Abstract  We performed two rotationplasties (type A1 and A2) as salvage procedures in cases of custom-made endoprosthetic replacements of the distal femur and knee joint. The patients suffered from malignant bone and soft-tissue tumors of the knee, respectively. One of them developed chronic osteomyelitis around both stems of the prosthesis, and three local revisions turned out to be ineffective. The other patient, suffering from parossal osteosarcoma of the distal femur, developed a local recurrence following endoprosthetic reconstruction. The functional abilities following the operation of these two patients suggested that rotationplasty was a viable alternative to above-the-knee amputation in failed or severely complicated total arthroplasty of the knee with massive bone loss.

Introduction

In parallel with the increasing number of implanted tumor endoprostheses for malignant bone tumors, the revision rate is also expected to increase. If infections or local recurrences occur, a revision while preserving endoprosthetic components is sometimes impossible. Compared to above-the-knee amputation, rotationplasty has improved the postoperative functional outcome [3, 5, 6]. There are no reports about the use of this procedure in cases with failed endoprosthetic replacements.

Case reports

Case 1

In 1991, a 30-year-old woman underwent surgery with preservation of the knee because of parossal osteosarcoma. Two years later, a local recurrence of the residual femur metastases – histologically also grade 1 – occurred, leading to resection of the complete distal femur, and reconstruction was performed using a custom-made endoprosthesis. Four years later, in 1997, there was a widespread local recurrence of the osteosarcoma – grade 2 – invading this time the surrounding soft tissue, the vascular bundle, and the medial vastus muscle (Fig. 1 a, b). In this situation only amputation guaranteed oncologically wide margins. Thus, a modified rotationplasty type A1 [7] was performed, including extraction of the endoprosthesis and bone cement. Despite prolonged bony healing, the patient is walking without crutches 1 year later and is free of any signs of disease.

Operative technique

Following dorsal incision, the sciatic nerve was prepared, and the vascular bundle including the proximal anterior tibial artery and tibio-peroneal trunk were identified in the popliteal region. The incision was extended anteriorly and the knee joint opened to extract the tibial part of the endoprosthesis. The cement-filled bony epiphysis was sawn, parallel to the joint line, and the residual soft tissue was resected. We sawed through the cement as potentially contaminated tissue, as the margins were more than 10 cm away in relation to the tumor recurrence. The sciatic nerve was identified in the proximal direction up to the level of the minor trochanter. Cutting the lateral and anterior muscles, the femoral neurovascular bundle was identified and the femur osteotomized. After dissecting the arteries and veins, the tumor resection was completed, and all structures of the affected limb were discontinuous except for the sciatic nerve (Fig. 1 c). The bone cement was partially removed from the femur and proximal tibia by using chisels and an ultrasound device (Ultradrive, Biomet, Warsaw, Ind.). The leg was externally rotated (180°), and the femur and tibia were linked by a plate and screws (Fig. 1 d). Histologically, the specimen revealed wide margins. The healing process was prolonged, and 3 months following the operation, only a slight callus formation was visible, whereas after 6 months the defect was partially bridged (Fig. 1 e).

Case 2

A 41-year-old woman was operated on because of synovial sarcoma of the right knee in 1994. Therapy included wide resection of
the knee joint and endoprosthetic reconstruction using a modular system. Since the operation in 1994, the patient had never been pain-free. Furthermore, ongoing pain and disability led to two revisions. Radiographs and scintigraphic examination revealed chronic osteomyelitis and septic loosening. In 1996, the patient was admitted to our hospital with prosthetic loosening and persistent infection surrounding the endoprosthetic components. We suggested a two-stage revision procedure using a spacer and new prosthesis, which the patient refused, asking instead for a definitive solution for her problem. She had already contacted osteosar-

Fig. 1 a–e  Radiographs of the knee (a, b) show local recurrence of parosteal osteosarcoma; c after resection of the arteries and veins, tumor resection was completed, and the structures of the affected limb were discontinuous except for the sciatic nerve; d postoperative anteroposterior radiograph of the osteosynthesis; e radiograph taken 6 months later

Fig. 2 a–d  Radiograph following extraction of the infected prosthesis (a), b situation postoperatively, c development of instability and pseudarthrosis, d radiograph of reosteosynthesis