still their prosthesis functioning. 5 had revision of the system towards a Mutars modular prosthesis. One of these because of fracture of the bone, one due to breaking the stem of the prosthesis. Prosthetic complications: bushes revision 4, acetabular cup revisions 2, loosening of the stem requiring cementation 2, fracture solved by revision of the Kotz prosthesis 1, infection 2 treated by amputation and rotation plasty.

Conclusions: The Kotz modular system prosthesis at longer follow up requires often second surgical procedures what is a problem as patients tend to survive longer.

ID 104**Treatment and recurrence of primary aneurysmal bone cysts**

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Introduction: Aneurysmal bone cyst is a vascular benign but destructive lesion of bone, often situated in or near the epiphyseal plate. Recurrence rates vary among different treatment options from 0-59%. Purpose of this research was to identify the therapy with the lowest recurrence rate, shortest in-hospital stay and least complications, especially considering growth disturbance.

Material and Methods: From 81 patients were diagnosed with primary aneurysmal bone cyst between 1980 and 2006 in the Leiden University Medical Center. Curettage, golden standard treatment, was compared to embolization, excision, injection with Ethibloc, autologous bone marrow, and methylprednisolone (Depo medrol®). Embolization with a Seldinger procedure can be performed either as treatment or as pre-operative adjuvans to curettage. Embolization is the treatment of choice for aneurysmal bone cysts in the spine and pelvis. Complications are rare. En bloc excision is common treatment for aneurysmal bone cysts in expendible bones. After excision, autologous or allogenic bone graft is sometimes required. Recurrence after en bloc excision is rare. For aneurysmal bone cysts in or near the epiphyseal plate, excision is not suitable because of induced growth disturbance. Injection of aneurysmal bone cysts with Ethibloc (solution of zein in alcohol) is a novel treatment option. It stimulates formation of bone inside the aneurysmal bone cyst. Injections with Ethibloc are suitable for long bones, pelvis or spine.

Results: Major complications hardly ever occur, but fatal Ethibloc injection in the spine has been reported once. Minor side effects include fever, temporary local pain and temporary self-healed inflammatory reaction in the first two weeks. Injections with methylprednisolone (5) was used on small scale in previous years but have a high recurrence rate (100%) and is abandoned. Embolisation (13) had a recurrence rate of 45%. Curettage (42) had a recurrence rate of 40.5%. Injection with Ethibloc (21) had the lowest recurrence rate 14%, but is used only for three years.

Conclusions: Our first treatment of choice is injection with Ethibloc. If impossible embolisation is a good alternative. Curettage can be seen as the last resort, as it is the most invasive therapy.

ID 162**Post operative complications after total hip replacement in proximal femoral tumors**

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Introduction: To analyze the post operative complications after total hip replacement in proximal femoral tumors.

Material and Methods: We retrospectively reviewed 50 patients who undergone total hip replacement for proximal

femoral tumors between 1994 and 2005. The histological diagnoses included 14 - metastases, 10 - osteosarcoma, 8 - chondrosarcoma, 4 - Ewing's sarcoma, 4 - giant cell tumor, 3 - malignant fibrous histiocytoma, 2 paraosteal and 2 periosteal osteosarcoma, and 1 each from primary neuroectodermal tumor, myeloid disease, and aneurysmal bone cyst. The follow-up ranged from 1 - 9 years (mean follow-up 5 years).

Results: Out of 50, 10 (20%) patients had delayed post operative periprosthetic infection. In 5 patients, dislocation of the endoprosthesis, in 2 patients haematoma were occurred in the early post operative period. The dislocation was reduced with satisfactory functional results. Instability of endoprosthesis was observed in 6 patients and required revisional total or partial hip replacement. Local recurrence of the tumor occurred in 2 patients and 2 patients necessitated exarticulation of the hip joint. 3 patients showed evidence of lung metastases. One patient was died of myocardial infarction in the early post operative period. There was no evidence of disease in 32 patients.

Conclusions: In our experience, periprosthetic infection was the commonest complication observed and S.aureus was the commonest pathogen identified. Special care was taken to reconstruct the abductors and Psoas muscle to the endoprosthesis to increase the stability of the artificial hip joint. Though the complication rate is very high, there is no doubt that endoprosthetic replacement of the proximal femur provides a good functional and oncological outcome when compared with the various other reconstructive surgeries.

ID 262**Is hindquarter amputation justifiable: the Royal National Orthopaedic Hospital experience**

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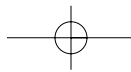
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Background: Advances in adjuvant and neoadjuvant therapies have rendered many tumours that previously necessitated amputation amenable to limb salvage procedures. However, a significant proportion of tumours are still treated by hindquarter amputation in an attempt to cure the patient, or to reduce the tumour load. This tends to be lengthy, mutilating and is associated with high morbidity and poor survivorship.

Aims: To review the survivorship, quality of life and functional assessment following hindquarter amputations performed in this centre in the last 10 years.

Material and Methods: This was a retrospective study of 51 consecutive patients who had hindquarter amputations for tumours between 1996 to 2006. Available patients were evaluated using contemporary functional outcome assessments (Musculoskeletal Society Tumour Score, Toronto Extremity Salvage Score, SF36).

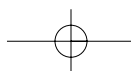
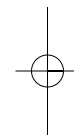
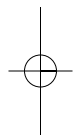
Results: Fifty-one patients (31 males, 20 females) had palliative (8) or curative hindquarter amputations (43) for chondrosarcoma (18), malignant fibrous histiocytoma (6), osteosarcoma (4) and other sarcoma subtypes (23). The mean age was 50.7 years (range 24-78). The mean duration of symptoms until referral was 5.2 months, the mean time from referral to tissue diagnosis was 16.2 days (range 2-80) and the time from confirmed histological diagnosis to surgery was 39.2 days (range 2-190) on average. Significant complications included phantom



Вестник РОНЦ им. Н. Н. Блохина РАМН, т. 17, №1 (прил. 1), 2006

limb pain (15), wound problems (24), urinary problems (6), cardiopulmonary events (5) and erectile dysfunction (3). 33 of the 51 patients have passed away, with a mean survival postoperatively of 10.7 months (range 2-43), with carcinomatosis the main cause of death. The mean cumulative survival following hindquarter amputation in this hospital is 17.3 months.

Conclusions: Patients with no metastasis and clear margins at amputation had a better cumulative survival rate. Therefore the decision to proceed for hindquarter amputation to achieve a curative resection is justified but has to be weighed up against the associated significant complications, morbidity and functional deterioration.



FREE PAPERS

ID 107

Treatment of pathological fracture in localised Ewing's sarcoma

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Material and Methods: We reviewed the treatment and clinical outcome of 32 consecutive patients with Ewing's sarcoma who presented with or developed pathological fracture after biopsy between 1984 and 2004. The minimum follow-up was 18 months. The mean age at diagnosis was 20 years (5 – 51). There were 18 males and 14 females. All patients were newly diagnosed and had localized disease at the time of diagnosis. 21 patients presented with pathological fracture while 11 patients developed fracture during the course of chemotherapy. The femur was the most common location in 15 patients. All the patients had chemotherapy according to the protocol current at the time of treatment. 7 patients had radiotherapy alone while 25 patients underwent surgical excision and reconstruction. Of the patients who had surgery, 7 patients had adjuvant radiotherapy. Fracture healing was the norm after pre-operative chemotherapy. Surgical margins were wide in 17 patients, marginal in 4 and intralesional in 3 patients.

Results: Local recurrence developed in one patient (3%). Metastases occurred in 12 patients (37%). At the time of review 16 patients were free of disease, 3 were alive with disease and 13 patients had died of disease. The cumulative 5 year metastases free and overall survival in all the patients was 58% and 61 % respectively and similar to patients with Ewing's sarcoma without fracture treated at our centre. The prognosis of patients who presented with fracture was exactly similar to those who developed fracture in the course of treatment.

Conclusions: We conclude that limb preserving surgery is perfectly safe in patients with Ewing's sarcoma who have associated pathological fracture and survival is not in any way compromised. Survival of patients who present with fracture is similar to those who develop fracture in the course of treatment. The exact role of adjuvant radiotherapy in these patients needs to be clarified.

ID 9

Radiation induced sarcomas of bone – factors that affect outcome

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Introduction: To identify patient, tumour or treatment factors that influence outcome in patients with radiation induced sarcoma of bone.

Material and Methods: A retrospective review of an oncology database supplemented by referral back to original records. Appropriate statistical analysis was done.

Results: We identified 44 patients who presented to our Unit over a 25 year period with a new sarcoma of bone following previous radiotherapy. The age of the patients at presentation ranged from 10 to 84 years of age and the time interval from previous radiotherapy ranged from 4 to 50 years (median 12.5 yrs). The median dose of radiotherapy given had been 50 Gy but there was no correlation of radiation dose with time to development of sarcoma. The pelvis was the most common site for development of sarcoma (14 cases) but breast cancer was the most common primary site (8 cases). 9 of the patients had metastases at the time of diagnosis of the sarcoma and all but one of the sarcomas were osteosarcomas. Treatment was by surgery and chemotherapy when indicated and 30 of the patients had treatment with curative intent. The survival rate was 41% at 5 years for those treated with curative intent but in those treated palliatively median survival was only 6 months and all had died by one year. The only factor found to be significant for survival was the ability to completely resect the tumour, thus limb sarcomas had a better prognosis (66% survival at 5 years) than central ones (12%) ($p=0.009$).

Conclusions: Radiation induced sarcoma is a rare complication of radiotherapy. Both surgical and oncological treatment is likely to be compromised by previous treatment the patient has received. Despite this 40% of patients will survive more than 5 years with aggressive modern treatment.

ID 30

Hemipelvic replacements with saddle prosthesis in the reconstruction of periacetabular primary and secondary tumors

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Introduction: The first purpose of this study was to evaluate the saddle prosthesis in patients with periacetabular tumors in terms of the functional results obtained after several postoperative intervals. The second purpose was to evaluate the complications and how they might be prevented in the future.

Material and Methods: Functional results according to the MSTS functional rating system were evaluated at several postoperative intervals in 25 patients treated with internal hemipelvectomy and reconstruction with the saddle prosthesis because of periacetabular malignancies.

Results: At a mean follow-up of 112 months, 14 patients (56%) were free from disease. Complications were observed in 17 cases (68%) including nerve damages (2 cases), deep infections (3 cases), upward migrations of the saddle (2 cases), saddle dislocations (2 cases), sacroiliac subluxations (2 cases), mechanical failures (1 case) and local recurrence (5 cases). The surviving patients achieved an average of 70% of their pre-morbid function.

Conclusions: Two contraindications (relative) to reconstruction with the saddle prosthesis could be ascertained: osteoporosis and extended involvement of the iliac wing by tumor. This method of reconstruction has a high morbidity and should be performed only at specialist centers, but the functional and oncological outcomes are satisfactory.

