

Biological Reconstruction after Resection of malignant Bone Tumors

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Background

Malignant bone tumors are frequently located close to the knee joint and reconstruction after tumor resection with a tumor prosthesis is a common option. If located in the diaphysis kallusdistraction with fully implantable systems allow a biological reconstruction. In the metaphysis, if the growth plate is not affected, kallusdistraction with external fixation and motorized traction devices are an alternative, even for three-dimensional biological reconstruction.

Questions/Purposes

How effective biological reconstruction with kallusdistraction can be after resection of malignant bone tumors in the diaphysis and the metaphysis of the lower leg? Which systems can be used depending on the defect size and the defect location and which results can be achieved? What is the effect of chemotherapy and radiation?

Patients and Method

7 patients got a biological reconstruction after en-bloc-resection of malignant bone tumors (5 osteosarcomas, 2 Ewing-sarcomas) of the lower leg. The resection boundaries and the oncological concept were maintained according to the established standard in all cases. In 3 cases the defect was located in the diaphysis and a fully implantable Fitbone system was used to perform bone transport after chemotherapy was finished. In 4 cases the defect was located in the metaphysis, the growth plate was not affected but resected with the tumor. Stabilization was done with an external fixator and bone transport was performed with a single wire transport system and an external motor drive during chemotherapy. In 3 cases a three-dimensional reconstruction of the metaphysis was performed. The mean age was 12,2 years, the mean defect size was 14cm (11-20). No radiation was applied in any case. In 5 cases limb lengthening was performed later with the Fitbone system at maturity



Results:

In all cases the bone transport was finished without complications and a bony continuity of high quality was achieved. Bone formation was delayed in cases when transport was performed during chemotherapy. Mean time of lengthening was 175 days. There was no deep infection even not in the cases with external fixation for long time under chemotherapy. In 5 cases minor technical problems like screw migration or breakage of the wire occurred which made a re-operation necessary.

Conclusion:

If the defect is located in the diaphysis the Fitbone system offers safe and comfortable options for a biological reconstruction. In the metaphysis technical high demanding external systems are necessary especially if three-dimensional reconstruction should be done. The procedure is time consuming and reconstruction takes time in the early phase of tumor treatment when the survival is still doubtful. Finally however the biological reconstruction shows perfect clinical and radiological results and nearly a normal function of the leg.