

SCIENTIFIC INFORMATION

Functional results in patients with sarcoma around the knee joint

Kokavec M¹, Svec A², Zilinek V³, Huraj E¹, Gajdos M¹

Department of Pediatric Orthopaedics, Comenius University, Faculty of Medicine, Bratislava, Slovakia.
 kokavec@dfnsp.sk

Abstract: Authors evaluated functional outcomes after three different surgical procedures for sarcoma around the knee joint. Sixteen patients with sarcoma were given four to six preoperative courses of chemotherapy. Patients were separated into three groups according to the pattern of tumour excision. The first group underwent the resection of proximal fibula and tibialis anterior muscle resection, the second group underwent resection of distal femur or proximal tibia with total knee replacement, and the third group underwent radical amputation. The mean functional evaluations were 100, 95 and 80%. All marginal resections of proximal fibula resulted in excellent function. No local evidence of tumour recurrence was seen at mean follow-up of 24 months (Tab. 1, Fig. 2, Ref. 7). Full Text (Free, PDF) www.bmj.sk.

Key words: sarcoma, knee joint, different surgical procedures, children, adolescents.

Osteosarcoma occurs in young patients usually around the knee joint. More than 70 % of patients with osteosarcoma treated with chemotherapy and proper surgery have five-year survival rate (1, 5, 7). The most frequent surgical techniques for treatment of osteosarcoma around the knee joint include resection alone, resection and reconstruction with endoprosthesis and amputation of the extremity in indicated cases. Sarcoma around the knee joint presents a surgical challenge. The purpose of this study was to investigate the functional outcome of patients with sarcoma around the knee joint.

Patients and methods

Between 2005 and 2008, sixteen patients with sarcoma around the knee joint were treated at our institute. The study population consisted of 10 male and 6 female patients. The mean age at diagnosis was 14.25 (range 11–18) years. Eleven of the 16 cases had stage IIB of conventional osteosarcoma, one had periosteal osteosarcoma, one had parosteal osteosarcoma, two had Ewing sarcoma and one had rhabdomyosarcoma. Tumours were located in the distal femur (8 patients), proximal tibia (3 patients), proximal fibula (4 patients) and in the muscle (1 patient).

All of the patients with histopathological diagnosis of sarcoma were treated in close cooperation with the Department of Pediatric Oncology, including intravenous neoadjuvant chemotherapy, consisting of high dose of methotrexate, cisplatin, doxorubicin

and ifosfamide. Before the surgery, the chemotherapeutic effect was evaluated by plain radiography, MRI and scintigraphy (Figs 1, 2).

The surgical procedure was explained to the patients' parents and to adolescent patients. Amputation was indicated in cases where the surgical margin was not safe because of neurovascular involvement, minimal or no response of tumour to neoadjuvant chemotherapy, or if the functional outcomes after reconstruction are expected to be worse than those after amputation.

Postoperative chemotherapy started 2–3 weeks after surgery, i.e. after the wound had completely healed.

The functional evaluation was assessed using the revised 30-point functional classification system established by the Inter-

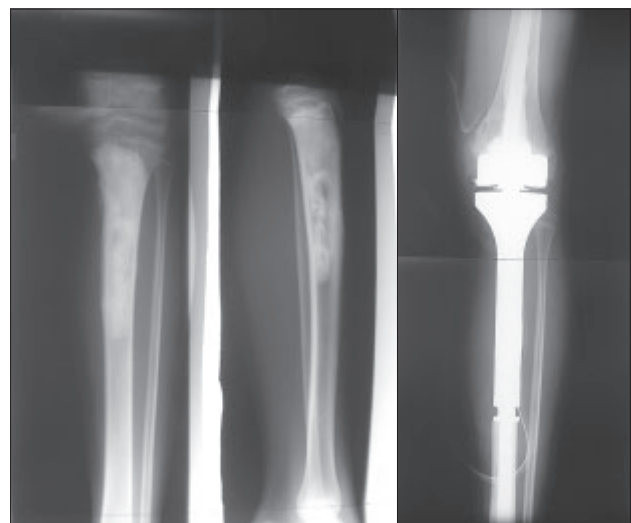


Fig. 1. Eleven-year-old girl with osteosarcoma of proximal and middle tibia treated by resection and reconstruction with individual tumorous „growing“ knee endoprosthesis LINK

¹Department of Pediatric Orthopaedics, Comenius University, Faculty of Medicine, Bratislava, ²First Department of Orthopaedics and Traumatology, Comenius University, Faculty of Medicine, Bratislava, and ³Department of Pediatric Oncology, Comenius University, Faculty of Medicine, Bratislava, Slovakia

Address for correspondence: M. Kokavec, MD, PhD, Zalusicka 9, SK-821 01 Bratislava, Slovakia.
 Phone: +421.2.59371451

Tab 1. Cohort of patients with sarcoma around the knee joint operated on between 2005–2008.

