Proximal Humerus Allograft Prosthetic Composite in 17-Year-Old Patient with Osteosarcoma

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The surgical management of proximal humeral reconstruction requires thoughtful consideration of the complexity of the rotator cuff anatomy. Several techniques exist to accomplish reconstruction of the proximal humerus including allograft prosthetic composites (APCs), metallic endoprostheses, and osteoarticular allografts. APCs are favored in younger, active patients due to improved functional outcomes and the ability to restore rotator cuff integrity through biological integration. However, they carry higher infection and graft failure risks. Metallic implants, often used in elderly low-demand patients, offer durability and reduced complication rates but are limited in restoring soft tissue function and shoulder mobility. Pure allografts are rarely used today due to high rates of graft resorption, non-union, and mechanical failure. Most experts feel that APCs provide the best balance of function and durability, while metallic implants are suitable for cases prioritizing simplicity and immediate stability. Our patient is a 17-year-old female who initially presented to the emergency department with an eight month history of left shoulder pain and concomitant weight loss. Advanced imaging demonstrated a large proximal humerus lesion, and she underwent biopsy which demonstrated osteosarcoma. No metastatic disease was seen on CT or bone scan. She underwent neoadjuvant chemotherapy. Post-chemotherapy MRI re-demonstrates the left proximal humerus lesion, with good treatment response, measuring 150mm from the tip of the greater tuberosity. There is a soft tissue component projecting anterolaterally. A deltopectoral interval was incised with careful identification of the cephalic vein. The pectoralis major, deltoid tendons, long head of the biceps tendon, and coracobrachialis were released. The median and ulnar nerves were identified and tagged. The rotator cuff was carefully released. A 170mm resection was made. A proximal humerus allograft was prepared and trialed. A 194mm size six revision stem was cemented into the allograft and a 38mm anatomic head with zero offset was inserted into the stem. Adjuvant fixation was performed and the rotator cuff was repaired using a pants-over-vest technique starting with the posterior and inferior cuff and progressing to the superior and anterior cuff. Glenohumeral joint stability was confirmed using fluoroscopy. Restrata wound matrix was applied over the allograft to minimize dead space and promote wound healing. All muscles were reattached and the interval was closed in a standard layered fashion.