ID 158

Local and systemic control in chondrosarcoma still a challenging problem

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Introduction: Chondrosarcoma is the second most common primary bone sarcoma in patients over 20 years of age. The histological grading of this tumor has a broad spectrum from borderline tumors like aggressive enchondroma to high grade dedifferentiated chondrosarcoma. The wide surgical resection is considered to be the most important aspect of management in the treatment, because current chemotherapy and radiation have no significant role in the treatment of this disease. Therefore local and systemic control in these patients is still a challenging problem.

Material and Methods: In this retrospective study we analyzed the data of 255 chondrosarcoma patients (mean age 48 years) treated in the period from 1975 to 2004 in a single institution. The mean follow up was 55 month (range 1 to 365).

Results: 204 patients had grade I + II tumours and 51 had grade III + IV tumours according to histological criteria. The most prevalent sites of the tumour were the pelvis (36%), the femur (16%) and the humerus (11%). Local recurrences occurred in 47 patients (18,4%) and metastases were observed in 43 patients (16,8%) after treatment. The statistical analysis

showed no significant influence of chemotherapy or radiation on both, local and/or systemic control.

Conclusions: Despite adequate surgical margins we observed high rates of local recurrences and metastases in the patient population. The ineffectiveness of chemotherapy and radiotherapy regarding to local and systemic control leads to worse results in patients with chondrosarcoma compared to patients suffering from other primary bone tumors like osteosarcoma (e.g. local recurrence rates less than 5 %). Therefore the development of effective adjuvant treatment options is necessary to improve the outcome in these patients. In our opinion bisphosphonates could play a role in the future treatment of chondrosarcoma.

ID 39

Swedging-a forgotten sign in the radiologic diagnosis of eosinophilic granuloma of long bones

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Introduction: Eosinophilic Granuloma (EG) is a benign bone lesion, part of the Langerhans Cell Histiocytosis. Most lesions occur in the axial skeleton. Fewer than half occur in long bones. When present in long bone EG is located in the Diaphysis or Metaphysis. The radiographic features are mostly benign but in some cases it may present as an aggressive condition. Dr. Harold Jacobson coined the term "Swedging periosteal reaction" and described it as typical of EG. It is very thick, unilamellar periosteal reaction (PR) surrounding the lesion. It is typified by a thin lucent line separating the PR from the shaft of the bone.

Material and Methods: All cases of biopsy proven EG of long bones diagnosed in our center in the last 5 years were reviewed for the presence of swedging. In addition, 10 consecutive cases of Ewing's Sarcoma of long bones which demonstrated PR were reviewed.

Results: Twelve out of 14 cases of EG demonstrated swedging-type of PR. Other two had no PR at all. None of the Ewing's Sarcoma cases had this type of PR. One case of osteomyelitis and one case of stress fracture had similar appearing PR, though other imaging features differentiated them from EG.

Conclusions: Swedging-type of periosteal reaction, though not totally specific, is a useful sign in differentiation EG from other small round cell lesions of bone.

ID 153

Conservative treatment of patients with extremely aggressive fibromatosis: 10-year experience

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Introduction: The paper presents outcomes of radiation and thermoradiation therapies of patients with extraabdominal soft-tissue desmoid tumors.

Material and Methods: There are 83 patients with extra-abdominal soft-tissue desmoid tumors. All patients with extremely desmoid tumors received conservative treatment

during 1987 to 2002. All were traced back to their primary presentation and first treatment episode.

Results: Changes in neoplastic disease following radiation versus thermoradiation therapies are compared in 57 patients followed up for at least 10 years after discontinuation of conservative treatment (41 females and 16 males were identified). Median age at presentation was 39 years (range 15–84). Most patients presented with regression of desmoid tumors within 3 years after discontinuation of conservative treatment, though tumor regression time was longer in some cases. 10-year disease-free survival was greater in patients receiving thermoradiotherapy (radiation and hyperthermia) as compared to irradiation: 74.4 versus 28.6% ($p < 0.05$), while continuing growth and disease recurrence rates were higher after radiation therapy: 9.3 versus 57.1% ($p < 0.05$).

Conclusions: Monitoring tumor temperature during local hyperthermia is a factor of relapse-free survival of vital importance.

ID 128

Soft tissue sarcomas of the pelvis

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Introduction: 99 consecutive patients with new diagnosed soft tissue sarcomas involving the pelvic region were studied to determine the outcome and prognostic factors for survival and local recurrence.

Material and Methods: The mean age at diagnosis was 57 years. There were 55 males and 44 females. The mean tumor size was 12 cm (2 – 30). The tumor was deep in 79 patients and superficial in 20. Surgical treatment was excision in 93 patients and hindquarter amputation in 6 patients. Histological grade was grade I in 23, grade II in 22 and Grade III in 53 patients. 7% of the patients had metastases at presentation.

Results: The 5 year overall survival in all the patients was 57% and local recurrence occurred in 22% of the patients. The risk of inadequate surgical margins in patients with tumors within the pelvic brim was 50% compared to 18% for those with tumors located outside the pelvic brim. The significant predictors of local recurrence were inadequate margins and location of the tumor within the pelvic brim. Tumor size, grade and depth did not influence development of local recurrence. Significant predictors of survival included metastases at presentation, tumor grade and depth. The cumulative 5 year survival for patients with deep high grade tumors, deep low grade tumors, superficial high grade and superficial low grade tumors were 45%, 74%, 63% and 100% respectively ($p = 0.01$). Development of local recurrence adversely influenced development of metastases and overall survival with 5-year overall survival of 66% in those patients without local recurrence compared to 37% in those who develop local recurrence ($p = 0.005$). Multivariate analysis revealed that for patients with localized disease at diagnosis that histological grade and development of local recurrence were the most important determinant of overall and metastases free survival.

Conclusions: We conclude that treatment of patients with pelvic soft tissue sarcoma is challenging with high risk of inadequate margins and local recurrence in those with tumors located within the pelvic brim. Patients who develop local recurrence

have an extremely poor prognosis. Patients with high grade and inadequate surgical margins represent a particular group with very high risk of metastases and death even with radiotherapy and perhaps should be considered for other adjuvant treatment.

POSTER SESSION

ID 269

Do pathological fractures in bony sarcomas relate to prognosis?

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Introduction: Pathological fractures are thought to adversely influence prognosis in bony sarcomas. The aim of the study was to establish the influence of pathological fracture on local recurrence and survival in high grade chondro-, osteo-, and Ewing's sarcoma's.

Material and Methods: Retrospective survey on prospectively kept database. Recording of patient- and tumor characteristics and treatment to establish comparability of patients with and without pathological fracture in high grade, non-metastatic osteo-, chondro-, and Ewing's sarcoma, treated between 1980 and 2000. Compared were local recurrence and survival between patients with and without fracture. To make groups comparable only extremity tumour were included.

Results: In all 3 tumors, groups with and without fracture were comparable, although tumours tended to be located more proximally in patients with a fracture. No difference was found in local recurrence between fracture and no-fracture group in any of the tumors. 10 Year survival in the patients with a fracture was 35% in the osteosarcoma group ($n = 42$), and 32% in the chondrosarcoma group ($n = 34$), which was statistically lower than in patients with these tumors without fracture (survival 59% and 63% respectively; $p < 0.05$). In Ewing's sarcoma ($n = 19$) survival was 73% in patients with a fracture which was comparable with patients without a fracture (63%; $p = 0.68$).

Conclusions: Pathological fractures do not seem to correlate with local recurrence. In high-grade osteo- and chondrosarcoma they are however correlated with worse survival. This is not so for Ewing's sarcoma, where no correlation of fracture with survival was found. A possible explanation of this could be that Ewing's sarcoma is reacting more than the other 2 sarcomas to chemotherapy.

ID 195

Role of spondylography in detection of changes in skeleton after treatment of intraparavertebral tumors

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Introduction: The aim – to study the possibilities of X-ray examination of children's vertebra with intraparavertebral tumors, to improve the diagnostic efficacy of this pathology.

Material and Methods: There were 95 children under study. The tumor localization was the same in chest and retroperito-

nium cavity. The spondylography was performed in four-views in all cases.

Results: Data analysis of skeleton x-ray examination was exposed that 40% of children who undergo combined with radiotherapy or complex therapy have had the disturbance of physical development, changes in structure and deformation of vertebra, ribs and pelvic bones. The analysis of bone system in children after chemotherapy (37%) did not show the changes. In the group of children with after-radiotherapy effect there were changes: 97% in vertebra, 83% in pelvic bones, 53% in ribs, 73% in transversal appendices of vertebra, the decrease of vertebra body height in 70%, the condensation of their structure in 47%. The rotation of vertebra bodies in combination with small divergence of vertebra was developed in 57%. The disturbance of the development, structure of iliac bone on the tumor side was exposed in 83%, the decrease of width in 70%, deformation, asymmetry of pelvic ring, under-development of one half of the sacrum in 47%.

Conclusions: Obtained results allow us to improve the radiotherapy approaches.

ID 196

Imaging of intraparavertebral tumors in children

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Introduction: To study clinic and radiology data and efficiency of spondylographics (SG), ultrasound (US), computed tomography (CT), MRI, bone scan in evaluation of diagnostic methods in case of intraparavertebral tumors (IPVT) in children.

Material and Methods: 95 patients with IPVT were studied. The age ranged from 8 months to 15 years. 78% of patients had neuroblastoma, 13% - neurofibroma, 4% - teratoblastoma, 3% - Ewing sarcoma, 2% - rabdomiosarcoma.

Results: intraparavertebral neuroblastoma is often diagnosed in patients under 3 years, most common sites are thoracic spine (50%) and lumbar spine (50%). Others IPVT are most common for children over 10 years. Neurofibromas were localized in cervical and thoracic spine in 57%, teratoblastoma (19%) and Ewing sarcoma (14%), rabdomiosarcoma (10%) were localized in lumbar spine. All neurogenic tumors induced deformation and atrophia of surrounding bone structures. Round-cell sarcomas led to destruction of bone. IPVT often produce severe neurologic disorders. There were no neurologic symptoms in 20% of patients with IPVT.

Conclusions: CT and MRI are the methods of choice for diagnostic evaluation of spinal canal and paravertebral tumors.

ID 198

The complex diagnostics of pediatric chondrosarcoma

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Introduction: to develop rational complexes of methods of diagnostics and the combined treatment of rare malignant

tumours of bones (chondrosarcoma) in the childhood, directed on improvement of the results of treatment with the account of prognostic factors, describing biological behaviour of a tumours and specific features of the patient.

Material and Methods: in Scientific Research Institute of Pediatric Oncology and Hematology from 1979 till 2005 were on observation and treatment 83 patients with the primary chondrosarcoma, the male 44 (54%), and female 38 (46%). By all the patients the diagnosis was established on the basis of the clinical, radiological data and the morphological conclusion.

Results: The chondrosarcoma at children makes less than 7% of all initial malignant neoplasms of the bone system. The complex of diagnostic actions is necessary for a sure establishment of the diagnosis.

