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11425 - In What Circumstances The Expandable Prosthesis Would Be Appropriate For The Reconstruction After Tumor Resection?

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Abstract

Background Malignant bone tumors mostly occur around the knee in the second decade. Currently, surgery is the mainstay of the treatments. In most cases, the physis is resected along with the tumor. Subsequently, the discrepancy of the lower-limb length will develop. Expandable prosthesis is one of the options that were designed to relieve the length discrepancy. However, in what circumstances the expandable prosthesis is wanted is still unknown.

Questions/purposes The factors that potentially led to the limb length, including the age, the resection type, were analyzed. The indications for the expandable prosthesis were therefore proposed.

Patients and Methods This was a retrospective research based on the review of the patients' records and imaging data. One hundred patients met the criteria for the research; these criteria included the tumor was located in the distal femur or the proximal tibia, the bone end of either distal femur or proximal tibia was resected, the age was less than 16 years old, the epiphysis is not closed, at least two stages of X-ray were taken to evaluate the lower-limb length, and the minimum duration of the follow-up

was 6 months after the surgery. There were 62 male and 38 female patients. The median age at the time of the surgery was 12.9 years (range, 7.2-15.8 years). There were 96 conventional osteosarcomas, 1 parosteal osteosarcoma, 1 telangiectatic osteosarcoma, 1 Ewing sarcoma and 1 undifferentiated pleomorphic sarcoma. The tumors were located 58 in the distal femur and 42 in the proximal tibia. The surgeries included 58 distal femur resections with conventional prosthesis replacement, 19 proximal tibia resections with conventional prosthesis replacement, and 23 proximal tibia resections with prosthesis replacement of the tibia part only. Both the distal femur end and the proximal tibia end were resected for the first two methods. Only the proximal tibia end was resected for the third method. The lower-limb length was evaluated with X-ray every 3 months until the physis was closed for each patient. The relation between the limb length and the possible affecting factors, including the age, the gender, and the various surgery methods was analyzed.

Results The mean follow-up was 2 years (range, 0.5 to 7.1). Totally, the limb length was evaluated 352 times with X-ray. For the male patients with both bone ends involved, the lower-limb length discrepancies were 142.7mm, 105.4mm, 74.7mm, 49.9mm, 30.7mm, 16.4mm, 6.4mm and 0.3mm for the patients aged from 9 to 16 years old when the surgery was initially done, respectively. While the female patients with both bone ends involved, the discrepancies were 91.9mm, 64.8mm, 43.8mm, 28.1mm, 16.9mm, 9.3mm, 4.4mm and 1.4mm, respectively. For the patients with the distal femur involved, the femur discrepancies were 93.9mm, 70.3mm, 50.5mm, 34.2mm, 21.2mm, 11.3mm, 4.2mm and 0mm for male patients aged from 9 to 16 years old, and 75.1mm, 52.1mm, 34.5mm, 21.6mm, 12.5mm, 6.6mm, 3.0mm and 0.9mm for female patients, respectively. For the patients with the proximal tibia involved, the tibia discrepancies were 40.3mm, 32.9mm, 25.9mm, 19.4mm, 13.6mm, 8.4mm, 4.0mm and 0.5mm for male patients aged

from 9-16 years old, and 33.6mm, 26.0mm, 19.3mm, 13.6mm, 8.7mm, 4.7mm, 1.6mm and 0mm for female patients, respectively.

Conclusions The lower-limb length was associated with the involved bone ends for the patients with unclosed physis. Even the bone end was not resected; the limb length was still compromised if the tumor resection and prosthesis replacement was done for the neighbor bone end. For male patients aged more than 14 and female patients aged more than 13, the lower limb length discrepancy until the physis closed is less than 2 cm when the conventional prosthesis replacement is performed. Therefore, the expandable prosthesis is not recommended for those patients. For male patients aged more than 12 and female patients more than 11, the lower limb length discrepancy until the physis closed is less than 2 cm when the prosthesis replacement with only one bone end involved is performed. Therefore, the expandable prosthesis is not recommended for those patients as well.

Level of Evidence: Therapeutic Level IV.