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Bioexpandable Prostheses

Bone Lengthening after Resection of malignant Bone Tumors in Children

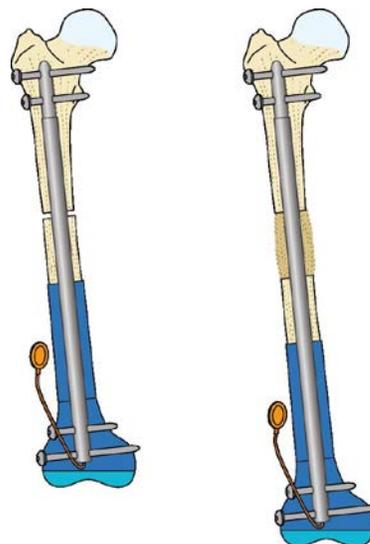
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Background:

Expandable endoprotheses could be an option after resection of malignant bone tumors of the lower extremities in children and adolescents not only to bridge the defect but also to overcome limb length discrepancy. To achieve equal limb length at maturity different concepts of expandable endoprotheses are available. One option is to lengthen the prosthesis with an internal power unit but especially in cases of a huge demand of lengthening the relationship from prosthesis to the remaining bone becomes worse. As consequence a new idea was to lengthen not the prosthesis but the remaining bone as it is performed frequently in cases of congenital or posttraumatic limb length discrepancies.

Questions/Purposes:

How can a fully implantable lengthening nail, like the motorized Fitbone, used for bone lengthening in cases when a tumor prosthesis is in place? When lengthening should be done and which results can be expected?



Patients and Methods:

Both systems (MUTARS Xpand and MUTARS BioXpand, implantcast, Buxtehude, Germany) are equipped with the motorized Fitbone device which gets its energy for lengthening wireless from outside by electromagnetic waves. After surgery the skin is closed completely. In case of bone lengthening with the "bioexpandable" endoprosthesis, the bone has to be osteotomized and is lengthened postoperatively with 1mm/day. Therewith finally the relationship of the prosthesis length compared to leg length develops in favour of the bone. 6 patients (3male, 3 female) were treated with the BioXpand. In 4 cases the femur and in 2 cases the tibia was lengthened after resection of an osteosarcoma (4) or an Ewings-sarcoma (2). The mean age of the patients was 16,3 years at the time of lengthening and the mean amount of lengthening was 82mm. In one case of a huge discrepancy the lengthening was performed in 2 steps.

Results:

Lengthening could be finished successfully in all cases. There was no infection. The bone regenerate in one of the tibia cases was poor so that bone grafting had to be performed from the iliac crest. In one case a temporarily contracture of the knee joint was observed which recovered completely after finishing lengthening. In one case a breakage of the nail occurred 2 years after lengthening just before the replacement to the final prosthesis was planned.

Conclusion:

The "bioexpandable" prosthesis is a favourable option for children after resection of a bone tumor. The device is safe and offers the same advantages as in congenital or posttraumatic shortenings. Better long term stability of the prosthesis can be expected. The small diameter and the length of the remaining bone as well as stress shielding are basic problems also the repeated operative interventions are a challenge for further developments.

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