Conclusions: The most significant in prognostic attributes are duration of the anamnesis, sex, localization of a tumour, its morphological variant and medical pathomorphosis. For statement of the diagnosis it is necessary to use all the clinic and diagnostic data, such as clinical picture, radial methods of diagnostics (ultrasound, X-ray, computer tomography, angiographics, magnetic-resonance imaging) and hystologic examinations. The hystologic research is carried out with the minimal invasive method – trepanobiopsy with the X-ray control, but if this method have not high informative, the method of open biopsy of the tumour is applied.

ID 248

Difficulties of diagnosis of low-grade intraosseous osteosarcoma

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Introduction: Low-grade intraosseous osteosarcoma (LGIO) is a rare tumour of low-grade anaplasia as compared with common osteosarcoma, characterized by slow development, a weakly pronounced tendency to metastatic spreading, considerably better survival and prognosis. Purpose – studying clinical and morphological peculiarities of LGIO.

Material and Methods: Clinical, roentgenological and morphological peculiarities of LGIO werestudied in a total of six 19-to-36-year-old patients.

Results: The X-ray signs are variable and non-specific. More often, this is a metaphyseal lesion spreading to the articular end of the long bone. Observed herein could be: a periosteal reaction in the form of linear periostitis, or absence thereof, bulging of the bone, osteolytic or mixed portions of destruction, portions of pronounced sclerosis, destruction of the cortical plate, a soft-tissue component. CT and MRI help reveal signs of malignancy, not always detected on X-ray photographs. Due to weakly pronounced atypia of cellular elements and the osteoid, histologically, LGIO is rather often interpreted as a benign lesion. The histological picture of LGIO is variable, being however mainly characterized by the presence of bundles of spindle interweaving tumour cells with inconsiderable polymorphism and cytological atypia, low cellularity, a small number of mitoses, irregular production of the osteoid and comparatively mature bone. In abundant production of the osteoid, LGIO resembles osteoblastoma (2 cases) or parosteal osteosarcoma, in formation of thin

bone trabeculae, it resembles fibrous dysplasia (1 case). With predominantly spindle-cell component and very low production of osteoid, ILGO looks very much like desmoplastic or chondromyxoid fibroma (2 cases), low-grade fibrosarcoma.

Conclusions: Diagnosis of LGIO is one of the most complicated challenges in bone oncology, therefore requiring close cooperation between pathologists, specialists in radiodiagnosis, and orthopaedic surgeons.

ID 270

Bone and joint infections resembling bone tumours

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Introduction: We present 24 cases of infections of bone and joints that presented initially with a clinical picture of a bone tumor and we discuss the differential diagnosis between those two entities.

Material and Methods: We treated 24 patients with an acute infection of a bone or a joint. All they were referred to us by other units with the indication of a sarcoma. Usually, there was a painful growth and osteolysis; the clinical picture was not typical. The patients had biopsy and histology, as well as direct microscopic examination of the samples for bacteria and cultures for aerobic and anaerobic bacteria and investigation for brucella. They were investigated for fungal and TB infections with PCR. A few selected cases had tests for hydatid cyst and HIV. The joint fluid was examined under polarized light for uric acid crystals.

Results: Lab tests found 6 cases with tuberculosis of bone, 9 cases with staphylococcal osteomyelitis, 3 hydatids, 3 HIV, 1 infected TKA, 1 knee gout, 1 osteomyelitis due to plaster pressure and 1 spinal brucellosis. The lesions affected spine, sacrum, femur, knee and humerus.

Conclusions: The clinical picture of infections of the skeleton may be subtle and atypical but the prognosis is often grave if they don't receive proper treatment immediately. High index of suspicion, biopsy, swabs and appropriate diagnostic investigations help to establish the diagnosis and select the proper treatment.

ID 283

Specific features of clinicoradiological and histomorphological diagnoses

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Background: Analysis of the literature demonstrates clinicoradiological semiotics of some primary bone tumors to be developed rather poorly. There are no clear-cut criteria to differentiate benign from malignant tumors. This leads to diagnostic mistakes. For instance, mistakes in the diagnosis of tumors of the spine and flat bones, as mentioned by various authors, occur in more than 80% of cases. It is no doubt today that the diagnosis of bone tumors is a complex assessment including clinical, radiological, biochemical, morphological

and special investigations. The purpose of this study was to analyze specific features of clinicoradiological and histomorphological diagnosis in patients with giant-cell tumors.

Materials and Methods: A total of 216 patients (pts) with giant-cell tumors or bone cysts, 8 to 72 years of age, were managed at the Saratov Institute of Traumatology and Orthopedics during 1990 through 2006. Among the 216 pts there were 73 (33.7%) females and 67 (31.1%) males with giant-cell tumors; 36 (16.6%) females and 40 (18.6%) males with bone cysts. The complex examination consisted of clinicoradiological and histomorphological investigations. Preliminary and final histomorphological analyses were made on operative specimens from all pts.

Results: We compared clinicoradiological and histomorphological diagnoses of pts with giant-cell tumors and bone cysts. Variability of the radiological and clinical evidence of giant-cell tumors available to a much degree depended upon histology of the giant-cell tumors. Indeed, some radiological signs such as bone swelling together with trabeculocellular picture of the lesion are considered exclusively pathognomonic of benign giant-cell tumors. In females with giant-cell tumors in our study (34) their clinical and histomorphological diagnoses did not coincide in 46.6% of cases. Differential diagnosis of giant-cell tumors was a problem in cases with lytic lesions. Morphological study should therefore receive preference in the accurate diagnosis of these neoplasms. The diagnosis may be verified by cytology and histology each of the methods having its advantages and disadvantages as to individual types of giant-cell tumor. In males (34) with giant-cell tumors their clinical and histomorphological diagnoses did not coincide in 50.7% of cases. The giant-cell tumors were differentiated from other bone tumors, dysplasias and dystrophies that had similar clinical and radiological symptoms (chondromas, chondroblastomas, hemangiomas, fibrous dysplasias, dystrophic cysts, osteogenic sarcomas). The latter is sometimes mistaken for lytic type of giant-cell tumor because of intensive growth and painful course. In females (12) with bone cysts discrepancy between the clinical and histomorphological diagnoses was found in 33.3%. In males (11) with bone cysts discrepancy of the diagnoses was found in 27.5%. Bone cysts required differentiation from other bone tumors, dysplasias and dystrophies that had similar clinical and radiological symptoms (chondromas, chondroblastomas, hemangiomas, fibrous dysplasias, osteogenic sarcomas, osteomyelitis).

Conclusions: Differential diagnosis between giant-cell tumors and bone cysts remains an important problem and requires more profound study in spite of the progress in this field.

ID 230

Surgical treatment malignant bone tumors in children with growing endoprosthesis

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Introduction: The primary malignant bone tumors present 7% all malignant tumors in children and youth. Most frequent are osteosarcoma, sarcoma Ewingi and chondrosarcoma. The development of reconstructive techniques causes that possibilities of large bone defects completing increase.

Material and Methods: In Clinic, between 2000 to 2005, 41 limb salvage operations have been done with using growing endoprostheses. The patients were in age from 4 to 25 years. In mostly tumor was localized near the knee. In 36 pts. endoprosthesis was elongated mechanically and 5 electromagnetic endoprosthesis.

Results: Alive 39 pts. 74% of patients had excellent and good functional score. The best results we achieved with regular rehabilitation. In 12 pts. we observed complications.

Conclusion: The limb sparing surgical procedures is effective methods of therapy. These kind of operations have relatively small complications, but still are. In those below the 10 years, the growing endoprosthesis are recommended, because their elongation proceeds together with the patient growth.

ID 256

Bone remodelling around the passive growing component of expandable endoprosthesis

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Introduction: When inserting the passive component of an expandable prosthesis a polyethylene sleeve is commonly used. The sleeve migrates towards the lateral cortex and causes a cortical reaction and hence the use of the sleeve has been discarded recently. This study quantifies the amount of cortical reaction and degree of cortical drift in patients that had sleeves and those that did not.

Material and Methods: We reviewed X-rays and case notes of all patients that had an expandable endoprosthesis in a 20 year period. The thickness of medial and lateral cortices of the tibial diaphysis was measured at 6 months and on the last follow up radiograph. The distance from the edge of the sleeve (or prosthesis) from the cortical edge was also compared. Retrieved components also had their histology reviewed.

Results: The sleeve shifted laterally on average by 2 mm (range 0.5 - 3 mm) and touched the cortex. This was associated with an increase in lateral cortical thickness by 2.27 mm (range 1 - 3 mm). When the sleeve was used the prosthesis was inserted in the mid-line. When the sleeve was not used the tibial component tended to be inserted in valgus.

Conclusions: The presence of a sleeve is associated with a cortical reaction and the sleeve tends to migrate laterally. The clinical implications of this and the evolution of the design will be discussed in the meeting.

ID 272

Treatment of The Benign Lesions of The Femoral Neck

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Introduction: Benign lesions of bone frequently are found in the proximal femur. Bone tumors such as fibrous dysplasia, giant cell tumors, chondroblastomas, simple bone cysts aneurysmal bone cysts are often seen in this region. Benign lesions of the proximal femur are usually larger in size and they weaken the supporting framework of femoral neck.

Material and Methods: Twelve patients were treated and seen in followup. Six men and 6 women between the ages of 10 and 45 years (average 30 years) were seen at an average followup of 33 months. Seven patients had fibrous dysplasia; 3 had simple bone cysts; 1 had aneurysmal bone cyst and 1 had chondroblastoma. All patients were treated with curettage and morselized allogenic bone grafting. In addition to this treatment three patients treated with deep frozen fibular strut graft; three patients treated with proximal femoral nail and two patients treated with screws.

Results: There were no complications. The functional results were excellent (nine), good (two), fair (one). Nine lesions healed completely and three healed partially which all had fibrous dysplasia.

Conclusions: Allografts have a distinct place in the treatment of benign bone lesions of the femoral neck.

ID 63

Giant cell tumour of bone and pulmonary metastases

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Introduction: Giant cell tumour of bone (GCT) despite its benign classification has the capacity to locally recur and rarely may develop lung metastases. In literature, data on lung metastases shows different development pathways: spontaneous remission, dimensional stability, or increase in size and number.

Material and Methods: The Rizzoli Institute archives registered to December 2005 1209 patients with bone GCT. Nineteen (1.5%) underwent surgery, by the same team, for lung metastases. Nine were males, age ranging from 16 to 62. Site of primary GCT was the upper limb in 8 cases, lower limb in 10, spine in 1. In 13 cases a local recurrence was evident. Lung metastases were monolateral in 11 pts.

Results: Average disease free interval (DFI) from the onset of the primary tumour was 30.3 months in 17 pts; in 2 cases lung metastases were evident at presentation. All patients were operated with a contemporary mono or bilateral thoracotomy and wedge resection. The average number of resected metastases was 8 (1-23). Follow-up consisted in repeated CT scan. Thirteen patients were freed from metastases and are continuous disease free: average follow-up 96.1 months. Four patients are alive with lung relapse: average follow-up 107 months. Two patients died after 12 and 64 months respectively. Prognostic factors were evaluated. Histological specimens of the primary tumours were also evaluated with real-time PCR techniques for expression of genes related to lung metastases, and in particular the NG2 gene.

