

**Title:** Shoulder Hemiarthroplasty for Malignant Tumors of the Proximal Humerus: A Consecutive Series of 57 Patients

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**Background:** Shoulder arthroplasty is oftentimes considered in the setting of resection of malignant tumors of the proximal humerus in an effort to provide a functional extremity and achieve limb salvage. However due to the need for extensive bone and soft tissue resection and the need for adjuvant treatment, there is concern regarding postoperative complications and need for reoperation. Currently, there is a paucity of data concerning the mid-term survival of a hemiarthroplasty (endoprosthesis) of the proximal humerus with studies frequently combining benign and malignant conditions, or grouping endoprostheses from multiple areas of the body into one cohort.

**Purpose:** The purpose of this study was to examine a consecutive series of endoprosthetic replacements of the proximal humerus performed for a malignant process to evaluate 1) overall patient and implant survival, 2) need for reoperation, and 3) postoperative complications including infection and amputation.

**Methods:** Using our Institutional Total Joint Registry database, we identified 186 patients who underwent a shoulder hemiarthroplasty for an oncological process of the proximal humerus from 1975-2013. We excluded all patients that did not have an endoprosthesis placed for a malignant process, leaving a cohort of 57 patients. Kaplan-Meier survival outcomes were assessed for overall survival and reoperation. Functional outcomes were measured using the Simple Shoulder Test (SST) and the American Shoulder and Elbow Score (ASES). The mean age was 58 years (range 10-84) at the time of the surgery, with 54% of patients being female. 40% of patients were classified as obese. The most common pathology was metastatic disease (n=28, 49%). All surviving patients had at least 1-year follow-up with a mean follow-up of 4 yrs (1-10 yrs). The mean time to death was 2 yrs (range 1 mo – 9 yrs).

**Results:** The mean 2-, 5-, and 10-year overall patient survival was 50%, 33%, and 11% (Fig. 1). One patient underwent a forequarter amputation for tumor recurrence. In addition to this, four patients underwent a reoperation for other reasons, including ORIF of a periprosthetic fracture (n=2), local flap coverage for a wound complication (n=1) and removal of a painful granuloma (n=1), at a mean 2 years following surgery (range 8 mo-6 yrs). The mean postoperative shoulder abduction and external rotation were 49° (range 0-110°) and 19° (range 0-40°). Of the patients survived a minimum of 1 year, 88% had no to mild pain. The mean SST and ASES score were 3 (range 1-8) and 56.4 (range 20-80) respectively. Postoperative complications included nerve palsy (n=2, 3.5%), humeral fracture (n=2, 3.5%), DVT (n=1, 1.7%), dislocation (n=1, 1.7%) and superficial wound infection (n=1, 1.7%).

**Discussion:** Although patients typically succumb to their disease prior to implant failure, the results of our study seem to demonstrate that shoulder hemiarthroplasty provides a durable reconstructive option in the setting of a malignant process. The procedure provides pain relief in a vast majority of patients, although function is oftentimes limited. In contrast to other studies, there were no cases of component revision; however one patient underwent a forequarter amputation for tumor recurrence. This study provides a reference for comparison with patients treated with a reverse shoulder arthroplasty after resection of a proximal humerus malignancy.

Figure 1:

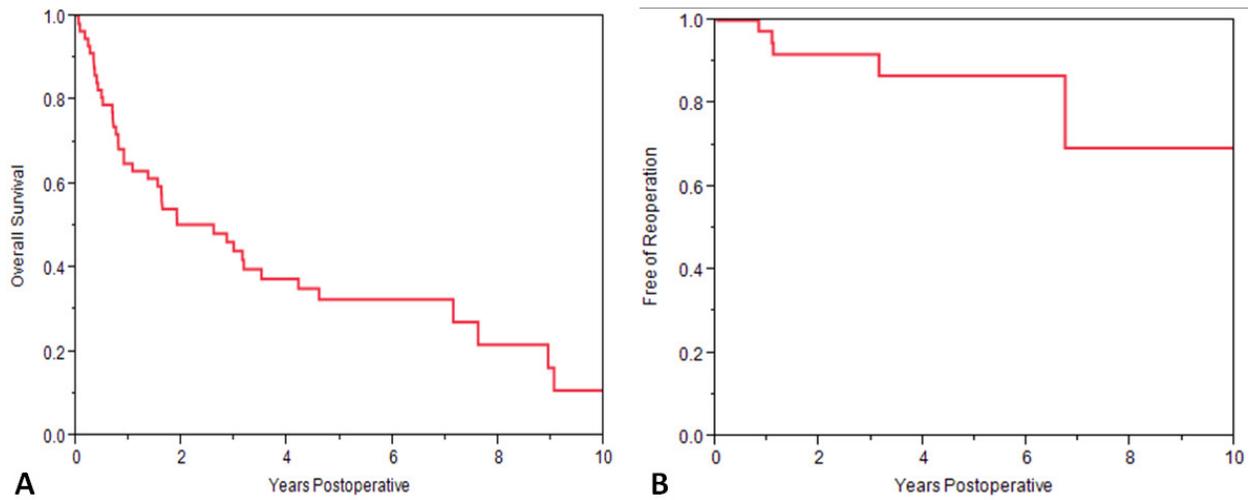


Figure 1: Overall- (A) and reoperation-free (B) survival following endoprosthetic reconstruction for a malignant process of the proximal humerus. Patients frequently succumb to their disease prior to needing an additional procedure.