Case	age	gender	Dg./site	Pattern of excision	Reconstruction	Outcome	Functional score (%)	Follow up (m)
1.	12	M	OSA fem	Amputation		CDF	77	43
2.	13	M	OSA fem	Amputation		CDF	83	27
3.	13	M	OSA fem	Amputation		CDF	83	30
4.	17	F	OSA fem	Amputation		CDF	77	34
5.	14	F	OSA fem	Resection	TEP	CDF	100	8
6.	18	M	OSA fem	Resection	TEP	CDF	100	7
7.	14	M	OSA tib	Resection	TEP	CDF	93	6
8.	11	F	OSA tib	Resection	TEP grw	CDF	87	9
9.	14	F	OSA fem	Resection	TEP	CDF	90	9
10.	11	F	OSA fem	Resection	TEP grw	CDF	100	10
11.	16	M	EwSA tib	Resection	Graft		83	22
12.	12	M	R-SAmta	Resection	-	CDF	100	31
13.	16	M	OSA fib	Resection	-	CDF	100	36
14.	13	M	EwSA fib	Resection	-	CDF	100	41
15.	18	F	OSA fib	Resection	-	CDF	100	38
16.	16	M	OSA fib	Resection	-	CDF	100	29

CDF – Continual disease free, DOD – died of disease, RML – removal of metastatic laesions, M – male, F – female, OSA – osteosarcoma, EWSA – Ewing sarcoma, RSA – rhabdomyosarcoma, fem – femur, tib – tibia, fib – fibula, mta – musculus tibialis anterior, TEP – total endoprosthesis, grw – “growing” endoprosthesis

national Society of Limb Salvage, and Musculoskeletal tumours Society (2). This score measured six parameters: pain, function, emotional acceptance, use of walking supports, walking ability and gait. Each parameter was given a value ranging from 0 to 5. The highest value was assessed at least 6 months after the operation had been selected. Individual scores were summed together to obtain the overall score with maximum 30 points, which was then expressed as a percentage.

Results

Four patients underwent amputation and 6 received endoprostheses as first surgical treatment. Four patients underwent wide excision of proximal fibula (3 cases of osteosarcoma, one

Ewing sarcoma), one patient underwent a complete excision of anterior tibial muscle because of rhabdomyosarcoma and one patient with Ewing sarcoma of the proximal tibia underwent resection and reconstruction with allograft (at another institution).

Patients were separated into three groups according to the pattern of tumour excision. The first group (4 patients) underwent resection of proximal fibula and anterior tibial muscle resection (1 patient), the second group underwent resection of distal femur or proximal tibia with total knee replacement (6 patients) and the third underwent radical amputation (4 patients). The mean functional evaluations were 100, 95 and 80%. All marginal resections of proximal fibula resulted in excellent function. No local evidence of tumour recurrence was seen at mean follow-up of 24 months. No inflammatory or mechanical complications with endoprostheses were seen (Tab. 1).

Discussion

The prognosis of osteosarcoma and Ewing sarcoma has been dramatically improved due to the introduction of chemotherapy. Adjuvant chemotherapy has permitted limb-salvaging procedures that preserve the quality of limb function (1). We agree with Hayashi (3) that for the use of limb salvaging procedures the chemotherapeutic effect is a more important justification than the surgical margin. The efficiency of chemotherapy alone improves the prognosis and minimises the surgical margin.

The functional results of this study confirmed the results of Natarajan (4, 6), namely that marginal excision of the proximal fibula resulted in excellent function. We have the first experiences with extendable prostheses with internal springs that are able to elongate the implant with minimal surgery. The functional assessment using the Musculoskeletal Tumour Society's

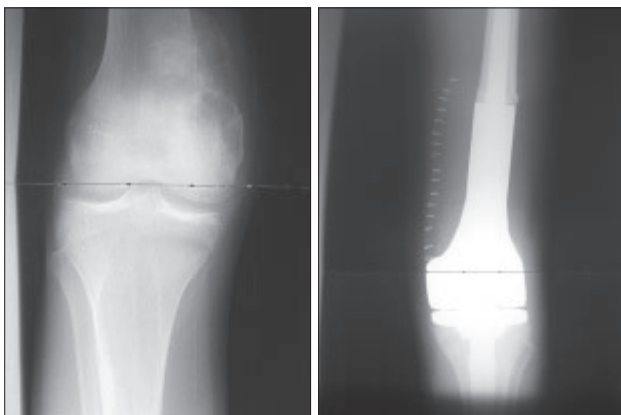


Fig. 2. Eighteen-year-old boy with conventional osteosarcoma of distal femur treated by resection and reconstruction with individual tumorous knee endoprosthesis LINK.

functional scores demonstrated the effectiveness of endoprostheses, lower values of pain and function. The amputees in our cohort showed inferior results in categories with supports, walking and emotional acceptance. We still consider amputation as an adequate method of treatment enabling to achieve very good mid-term functional results in indicated cases in young patients suffering from sarcoma located around the knee joint.

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