

## Synthetic Mesh Augmentation Decreases Soft Tissue Failure in Metallic Endoprosthesis Proximal Humerus Reconstructions: A Multi-Center Study

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### Background:

The use of a metallic endoprosthesis to reconstruct an osteo-articular defect of the proximal humerus following bone tumor excision has been well described. Historically, the primary mode of failure for such reconstructions has been soft tissue failure, leading to revision in 20-23% of the cases. To address this failure mode, some orthopedic oncologists have incorporated a synthetic mesh, sutured to the glenoid and encircling the metallic endoprosthesis, in order to provide a passive restraint to glenohumeral translation and to provide a site of attachment for the residual soft tissues. Early reports have suggested the utility of this augmentation, but no large case-series has been presented demonstrating statistical efficacy.

### Purpose:

The purpose of this study was to assess the surgical outcomes of a metallic endoprosthesis following proximal humerus reconstruction for bone tumor, comparing complications and failure rates when a synthetic graft material was used to create an artificial capsule versus when no such augmentation was utilized.

### Patients and Methods:

A retrospective chart review at three major cancer centers was conducted on patients that underwent metallic endoprosthesis reconstruction following proximal humerus bone tumor excision between 1999-2014. Subjects were excluded if the indication for surgery was non-oncologic, the surgery involved resection of the scapula, or a total humerus replacement was utilized. Subjects were segregated into two groups: those that received synthetic mesh graft augmentation as part of the reconstruction and those that did not. Follow up data were collected; short follow-ups were included, in order to capture those that had early failure. Data for demographics, diagnosis, operative metrics, complications and failure mode were collected and analyzed. Failure was defined as need for revision surgery, and mode of failure was classified according to the Henderson Classification scheme. A chi-square test of independence determined statistical significance for the nominal data.

### Results:

One hundred nine (109) patients with proximal humerus reconstruction met inclusion criteria. Average age was 50.6 years (14-86) and average follow up was 39.3 months (1-250). Sixty-six (66) patients received synthetic mesh graft augmentation while 43 did not; there were no significant differences in age, diagnosis, follow up, or non-failure complications between the two groups. When all modes of failure were analyzed, only soft tissue failure (Type 1) reached statistical significance between the two groups. The graft-augmented group experienced a soft tissue failure in 6 cases (9.1%), while the non-augmented group experienced a soft tissue failure in 10 cases (23.3%),  $p=0.04$ .

### Conclusions:

The primary mode of failure following metallic endoprosthesis reconstruction of the proximal humerus is soft tissue failure, leading to symptomatic subluxation, dislocation and/or muscle incompetence. In the current series of 109 patients, the use of a synthetic mesh graft to augment the reconstruction led to a statistically significant decrease in soft tissue failure.

Level of Evidence: Level III, retrospective comparative study