Conclusions: In conclusion, resection of lung metastases from bone GCT is strongly suggested when their volume increases in time and it is possible to free patients from disease.

ID 150**Platelet rich plasma improves bone formation in a long bone defect on a high surface scaffold***K. Szalay¹, J. Vogel¹, W. Richter¹, V. Ewerbeck², P. Kasten², M. Szendrői²,*¹Department of Orthopaedic Surgery, University of Heidelberg, Heidelberg, Germany;²Department of Orthopaedic Surgery, Semmelweis University, Budapest, Hungary

Introduction: Autogenous bone grafting is considered as the golden standard for filling bone defects even today, despite significant problems arising from high complication rate, donor-site morbidity, and limited amount of donor bone. The concept of tissue engineering is based on three pillars including scaffolds, cells and growth factors. There is a new high surface ceramic scaffold called calcium deficient hydroxyapatite (CDHA) that proved to be superior to known low surface scaffolds regarding bone formation. Well established potent cells are mesenchymal stem cells (MSC) that can be obtained autogenously from bone marrow and can be rapidly expanded. Platelet rich plasma (PRP) contains high concentrations of growth factors, which play an important role in the early phase of bone healing. The aim of this study was to assess the effect of PRP on new bone formation in a critical sized diaphyseal bone defect with combination of MSC and an absorbable CDHA scaffold in a rabbit model.

Material and Methods: Critical sized bone defects (1.5 cm) were created in the radius of New Zealand White rabbits (n=6/group). Animals were treated in compliance with the guiding principles in the Care and Use of Animals. The Committee on Animal Experimentation of Baden-Wuerttemberg approved the experiment. The defect was filled with CDHA ceramic cylinders alone, MSC/CDHA composites, PRP/CDHA composites or PRP/MSC/CDHA composites. Empty defects and defects filled with autogenous spongiosa served as controls. The observation period was 16 weeks. Bone marrow was aspirated of the tibia, MSC were isolated and expanded to cell numbers of 5x10⁶. PRP was produced allogeneously by centrifugation of whole blood from 5 rabbits. X-rays were taken every 4 weeks to determine the actual position of the ceramic implant and time course of bone formation. Mechanical stiffness was evaluated by a four-point non-destructive bending test. μ -CT scans were used to assess the amount of newly formed bone and the resorption of the implanted ceramic, and verified by analysis of histological slides. The effects of the independent variables, i.e., "stiffness", "bone formation" and the "resorption of CDHA" were examined by multifactorial analysis of variance (ANOVA). Differences between the subgroups of the independent variables were checked in post-hoc tests.

Results: We did not observe displacement of the implant. μ -CT scan showed significantly higher amounts of new bone formation ($p<0,001$) and ceramic resorption ($p<0,0005$) in the MSC/CDHA, PRP/CDHA and PRP/MSC/CDHA groups compared to the empty CDHA, but there were no differences among these groups. Biomechanical testing showed a higher flexural rigidity of the groups with MSC and PRP ($p<0,05$) compared to the empty CDHA group.

Conclusions: Bone healing is better using either mesenchymal stem cells or PRP in critical bone defects filled with the

new high surface ceramic CDHA. However, an additive effect was not observed using combination of the two components.

ID 249**Aggressive aneurysmal bone cyst of the vertebral column and pelvis***G.N. Berchenko, A.I. Snetkov, A.R. Frantov*

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Introduction: Aneurysmal bone cyst is a benign tumor of bone that can be locally aggressive and cause extensive weakening of the bony structure and impinge on surrounding tissues.

Material and Methods: Clinical, roentgenological and morphological peculiarities of aggressive aneurysmal bone cysts (AABC) were studied in a total of eight 6-to-17-year-old patients.

Results: AABC was localized in the bones of the cervical, thoracic and lumbar portions of the vertebral column (2, 3 and 1 patients, respectively), as well as in the pelvic bones (2 patients). The roentgenological signs of AABC are similar to those of a low-grade anaplasia malignant neoplasm, i. e., a pronounced periosteal reaction, total destruction and penetration of the cortical plate, rapid dissemination of the pathological process in soft tissue. Histological signs of AABC are as follows: presence of blood-filled cavities and connective-tissue septa separating them, stroma containing proliferating fibroblast-like cells, histiocytes, unevenly localized multinucleated giant cells; high cell-to-matrix ratio, well differentiated intercellular matrix of various degree of maturity, predominantly benign cytological characteristics of the cells with no signs of either anaplasia, or pathological mitoses, as well as local invasion of the pathological tissue to the adjacent soft tissue (sometimes in the form of satellite nodes). Pathological tissue extended to the adjacent bones in four patients (vertebral bones – 3 patients and pelvic bones – 1 patient). Pathologic fractures were formed in four patients. Differential diagnosis is primarily made with a teleangiectatic variant of a low-grade osteosarcoma. Surgical treatment consisted in an extensive marginal resection followed by alloplasty of the defect, and sometimes combined with Collapan.

Conclusions: AABC is a locally expanding benign lesion characterized by considerable destruction of the bone involved and dissemination of the pathological process into the adjacent soft tissue, sometimes accompanied by destruction of the articular surface, and formation of a pathologic fracture.

ID 264**A rare case of de novo bone involving peripheral T-cell lymphoma, unspecified***K. Bodo, W. Weybora, E. Spuller, A. Leithner, R. Radl*

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Introduction: We report a case of de novo T-cell lymphoma of the spine of a 60-year-old man who showed a lytic lesion in TH 10-12. Malignant lymphoma involving bone is unusual, accounting for approximately 7% of all bone malignancies. T-cell lymphomas are vanishingly rare.

Material and Methods: Magnetic resonance imaging showed a large, heterogeneous enhancing lesion involving the medul-

lary and cortical bone of the vertebrae with cortical disruption and extension into the adjacent paravertebral soft tissue. Diagnosis was made on a biopsy from the vertebral bone by routine histology and immunohistochemistry.

Results: The biopsy showed sheets and clusters of cells resembling lymphocytes with slightly irregular nuclei. Between the lymphocyte resembling cells a population of large lymphoid cells with immunoblast-like nuclei were interspersed. Immunohistochemistry showed positive reactions with the T-lineage markers CD3 and CD4. Most of the cells expressed CD3, some of them CD4. There was a loss of the T-cell antigens CD5, 7 and 8. There was no reaction with CD20, 21, 22 and CD30.

Conclusions: This is a rare case of a peripheral T-cell lymphoma, unspecified, diagnosed in the spine. The morphologic and immunohistochemical characteristics of the cells classify this lesion as a peripheral T-cell lymphoma, unspecified. To the best of our knowledge there are only few cases reported about a de novo lymphoma like this involving bone.

ID 56

Osteolytic lesions of the calcaneus: a series of 19 patients

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Introduction: Bone tumours rarely occur in the calcaneus. The purpose of this series was a retrospective analysis of all calcaneal osteolytic lesions archived in the Graz Bone Tumour Registry.

Material and Methods: Between 1998 and 2006 19 patients (12 male, 7 female) with a mean age at diagnosis of 27 years (8-79) were treated due to an osteolysis of the calcaneus. The causes of osteolysis were four primary malignant tumours, two bone metastases of carcinomas, ten benign tumours, and three tumour-simulating processes. Preoperative x-rays were available in eleven cases and analysed for the accuracy of the primary suspected diagnosis on the basis of x-rays only.

Results: In all but two cases the x-ray was typical for the process causing the osteolysis. However, in two cases of calcaneal osteosarcoma the x-ray features with a clear defined osteolysis, a sclerotic rim and trabeculations seemed typical for a benign process. In these two cases even MRI did not help to suspect a malign process.

Conclusions: Although in most cases, based on an x-ray, it is possible to distinguish between a malignant and a benign cause for an osteolysis of the calcaneus, caution should never be laid aside, as especially calcaneal osteosarcoma may mimic a benign process. Therefore, in almost all cases a biopsy should precede definitive treatment.

ID 237

Calcaneus's malignant neoplasm in children surgical treatment

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Introduction: Malignant neoplasm of calcaneus is very rare among children and constitute 3% of all bone tumors. The purpose of this paper is to present methods and surgical treatment results of calcaneus malignant neoplasm among children with the application of a large allogenic graft of the head of femur with a fragment of the nec ion of a large allogenic graft of the head of femur after excision of the calcaneus can assure long-term very good functioning results.

Material and Methods: The Clinic's material consist of records 3 patients treated for primary malignant bone neoplasm. The surgery was conducted under general anesthesia. Skin incision was made on the surface of inner side of the foot. After the dissection of the calcaneus together with the tumor wide resection) reconstructed the defect. An allogenic graft was modeled and it was connected with the tarsal bone using a metal clasp (arthrodesis). The Achilles tendon was sawn on to the graft. The limb was immobilized in plaster.

Results: Apart from edema of the surrounding tissues early post-operation complications were not observed. The flexion movement of the foot's back and sole were partially maintained. Local oncological radicalism was obtained among all the children. He graft healed up. The children can move without aid.

Conclusions: The application of a large allogenic graft of the head of femur after excision of the calcaneus can assure long-term very good functioning results.

ID 92

Giant cell tumor of the capitate bone

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Introduction: Giant Cell tumors of bone (GCTOB) are usually benign, mostly seen around the knee and distal radius but rarely in hand and wrist. A thorough review of the literature revealed only 4 primary GCTOB of the capitate. We are reporting a case of GCTOB of the capitate.

Material and Methods: A 24 year old female presented with a mild swelling on the dorsum of her left hand, painful during dorsiflexion and strong grip. There was no history of trauma or previous treatment. Plain roentgenogram showed a lytic lesion destructing the capitate almost totally. MRI revealed a neoplastic lesion expanding beyond the cortex both dorsally and palmarly. Open biopsy revealed GCTOB. Radiologic bone survey and lung CT revealed no pathology. Enblock resection and reconstruction with a bicortical bone graft from the iliac crest was done.

Results: At the 6th month control, she had no pain. Wrist flexion and extension were 30 degrees each, 20 degrees of radial and 15 degrees of ulnar deviation could be done. Graft was incorporated with 3rd and 4th metacarpals, and surrounding carpal bones. The control MRI revealed no recurrence, bone scintigraphy was done, again revealing no pathology.

Conclusions: GCTOF remains to be difficult to treat. Intralesional resection, curettage, adjuvants, grafting, filling the defect with bone cement, marginal or wide resection and even amputation are all argued. In our case, tumor had expanded beyond both the dorsal and the palmar cortices when applied and had signs of being intra-articular. We preferred enbloc resection of the tumor and intercarpal and partial carpo-metacarpal arthrodesis. Our patient is fully functional with no complaints during her daily activities, yet the risk of recurrence still exists since the 90% of recurrences are seen within 2 years and recurrence may be seen up to 10 years postoperatively.

