

Reconstruction Options for Tumors of the Proximal Humerus: A Systematic Review

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Background:

The proximal humerus is a common location for both primary and metastatic bone tumors. There are numerous reconstruction and stabilization options after surgical management including allograft, alloprosthetic composite (APC), megaprosthesis, and more recently, reverse shoulder arthroplasty (RSA). The main goals of reconstruction are restoration of function and minimization of complications. Patient demographics, tumor characteristics, and anatomic involvement are important factors to consider when selecting the optimal reconstruction.

Purpose:

There is no consensus on the ideal method of reconstruction. The purpose of this study was to appraise the existing literature and compare outcomes of different treatment options.

Methods:

A systematic review of English-language literature was performed of multiple electronic medical databases with a focus on surgical reconstructive options for lesions involving the proximal humerus. Details were recorded including patient demographics, length of follow-up, primary vs metastatic tumor, functional score, range of motion, rate of reoperation, and complications.

Results:

A total of 24 articles and 556 patients (RSA 40, hemiarthroplasty 11, APC 43, megaprosthesis 337, autograft 16, osteoarticular allograft 56, clavicle pro humerus 22, allograft arthrodesis 25, autograft arthrodesis 6) were included for analysis. The rate of complications requiring reoperation were lowest for megaprotheses (19%) followed by RSA (21%) and APC (27%), and highest for osteoarticular allograft (47%). Mechanical failure rates were lowest in megaprotheses (19%) and slightly lower for APC (23%) compared to RSA (28%).

Postoperative function as measured by MSTS score were similar amongst all major reconstructive options (RSA, APC, megaprosthesis, and osteoarticular allograft), ranging from 72% to 80%. Patients were generally only able to abduct approximately 30° and no greater than 90°. With resection of the rotator cuff, deltoid muscle or axillary nerve, function and stability were compromised even further. The effect of glenoid resection varied amongst studies. If the deltoid and axillary nerve were preserved, active forward flexion and abduction were significantly better (>90°) with RSA. To achieve external rotation with RSA, muscle transfer was sometimes necessary to compensate for a deficient posterior rotator cuff.

Conclusions:

Trends for reconstruction of proximal humeral defects after tumor resection have changed over the years. Osteoarticular allograft has a high rate of complications requiring reoperation and a lengthy time to union, yet functional results are similar to other options. Although APC reconstruction is a reasonable option in selected individuals, megaprotheses have become more popular due to relative

ease of implantation, lower rates of complications, and acceptable functional results. In lower-demand patients with a functional deltoid muscle and axillary nerve, RSA should be strongly considered.