

Skeletally immature child with osteogenic sarcoma over proximal femur treated with adult humeral osteochondral allograft

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Background:

Osteosarcoma is very rare in young children, accounting for only 1 to 2.8%. Furthermore, osteosarcoma is relatively rare at proximal femur in skeletally immature children and it is difficult to reconstruct. Mostly hip disarticulation is suggested. After resection of the tumor, the reconstruction procedure is a great challenge. There are some problems that should be considered, including mechanical strength, acetabular development, leg discrepancy, lack of small size prosthesis and proper size allograft. There is no standard procedure of reconstruction after resection of the proximal femur bone malignancy.

Questions/Purposes:

We introduce a new method to reconstruct proximal femur bone tumor with adult humeral osteochondral allograft.

Patients and Methods:

A 6-year-old boy had pathologically proved osteosarcoma over right proximal femur. After neoadjuvant chemotherapy, wide excision of the tumor and limb salvage procedure was performed. Due to small size of the proximal femur in the skeletally immature children, we reconstructed proximal femur with adult humeral

osteochondral allograft. Antibiotic-impregnated cement with Steinmann pin was put inside the allograft for augmentation and the allograft was fixed with dual plates. He started ROM exercise and muscle training six weeks after the surgery. Partial weight bearing began three months later.

Results:

One year after the surgery, he recovered well. MSTs score was 83%. However, a severe fall happened on the boy 15 months after the surgery. Fracture at anatomical neck was shown. Therefore, revision surgery with the other side of humeral allograft from the same donor was performed. This time, we did the allograft-prosthesis composite with bipolar hemiarthroplasty because geography of proximal humerus is quite different at the other side and we didn't have another similar size of allograft. Besides, lung metastases at right lower lobe and left upper lobe were noted 4 years later, and wedge resection was done twice. He recovered well except limping gait. Nine years after the second reconstruction, varus deformity at right femur and lower leg discrepancy were noted. Correction and leg lengthening with another allograft-prosthesis composite surgery using adult proximal femur and total hip arthroplasty was done. Two years after the last surgery, there was solid union at bone junction. MSTs score was 90%.

Conclusions:

The preferred method for restoration of hip function in 6-year-old children following proximal femur resection for a malignancy remains unclear. We considered about acetabular development and preservation of proximal femur bone stock. Adult humeral osteochondral allograft seems to be a choice. It's easily available, and humeral head geography is similar to femoral head, with rigid bone structure for weight bearing. However, as the children grow up, stage surgery is still needed for the deformity.