ID 187

Giant-cell tumor of flat bones

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Introduction: Giant-cell tumor may present substantial problems in differential diagnosis. Conventional giant-cell tumor of bone is a distinct, locally aggressive neoplasm. Radiographic imaging, gross findings, histology is well known and described in the literature. The differential diagnosis from giant-cell reparative granuloma, brown tumor, nonossifying fibroma, chondroblastoma and chondromyxoid fibroma and also solid areas of aneurysmal bone cysts may cause numerous questions and take a lot of practical knowledge. Bone erosion in pigmented villonodular synovitis can sometimes present difficulties in differential diagnosis.

Material and Methods: We collected 12 rare cases of giant-cell tumor of pelvic flat bones. All patients were between 20-54 years of age with equal distribution between men and women. All cases occur in ilium and pubis, with iliac crest and acetabulum being the most frequent sites.

Results: Radiological features of the giant-cell tumor of pelvic bones were of large lytic defects with markedly expanded contours of bone. Large soft tissue component accompanied 6 of 12 cases. In these anatomic sites, the extent of the disease and its relationship to adjacent structures are best evaluated by computed tomography and magnetic resonance imaging. In 7 cases the magnetic resonance revealed secondary aneurysmal bone cyst changes. The radiographic features were nonspecific and overlap with usual differentials including malignant fibrous histiocytoma. In 4 cases prominent fibroxanthomatous and fibrohistiocytic reaction were revealed. In 2 cases several areas of hemangiopericytoma-like features were observed. In 2 cases a storiform arrangement of fibroblasts and macrophages resembled a benign histiocytoma. All 12 tumors were resected with no evidence of recurrence, but in 1 case where the tumor had features of prominent aggressive growth, proliferation and mitotic activity.

Conclusions: Early necrotic changes predominantly involved mononuclear cells with development of degenerative atypia mimicking malignant change. Necrosis in giant-cell tumors of pelvic bones was not a specific feature, more so reflecting the speed of growth. Among 12 cases only 1 recurrence was documented, showing more prominent aggressive growth and mitotic activity of the tumor, radiographic imaging of the expansion of the bone contours and soft tissue component. No metastatic disease has been developed.

ID 121

Malnutrition related complications in post hemipelvectomy patients

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Introduction: Hemipelvectomy is a very radical surgical procedure that is not performed frequently. The magnitude of this surgery causes a high consumption of energy and protein conducting the patients to a state of hypercatabolism. It is reported that hemipelvectomy presents about 50-70% of complications. The objective of this study is to evaluate the complications of the surgical wound and the flap (infection, abscess, dehiscence of the wound) and its relation with the malnutrition that suffer the patients after this surgical procedure.

Material and Methods: In this study, were included 14 cases, consisting in those patients that suffered any local complication secondary to the procedure such as infection, abscess or dehiscence of the wound. Data on sex, age, weight, height, size, body mass index (BMI), serum levels of albumin prior to surgery and 1-2 weeks after the presence of a complication. For the albumin it was considered as a mild depletion when it was from 3.4-2.8 g/dl, moderate 2.7-2.1 g/dl and severe <2 g/dl. The BMI was considered as normal from 20-24.9 kg/m² and overweight from 25-29.9 kg/m². The analysis was performed with the statistical software Stata 7, using descriptive measures.

Results: Of the 14 patients, were male 71% and 29% female. Mean age was of 35.5±9.7 years (male 34.2±10.3 years and female 39±8.2 years). Height of 1.61±0.07 m (males 1.64±0.13 m, women 1.60±0.67 m). Mean corporal weight was of 67.4±13.1 kg (male 63.2±9.1 kg, female 80.17±17.7 kg). Body mass index was of 25.8 kg/m² (male 24.6 kg/m² female 29.8 kg/m²). Initial serologic concentration of albumin was 3.3±0.9 g/dl (male 3.7±0.8 g/dl, female 2.2±0.4 g/dl) and final concentration was of 2.4±1.0 g/dl (male 2.6±1.1g/dl, female 2.0±0.6 g/dl). Infection was observed in 92.8% of the cases, without abscess and 50% had dehiscence of the wound. Six patients (42.8%) had two types of complications.

Conclusions: All the patients were admitted with a normal to obese nutritional state, according to the body mass index. Mild serologic albumin depletion was observed in these patients, at the moment of the complication the depletion was from mild and even severe in the female population. A high percentage of patients suffer malnutrition during the hospital stay (from the moment of the surgery to the presence of the complication), this probably contributes to the presence of local complications. It is required special attention on the nutritional status of the patient during the immediate post-operative period, even though that the patients tolerate oral nutrition, this is not enough to cover the nutrimental requirement during this period of hypercatabolism, secondary to the external hemipelvectomy.

ID 97

A video information program for children before lower limb amputation or rotationplasty

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Purpose: After several years of work and discussion the development of an information package for children before lower limb amputation or rotationplasty, has come to an end. The information on the DVD and photos gives a complete view about the medical treatment. And, even more important, social and emotional questions are answered. The information can be used as psychological preparation for surgery to diminish pre and postoperative anxiety.

Subjects: Years of experience and knowledge about psychosocial preparation were used to develop an information DVD and photo book. The DVD is based on social and emotional problems the patients have after the diagnosis of bone cancer and around the surgical intervention. The DVD is specially made for teenagers and young adults because this group can benefit very well from the possibility to identify with peers. It makes accepting the need to undergo an amputation or rotationplasty a little easier.

Methods: The information on DVD is given in a non-directive manner and prevents emotional mechanisms to become active. Four patients in the age of 14 until 19 years old appear as role models and are interviewed about their lives after surgery. Emotions as pain, anger and hope, and ways of coping with the situation are shared by the patient. Also living with prostheses, appearance, future and relationships are important issues, which are shared by peers. Two patients in the age of 13 and 16 years old are followed during the period of surgery, revalidation and fitting of their prostheses. Photos of their medical and physical treatments are included to complete the preparation package.

Discussion: In our opinion, psychological preparation of patients undergoing mutilating surgery like an amputation or rotationplasty should be attended by specialists at the field of psychosocial functioning. This information package should be handled by these specialists and could be helpful in their activities preparing this specific patient group before surgery, reduce stress, anxiety and stimulate the rehabilitation process.

ID 129

Prognostic factors in soft tissue synovial sarcomas

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Introduction: Synovial sarcoma is a morphologically well-defined neoplasm that most commonly occurs in soft tissue accounting for 5% to 10% of all soft tissue sarcomas. We reviewed 156 patients with synovial sarcoma of soft tissues treated at a supra-regional centre to determine survival and prognostic factors.

Material and Methods: There were 77 men and 79 women with mean age at presentation of 38 years (3 to 84). Follow-up periods ranged from 3 to 494 months (median 43 months). Tumor was located in lower extremities in 111 patients,

upper extremities in 34 patients, and trunk and pelvis in 11 patients.

Results: Overall survival was 66% at 5 years and 48% at 10 years. The 5 and 10 year survival for the 23 patients who had metastases at the time of diagnosis was 13% and 0% respectively compared to 75% and 54% for those without metastases at diagnosis. Local recurrence occurred in 18 patients (13%). The significant prognostic factors for survival included presence of metastases at diagnosis and development of local recurrence. Tumour size and depth, age of patients and use of chemotherapy did not significantly influence survival.

Conclusions: We conclude that the clinical factors which influence survival of patients with synovial sarcoma are different from those of soft tissue sarcomas in general. Biological factors may better predict prognostic survival than the usual clinical factors.

ID 260

Study of the neurinomas with ultrasonographic contrast media: recognition of a characteristic pattern

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Introduction: the neurinomas are benign tumours that take origin from the scabbard of the peripheral nerves. High resolution ultrasonographic constitutes an excellent methodic to visualize and differentiate the tumours of the peripheral nervous system to show the continuation live broadcast with the nerve ending to the two poles of the lesion. Besides the study of the vascularization with power-doppler, nowadays is always more frequent the use of the ultrasonographic contrast-media, that allows an expansion of the deriving signal from the vases. Purpose of our study is appraise if exists a characteristic distribution of the vases in the neurinomas and try in such way a characterization of the same.

Material and Methods: From January 2003 to February 2006 we appraised in our department 24 lesions that base on the their characteristic ultrasonographic, we identify as probable neurinomas. the patients (13F,10M) had an inclusive age among 15 and 90 years (middle age 46 years). We use the Technos Esaote echograph and it's dedicated software (CnTI).

Results: The cases that we have examined have introduced the following characteristics: In 17/24 damage we identified a contrast media enhancement defined "reticulate", in which are identified two patterns: reticulate to wide sweaters in 7/17 cases and reticulate to narrow sweaters in 10/17 cases. In 7/24 we observed a nearly homogeneous distribution of the contrast media, instead of the presence of little areas that remained without enhancement even in late venous phase. Such picture denominated "unhomogeneous diffused" and divided in two subtypes based on the presence of one (4/7 cases) or more (3/7 cases) avascular areas. The percentage analysis results that the 70,8% of the neurinomas introduce a pattern of type to reticulate, the remainder 29,2% introduces to unhomogeneous diffused enhancement pattern.

Conclusions: In base to our experience we think that the particular identified patterns may be of aid in the lesion recognition of the same nature.

ID 244**Our experience in standardizing surgical treatment of soft tissue sarcoma**

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Introduction: The adequate surgical treatment of patients with soft tissue sarcoma is still controversial. There are no common standards of minimally mandatory resection volumes. Purpose was to evaluate the preliminary results of radical resection locally advanced primary and recurrent soft tissue sarcomas affected adductor compartment of the thigh with a rectus abdominis musculocutaneous flap plastic reconstruction.

Material and Methods: From 2002 to 2005 fifteen patients with high-grade locally advanced soft tissue sarcoma localized in adductor compartment of the thigh underwent treatment at our department. 4 patients had primary sarcoma and 11 – recurrent sarcoma. We use CT and more often MRI in the preoperative planning of the tumor extent. Mean size of the tumors was 14.6 cm. Compartmental resection and a transferred rectus abdominis musculocutaneous flap reconstruction was performed in all these patients. Mean follow-up was 8.6 months.

Results: All operations were radical. Postoperative complications occurred in 2 patients. None of this group had local recurrence of disease. Lung metastasis was revealed in 1 patient.

Conclusions: 1) We consider that compartmental resection is the standard of surgical treatment in patients with locally advanced soft tissue sarcoma of adductor compartment, which consists of the adductive (longus, brevis, magnus) muscles, m. pectineus, m. gracilis and surrounding fascia. 2) Using a rectus abdominis musculocutaneous flap for wound reconstruction decrease the postoperative complication rate and is recommended as a standard of surgical treatment in this group of patients.

ID 259**Ultrasound guidance and histological correlation in the biopsy of soft tissues masses. Our experience**

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Introduction: Ultrasound-guided biopsy of superficial and deep masses of the muscle-skeletal apparatus is a minimally invasive, fast and low cost technique. In our experience the biopsies are always performed after a detailed assessment of the intralesional vascularization with use of ultrasound contrast media. We assessed the effectiveness of ultrasound-guided biopsies in the diagnosis of the soft tissues masses by comparing histology on the biopsy with histology on the surgical specimen.

Material and Methods: From January 2003 to January 2006 we performed 112 ultrasound-guided biopsies in 109 patients (65 males and 44 females, age 15-94 years). 16 and 18 G BioPince TruCut needles were used with the proper guiding-device. Prior to biopsy all lesions were assessed with a "Technos" (Esaote) ultrasound machine using contrast media (SonoVue, Bracco). In two patients the biopsy was repeated since the sample was not sufficient for a histological diagnosis; in another patient the biopsy was repeated

for a perceived discordance between histological and clinical data.

Results: 105 patients underwent a surgical excision of the mass after the biopsy. Two patients refused the proposed surgery and two were lost at follow-up. In 97/105 patients (92.4%) histology from the biopsy and histology from the surgical specimen were concordant. In 13 cases an open excisional biopsy was also performed before a complete surgical removal of the mass because of the aggressiveness of the lesion or because of a perceived discordance between histological and clinical data.

Conclusions: Ultrasound-guided biopsy of soft tissues is a safe and reliable diagnostic procedure. In our experience percutaneous biopsy was able to provide a correct preoperative diagnosis in 92.4% cases, thereby allowing the timely choice of the most suitable therapeutic approach, particularly important in high risk patients.

ID 37**Adult high-grade limb liposarcoma approached by limb sparing surgery and adjuvant radiation therapy**

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Introduction: ESMO minimum clinical recommendations for diagnosis, treatment and follow-up of soft tissue sarcomas have been recently published. "Early detection of recurrence might influence the possibility of a curative treatment. The patient should be followed every three months with history and physical examination. MRI of the site of resection of the primary tumor is proposed twice a year for the first 2-3 years and then once a year. For patients with high grade tumors, a chest X-ray is recommended every 3-4 months in the first 2-3 years, twice a year up to the 5th year, and once a year thereafter".

Material and Methods: A cohort of 38 adult patients with high-grade limb liposarcoma was approached by limb sparing surgery and post-operative radiation therapy.

Results: The 10-year local recurrence free survival was 83%, the 10-year metastasis free survival was 61%, the 10-year disease free survival was 51%, and the 10-year overall survival was 67%. The median values of these parameters have not been reached yet. Analysis of failure and success showed no association between these parameters and the age of the patients, the gender, the location of the primary tumor, the type of liposarcoma and the quality of resection.

Conclusions: Our results point to the fact that liposarcoma might recur even 10 years after the end of definitive therapy and might spread to unexpected sites as for soft tissue sarcomas. ESMO guidelines may require adaptation to liposarcoma follow-up.

ID 163**Treatment and outcome of soft tissue liposarcoma**

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Introduction: Liposarcoma is the second most frequent soft tissue sarcoma and the traditional approach is the combina-

tion of surgical treatment with radiation therapy and/or chemotherapy in selected cases. The purpose of the present study was a retrospective review of the data of 149 consecutive patients affected by liposarcoma of the extremities, treated in author's Institution during the last fifteen years, with the aim to correlate the observed outcome with treatment modalities and with recognized prognostic factors.

Material and Methods: There were 91 males and 58 females with an average age of 54 years (min 16-max 92). The tumor grading following Broders criteria showed a low grade lesion in 48% of cases and a high grade lesion in 52% of cases. The histologic pattern showed a conventional liposarcoma in 32 cases (21.5%) and a well differentiated liposarcoma in 21 patients (14%). The most frequent histologic finding was a myxoid liposarcoma in 52 cases (35%) while a pleomorphic liposarcoma was seen in 25 cases (17%). Both myxoid and round cell component was present in 12 cases (8%) and a round cell liposarcoma was seen in 3 cases (2%). Dedifferentiated liposarcoma occurred only in 4 cases (2.5%). The size of the tumor was smaller than 5 cm in 11% of patients, ranging from 5 to 10 cm in 51% of cases and larger than 10 cm in 29% of cases; in 9% of patients the original size was not available. The tumor was at first presentation in 54% of cases, it was a local recurrence in 29% of cases and a radicalization of a previous inadequate surgery was done in 17% of cases. The tumoral lesion was located in the lower limb in 124 cases (83%), in the upper limb in 16 (11%) and in the soft tissues of the trunk in 9 patients (6%). Surgery alone was performed in 31% of cases while chemotherapy and/or radiation therapy was associated in 69% of cases. A preoperative treatment was delivered in 10 cases, a postoperative treatment in 73 cases, while both neoadjuvant and adjuvant therapy was performed in 20 cases. After resection, a soft tissue flap was used for reconstruction in 19 cases (13%); the flap was rotational in 5 cases while a microsurgical free flap was used in 14 cases.

Results: In 8 cases (5%) a local recurrence occurred and in 27 cases (18%) a metastatic lesion was seen. Local recurrences were treated with surgical excision in 5 cases and with amputation in 3 cases. Metastatic lesions were seen to occur in lungs in 13 cases, in the soft tissue of the thoracic wall in 3 cases and in multiple site in 11 cases. At latest follow up, 70% of patients were continuously disease free, 5% were disease free after local recurrence or metastasis excision, 9% were alive with disease, 8% were dead of the disease, 2% were dead of other cause and 6% of cases were lost at follow up. Eleven patients (7%) underwent an amputation, in 5 cases as first surgical procedure, in 3 cases after a local recurrence and in 3 cases for complications of the radiation therapy.

Conclusions: The authors present the results in soft tissue liposarcoma, considering correlations with treatment modalities and prognostic factors of the disease.

ID 27

Aggressive fibromatosis of soft tissue totally involved scapula: uncommon presentation of a case report

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Introduction: Aggressive fibromatosis basically originated from musculo-aponeurotic junction and known also as des-

moid tumors that is locally aggressive and diffusely spreading margins. It has been reported that patients with an extra-abdominal desmoid tumors may have multiple minor bone abnormalities, including cortical thickening; exostoses; cysts and deformities in long bones. However, no previous reports have documented extra-abdominal desmoid tumor totally invaded scapula.

Material and Methods: We described a rare case of a 31-year-old man of the extra-abdominal desmoid tumor located in scapular region and invading totally scapula bone and transpassing to the scapulo-thoracic region. He had a pain that started at his shoulder and extended to his scapular region while he was doing exercises. Physical examination revealed a 15x10x5 cm mass that was not adherent to the skin but infiltrating underlying tissue and muscles at his right scapular region. The mass was firm, smooth-surfaced and well defined. Tenderness was noted around the mass. The computed tomography, tridimension reconstruction of the scapula, the magnetic resonance imaging and tru-cut biopsy were performed. Pathological examination was leading to the diagnosis of fibromatosis reported and wide resection was suggested. Type III intra-articular total scapulectomy was applied.

Results: Adjuvant radiotherapy was performed with 50 Gy for 10 days. At the end of two years follow-up period, local recurrence was observed by MRI evaluation. Local excision was performed. His follow-up examinations have been continuing.

Conclusions: Aggressive fibromatosis basically originated from musculo-aponeurotic junction and known also as desmoid tumors that is locally aggressive and diffusely spreading margins. No previous reports have documented extra-abdominal desmoid tumor totally invaded scapula. We describe an rare case of extra-abdominal desmoid tumor occurred in scapular region and invading totally scapula bone and transpassing to the scapulo-thoracic region.

ID 234

Surgery and combination therapy results in sinovial sarcoma: analysis of 25 cases

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Background: There are many problems to be solved in the treatment for sinovial sarcoma (SS) accounting for 5-10% of all soft-tissue sarcomas.

Materials and Methods: The study was performed in 25 SS patients (pts), age 12-63 years (median 40.1 years). The diagnosis was made basing on x-ray, ultrasound, computed tomography, histological and immunohistological analysis. 92% (23) of the pts had tumors greater than 5 cm. More than 70% of the pts had stage III disease. 23 (92%) cases had G3 and 2 (8%) cases had G2 tumors. Eight pts (group 1) received thermochemoradiotherapy (TCRT) including distant radiotherapy (up to an isoeffective total tumor dose 50-78 Gy) in combination with local hyperthermia up to 42°C in the tumor (4 sessions) between irradiation fractions and neoadjuvant and adjuvant (3-6 cycles) polychemotherapy. Pts from group 2 (n=11) received surgery alone. Group 3 (n=6) received TCRT and surgery. The groups were well balanced with respect to patient characteristics. Surgical procedures were

radical and organ-preserving except for 4 amputations in group 2.

Results: Immediate and earliest postoperative results were 3 (37.5%) partial responses, 5 (62.5%) stabilizations in group 1; complete response in all patients in groups 2 and 3. All recurrences were reported within the first year following treatment (4, 50% in group 1; 7, 64% in group 2; 1, 17% in group 3) except 1 case from group 2 who developed recurrence at 1.5 years following treatment. The 5-year overall (OS), recurrence free (RFS) and metastasis free (MFS) survival rates were respectively $8 \pm 11.01\%$, $31.4 \pm 20.59\%$, $9.3 \pm 12.3\%$ in group 1; $16.7 \pm 14.82\%$, $28.6 \pm 15.48\%$, $38.3 \pm 14.54\%$ in group 2; all pts survived 5 years including 1 case dying within year 6, $81.8 \pm 16.44\%$, $54.5 \pm 24.8\%$ in group 3.

Conclusions: Surgery remains the principal and mandatory treatment modality in SS. OS rate in group 1 was very poor. The 5-year OS and RFS rates in group 3 were significantly better than in other groups while MFS was better than in group 1 alone which confirmed the effect of multi-modality treatment in SS.

ID 119

Angiosarcoma metastatic to ovary. Case report

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Introduction: Angiosarcomas are rare tumors, originated from endothelial cells. They represent 1-2% of the soft tissue sarcomas. They appear frequently in head and neck skin in old patients or in soft tissues. The visceral angiosarcoma is even less frequent, it has been reported in liver, spleen, adrenal glands, thyroid and heart, it has been rarely described in ovary, with around 20 reports in the literature as primary tumor, and rarely in metastatic fashion to the ovary. This case is presented due to the unusual presentation.

Material and Methods: Case report.

Results: 32 years old female, with capillary hemangioma in lumbar sacral region, diagnosed 4 years before, that presents abscess in gluteus region, surgical drainage was carried out in December 2003, finding tumoral tissue, biopsy reported angiosarcoma. She was admitted at the National Cancer Institute of Mexico in January 2004 with 5 cm tumor on right gluteus, not well defined. CT shows a 12x5 cm tumor located in right gluteus that extends to lumbar region, without muscle involvement. A wide resection was carried out in February 2004, reporting a 4x3 cm. tumor in right gluteus, ulcerated with central necrosis. Pathology reported a residual high degree angiosarcoma with free surgical margins. 60 Gy was administrated in July 2004. In October 2004 she presented acute abdominal pain and a mass in left lower quadrant. She was submitted to surgery, finding an ovarian and left salpinx mass. Pathological report was metastatic angiosarcoma. We suggest chemotherapy but she didn't accept it. In February 2005 presented 1 cm, purple nodes in surgical wound. Biopsy reported angiosarcoma. One month later presented progression. MRI showed a rectal extrinsecal compression that displaced sacral nerves. In April 05, last follow-up. CT showed lung metastasis.

Conclusions: Ovarian metastasis of soft tissues angiosarcoma are extremely rare, and less common as acute abdomen.

There only few cases reported in the literature with ovarian metastasis and none presented as surgical emergency. The ovarian metastasis should be distinguished of primary ovarian carcinomas or even benign lesions. The characteristics of metastatic lesions include bilaterality, multiple nodules, superficial involvement and little parenchymal and lymphovascular invasion, and a history of primary tumor elsewhere.

ID 109

Routine MRI surveillance following definitive treatment of bone and soft tissue sarcoma

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Introduction: Local recurrence following definitive treatment of bone or soft tissue sarcoma is a predictor of increased morbidity. Early detection may affect outcome. The role of magnetic resonance imaging (MRI) screening following definitive treatment is controversial. There is no evidence in the literature that it is of value in detecting local recurrence earlier. This study investigates the experience of one treatment centre with routine surveillance MRI following treatment of sarcoma.

Results: There were thirty-seven men and twenty-eight women identified between 1996 and 2003. The mean age at diagnosis was 47 years (range 6-78 years). Twenty five percent (16 patients) had a primary bone tumour. Eight had an Ewings sarcoma, 3 osteosarcoma, 4 chondrosarcoma, and one giant cell tumour. Soft tissue sarcoma were liposarcoma (17 patients), leiomyosarcoma (6), synovial (5), fibromyxoid (5), epithelioid (2), spindle cell (2), malignant fibrous histiocytoma (6), rhabdomyosarcoma, MPNST, and two undifferentiated high-grade tumours. Sixteen patients had local recurrence (25%). Six were identified on surveillance scan, and the remaining ten required interval scans because of clinical suspicion of tumour recurrence. All those detected on surveillance had intra-lesional or marginal resections.

Conclusions: Surveillance scanning has a role in the early detection of local recurrence of bone and soft tissue sarcoma. Whether this results improvements in prognosis require longer-term follow up studies.

ID 96

Bone metastases from ovarian cancer

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Introduction: We report 2 cases of bone metastasis from ovarian tumours over a 15 year period at our institution.

Material and Methods: We reviewed all histological reports of bone metastases over a 15 year period at our institution and identified 2 patients with bone metastasis from epithelial and granulosa cell tumour of the ovary.

Results: Patient A, aged 50, presented with a pathological fracture of her right proximal femur which was found to be a solitary metastatic lesion from an epithelial ovarian tumour. She underwent a proximal femoral replacement followed by total abdominal hysterectomy and bilateral salpingo-oophor-

ectomy. Post-operatively she had radiotherapy to her right leg and a course of chemotherapy. Follow-up at 30 months revealed no recurrence with a Musculoskeletal Tumour Society (MSTS) score of 77%. Patient B presented with a history of right shoulder pain and a past history of a granulosa cell tumour of the ovary for which she had total abdominal hysterectomy and bilateral salpingo-oophorectomy 4 years before. She was found to have a solitary metastatic lesion in her right scapula and underwent a right scapulectomy with clear margins. Her post op MSTS score was 57%. She did not receive adjuvant therapy and on follow-up at 6 months was found to have bilateral lung metastases. Histological reports of both patients post operatively confirmed metastatic lesions from epithelial and granulosa cell tumour of the ovary. A review of the literature shows that skeletal metastases from ovarian cancer is rarely reported and few publications have documented the efficacy of adjuvant therapy such as radiotherapy, chemotherapy or hormonal treatment.

Conclusions: Bone metastases from ovarian cancer may be treated aggressively. Management requires a multidisciplinary team approach in a centre specialising in management of bone tumours. There is a need for increased awareness of the role of adjuvant therapy in the management of this condition.

ID 125

Postoperative intravenous patient-controlled analgesia-administered ketamine plus morphine spares morphine

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Introduction: Pain after surgery for bone and soft tissue tumor is intense, and may require large amounts of analgesics, especially opioids. The concomitant use of ketamine and opioids in patients undergoing general surgery has shown to reduce pain and spare opioids. We compared the effects of standard morphine dose alone vs. subanesthetic dose of ketamine plus 66% of the standard morphine dose via intravenous patient controlled analgesia (IV-PCA) on pain intensity in the orthopedic oncological patients.

Material and Methods: Forty patients underwent surgery under standardized general anesthesia. Postoperatively, they received via IV-PCA (lockout time 7 min) randomly, prospectively and double-blindly (n=20/group) morphine 1.5 mg/bolus (standard dose) or ketamine 5 mg + morphine 1 mg/bolus. Treatment started when the coherent 5/10 on a visual analog scale (VAS), and patient subjectively-rated pain as lasted up to 24 h. Intramuscular rescue diclofenac 75 mg was also available.

Results: The mean hourly pain intensity among the ketamine + morphine patients was lower ~ 50% compared to that in the morphine alone group, as was the morphine consumption. PONV was recorded twice in the only MO group; one of the ketamine + morphine patients reported a momentary unpleasant sensation.

Conclusions: The combination of IV-PCA subanesthetic dose of ketamine plus 33% lower dose of morphine reduces pain and spares morphine after surgery for bone and soft tissue tumor than the higher dose of morphine alone.

ID 126

Frequency of application of the intravenous patient-controlled analgesia (iv-pca) device is not an option?

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Introduction: Pain after surgery for bone and soft tissue tumor is intense, and may require large amounts of analgesics, especially opioids. The self-rated pain visual analog scale (VAS) is the current method used to evaluate level of pain. This methodology has been questioned; however, no better way to estimate such need has been suggested. We compared the use of intravenous patient-controlled analgesia (IV-PCA) vs. the patient's VAS data obtained by the nurse, aiming at establishing a correlation between these two parameters in orthopedic oncological patients.

Material and Methods: Twenty patients underwent surgery under standardized general anesthesia. Postoperatively, they received via IV-PCA (lockout time 7 min) morphine 1.5 mg/bolus. Treatment started when coherent patients subjectively rated pain 5/10 on a VAS and lasted up to 24 h. Intramuscular rescue diclofenac 75 mg was also available.

Results: Our data show that both the effective application of the device and the non-effective ones, i.e. activation of the device while locked-out, did not correlate with the use of morphine.

Conclusions: Our data suggest that the effective and the non-effective applications of the IV-PCA device does not indicate the true patient's numerical VAS estimation obtained by the medical personnel.

ID 273

Clinical picture, diagnostics and treatment of Baker's cyst in children

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Introduction: The problem of etiology, pathogenesis and treatment of popliteal region Baker's cysts concerns different specialties of medicine including surgeons, orthopaedicians-traumatologists, rheumatologists, pediatricians, tuberculosis specialists, infection disease specialists and oncologists.

Materials and Methods: The basis of study included comparative analysis of results from investigations and treatment of 123 patients, 3 to 15 years of age. Treatment arm had 59 patients, who were treated with paracentetic administration of cyclophosphamide in the cyst cavity and control arm with 47 patients after surgical resection of cyst, who were under observation in Vladimir Republic pediatric orthopedic-rehabilitation center. Besides this, data from advanced clinico-laboratorial findings of 17 patients with cyst in popliteal fossa, who are undergoing in-patient treatment in the Clinics of Arthrology, Research Institute of Pediatrics of the Russian Academy of Medical Sciences were included in the study.

Results: Following results were observed from the clinico-experimental findings. Idiopathic cyst of popliteal fossa was predominantly observed in boys (62,6%) at school-going age (median age – 8,4 years) with high locomotor activeness

against the background of 76,6% patients with signs of dysplasia of connective tissues. Ultrasound findings of tumor-like mass of popliteal fossa is a highly informative diagnostic procedure, used in both out-patients and in-patients with popliteal fossa cyst in all stages, which allows us to determine the localization of cyst, its value, multi-stage and to evaluate the effectiveness of treatment. Paracentetic-cytostatic treatment of popliteal fossa cysts are rationally carried out under ultrasound guidance, which allows us to maximally visualize the manipulation process, its radicalness and to avoid liable mistakes and complications. Cytologic, Immunologic findings of synovial fluid from cystic cavity of popliteal fossa in children, and also the pathological morphologic findings of its envelope testifies the presence of inflammation of bursa, that is, bursitis. Minimal stage of inflammation intensity shows the possibility of its irritative character. It's found that, direct co-relation in between the primary volume of the cyst and number is mandatory for paracentetic treatment. In majority of overwhelming situations, cysts with a volume up to 4 ml are effectively treated after a single procedure of cyclophosphamide administration. Cysts with greater volume need a puncture of up to 4 times. Experimental findings of cyclophosphamide's effect in joint tissues of healthier animals determined a three-fold threshold of toxic dose in comparison with therapeutic dose.

Conclusions: Our approved treatment of idiopathic Baker's cysts with administration of cyclophosphamide in to the cavity has pathogenetic substantiation and effectiveness. Immediate and long-term results from clinical and laboratory data, data from ultrasound and morphological findings testify the presence of local and general complications and adverse effects for the administration of drug in applicable doses.

ID 274

Differential diagnosis of symptomatic torticollis and malignancy in children

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Introduction: Lately, a considerable growth of oncological and dystrophic diseases are observed in children. Routine approach to symptomatic torticollis thereupon, needs a review towards application of high-tech investigational methods in equivocal situations.

Materials and Methods: In the last 2 years, 3 patients from 3 to 6 years of age were under our observation, hospitalized with a diagnosis of symptomatic torticollis of unknown etiology. During examination, we noted that the constrained position of patients' head with inclination to a side, forcible correction of the head position to the correct side, lead to pain in cervical spine. During this procedure, neck muscle tension, which is found in children with congenital myogenic torticollis was not noted. In cervical spine x-rays, including x-rays through oral cavity, precise expressible osteopathology was not found. Earlier patients received conservative treatment, including wearing entrenchment collars, exercise therapy, massage, thermal procedures, and physiotherapy

without any positive effect. In suspicion of changes in bone structure of cervical spine, we performed computerized tomography of cervical spine. In one case, the diagnosis was put forth as dystrophic osteocyst of the tooth of second cervical vertebra and in the other two cases dystrophic osteocysts at the arch of second and third cervical vertebrae. As an objective interest towards soft tissue elements in the region of pathologic mass, ultrasound investigation was performed on "Aloka-500", in which no pathologic changes were observed. Considering the possible arise of pathological fractures of the dystrophic cyst, fixation of cervical spine was implemented with the help of entrenchment collars with modest effort of traction towards cranial direction, which was the irritating moment for the stimulation of regenerative processes in dystrophic bone tissue. Patients received exercise therapy, directed towards the eradication of forming pathologic orthostatic reflexes with the practice of isometric relaxation.

Results: By performing computerized tomography, within 4 months after the start of treatment, active infill of osteocyst with normal bone tissue was observed. Within six months after the treatment, during check-up, children did not have any complaints. Placement of head was correct, in the median line, movement in the cervical spine was without any restrictions, and palpation of transverse and spinal processes of vertebrae was painless. Children were restricted for a year to elements such as, acrobatics (topsy-turvy) and wrestling, considering the huge overload to the cervical spine. Results of treatment were assessed as good.

Conclusions: Considering the above mentioned, we reckon that, during childhood it is mandatory to investigate the patients to rule-out malignancy before the treatment of patients with symptomatic torticollis. Computerized tomography and ultrasound investigation of cervical spine, performed in these patients, allow us not only to establish the correct diagnosis, but also control the specific treatment in patients with such difficult pathology.

ID 286

The use of pelvic spacer devices to facilitate delivery of radical radiotherapy in the treatment of bone and soft tissue sarcomas of the pelvis

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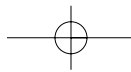
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Purpose: We report a series of patients with soft tissue and bone sarcomas of the pelvis who had pelvic spacer devices inserted in the pelvis to facilitate radical radiotherapy, and report functional outcomes following treatment.

Introduction: Treatment of malignant bone and soft tissue sarcomas affecting the pelvis is challenging. While some tumours can be resected locally, others may require internal hemipelvectomy and reconstruction, hindquarter amputation, or may be inoperable. Some patients will need to be treated with radical doses of radiotherapy, for example patients who have in-



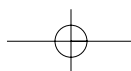
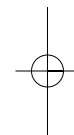
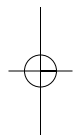
Вестник РОНЦ им. Н. Н. Блохина РАМН, т. 17, №1 (прил. 1), 2006

operable tumours, who decline amputation, or who require post-operative radiotherapy. Delivery of a radical radiotherapy dose to the lower abdomen and pelvis is technically challenging because of proximity of normal tissue structures such as bowel. Pelvic spacer devices can be used to displace bowel away from the tumour, allowing delivery of a dose of radiotherapy that would otherwise be limited by normal tissue toxicity.

Methods & Results: We performed a retrospective review of all patients who presented with a soft tissue and bone sarcomas of the pelvis and who underwent an insertion of a pelvic spacer followed by radical dose radiotherapy (55-70 Gy). Available patients were followed up and evaluated using the Musculoskeletal Society Tumour Score (MSTS) and the Toronto Extremity Salvage Score (TESS). There were ten pati-

ents; 5 had Ewing's sarcoma, 3 had osteosarcoma, 1 had spindle cell sarcoma and 1 had alveolar soft part sarcoma. 4 patients had metastases on presentation. The average age was 30 years (14 to 56 years), and average follow-up was 15 months (12 to 24 months). 4 patients died and 6 are still alive. There were no surgical complications. The average length of hospital stay following spacer insertion was 6 (2 to 10) days. The placement of a spacer allowed delivery of the optimal planned radiotherapy dose to be delivered in all cases.

Conclusion: Pelvic spacer insertion is feasible and allows delivery of optimal radical doses of radiotherapy to pelvic sarcomas. Furthermore, radical radiotherapy can be offered as an alternative to those declining morbid surgery, and seems to be associated with good functional outcomes.



EMSOS - SPECIAL SESSION: INTERNATIONAL PROJECTS (TRIALS, COLLABORATION)

ID 284

Prognosis and therapeutic targets in the Ewing family of tumors - sixth framework program - 1st year

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Introduction: The project through collaborative studies will define prognostic markers and new therapeutic targets in the Ewing's sarcoma family of tumours (ESFT) to provide rigorous scientific justifications for the development of clinical trials for this rare disease, which is manifested for the most part in children.

Material and Methods: The main objective of this project is to evaluate the prognostic relevance of selected markers (EWS/FLI-1, secondary genetic alterations, CD99, IGF-IR, NOVH, erbB-2 and TTF1) and the effectiveness of therapeutic approaches targeting some of these molecules.

Results: During this first year we have obtained some clear answers with respect to prognostic and therapeutic relevance of erbB-2, CD99 and IGF-IR. In addition the genetic profile of experimental models with differential metastatic ability have identified some new prognostic molecular markers that appear to have statistical significance (Gal3BP, Hint1, calnexin).

Conclusions: Cytogenetic profile of cell lines and tumor samples identified some novel small deletions and amplifications.

Two tissue arrays have been constructed and are now available for the analysis of some new other genes. Finally the project is taking steps in the construction of new therapeutic tools, such as antisense oligos against EWS/FLI1 in new, more effective vectors and chimerized antibody against CD99.

ID 285

Successful multinational implementation of the European and American Osteosarcoma Study EURAMOS-1 within the European Science Foundation's ECT-EUROCORES scheme

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Four multinational groups (COG, COSS, EOI, SSG) representing 14 countries (A, B, CAN, CH, D, DK, FIN, H, IS, N,

NL, SE, UK, USA) collaborate in EURAMOS-1. After successfully overcoming a multitude of organizational, financial and regulatory hurdles, all four collaborating groups initiated recruitment during 2005. The issue of sponsorship represented a major challenge, which was finally solved by finding an institution willing to act as central European sponsor (MRC London), which in turn delegated responsibilities to national institutions on a per-country basis. As of December 31st, a total of 74 patients from 43 institutions in eight participating countries were registered into the trial (D=39 patients / 26 institutions, S=4/3, N=7/2, UK=14/6, CH=4/2, NL=1/1, B=1/2, USA=3/2). More centres are becoming accredited to participate in each of these countries. The trial is now also open for recruitment in CDN, DK, and FIN, and it is expected that A and H will soon follow. Further countries expressed their interest to join. An Intergroup Safety Desk has been established and an elaborate system for SAE reporting to a multitude of competent authorities and ethics committees has been successfully implemented. Quality of life assessments taking into account age and language specific requirements have also been initiated. In addition to running the clinical trial, EURAMOS cooperates with the osteosarcoma work package of the European Network to Promote Research into Uncommon Cancers in Adults and Children: Pathology, Biology and Genetics of Bone Tumours (Euro-BoNeT) in order to advance the understanding of osteosarcoma biology.

In summary, after overcoming a multitude of challenges, EURAMOS-1 is now actively recruiting patients in 11 countries on two continents.

Supported as part of the European Science Foundation EUROCORES Programme ECT by funds from the EC Sixth Framework Programme, under Contract no: ERAS-CT-2003-980409.

ID 88

EUROPEAN BONE OVER 40 SARCOMA STUDY (EURO-B.O.S.S)

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Introduction: EUROBOSS is a multicentre prospective study for patients older than 40 years with highly malignant sarcoma of bone: Osteosarcoma, Fibrosarcoma, Malignant Fibrous Histiocytoma (MFH), Leiomyosarcoma, Dedifferentiated Chondrosarcoma. The present EUROBOSS protocol is based on the experience of the participating intergroups in the treatment of spindle cell bone sarcomas and their past and present osteosarcoma protocols.

Material and Methods: The study is a first step of a process to establish the standard chemotherapy treatment with the aim to improve outcome for patients with these rare tumours. In this regard, the study aims to determine the feasibility of intensive chemotherapy in this age group, and/or separate efficacy analyses according to the different histologic categories and whether the number of patients recruited by the

cooperating groups permits future randomised studies. Primary aim is to evaluate clinical outcome and chemotherapy-related toxicity in patients 41-65 years old with high-grade bone sarcoma treated with a three-drug chemotherapy regimen containing adriamycin (ADM), cisplatin (CDP) and ifosfamide (IFO), and the addition of methotrexate (MTX) to poor histologic responders.

Results: At January 2006, 90 patients were enrolled. The median age was 52 years (41-65), 54% were male and 46% female. Femur (44%), Tibia (19%), Pelvis (10%) and Humerus (8%) were the most frequent site of disease. 18% of patients were metastatic at presentation. Primary high grade osteosarcoma (41%), high grade spindle cell sarcoma (28%), dedifferentiated chondrosarcoma (18%) were the most frequently reported histologic diagnosis, but also MFH (4 pts), leiomyosarcoma (3 pts), small cell osteosarcoma (1 pt), fibrosarcoma (1 pt), radioinduced sarcoma (1 pt), dedifferentiated parosteal osteosarcoma (1 pt) were reported.

Conclusions: The study is ongoing and open to collaboration with other Groups or Institutions, after agreement of all participating groups.

ID 106

Dedifferentiated Chondrosarcoma – results of a European wide study

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Introduction: Dedifferentiated chondrosarcoma is a rare but highly malignant manifestation that can occasionally arise in patients with cartilage tumours. There remains uncertainty as to the best treatment for this condition and in particular whether chemotherapy may have a role in improving prognosis.

Material and Methods: Members of EMSOS were invited to contribute data on patients, tumours, treatment and outcomes of patients with dedifferentiated chondrosarcoma.

Results: 8 centres contributed data on 306 patients from 6 countries. The mean age was 57 (range 15 to 89) and the most common site was the femur (46%) followed by the pelvis (29%). 25% of patients presented with a pathological fracture and the most common high grade component identified was MFH. 23% had metastases at diagnosis and these patients had a median survival of 5 months. 30% of patients received chemotherapy with 47% under 60 having chemotherapy compared with 10% over 60. One third of this group had neoadjuvant chemotherapy and the rest had adjuvant treatment. 88% had surgery with limb salvage in 80% of this group. The overall survival was 38% at 2 years and 24% at 5 years but in patients without metastases at diagnosis these figures were 43% and 26% respectively. Poor prognostic factors for survival were: Metastases at diagnosis, amputation or no operation, local recurrence, age over 60 and pathological fracture at presentation. We were unable to identify any group in whom chemotherapy appeared to have a survival benefit.

Conclusions: Dedifferentiated chondrosarcoma carries a dismal prognosis. Although 30% of patients received chemotherapy in this study we were not able to prove that it improved survival. Early diagnosis and complete surgical excision still offer the best prognosis for this condition.

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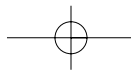
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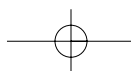
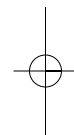
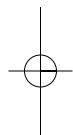
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Общая информация и сроки

Предварительная программа опубликована на сайте www.fecs.be

Подача тезисов до 30 июня 2006 г.

Ранняя регистрация до 18 августа 2006 г.

Поздняя регистрация до 3 ноября 2006 г.

Бронирование гостиниц до 2 октября 2006 г.

Членам ESSO предоставляется скидка при ранней регистрации

Место проведения

Palazzo del Casino

Lungomare Marconi

I-30126 Lido di Venezia

<http://www.veniceconvention.com>

Организаторы

Федерация европейских онкологических обществ (FECS)

Европейское общество по хирургической онкологии (ESSO)

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