



# 30-Year Follow-Up Results of 170 Cemented Endoprosthetic Reconstructions for Tumors of the Upper Extremity

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## INTRODUCTION

Given the rarity of musculoskeletal tumors of the upper extremity and the associated mortality, long-term survival data following limb salvage surgery is heterogeneous and largely limited to small series.

## OBJECTIVES

- To examine long-term outcomes of cemented stem endoprosthetic reconstruction following limb salvage for tumors of the upper extremity
- To compare functional outcomes following proximal humerus replacement (PHR) between reverse total shoulder arthroplasty and hemiarthroplasty

## HYPOTHESES

- Endoprosthetic reconstruction for tumors of the upper extremity are durable at long-term follow-up.
- Following PHR, reverse total shoulder arthroplasty demonstrates improved functional outcomes compared to hemiarthroplasty.

## METHODS

A retrospective review of 170 consecutive patients who underwent limb salvage surgery with endoprosthetic reconstruction for musculoskeletal tumors of the upper extremity at UCLA between December 1980 and December 2019 was performed.

Implant failure was defined by revision of the stemmed components, while limb salvage failure was defined by amputation.

## RESULTS

Table 1: Survival Data Following Upper Extremity Endoprosthetic Reconstruction

	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
<b>Implant Survival</b>						
Custom (N=35)	90.8%	81.7%	72.7%	72.7%	72.7%	72.7%
Modular (N=135)	95.4%	92.8%	88.1%	88.1%	88.1%	-
Total Humerus (N=21)	88.0%	65.2%	65.2%	65.2%	65.2%	65.2%
Distal Humerus (N=16)	80.2%	80.2%	40.1%	40.1%	-	-
Proximal Humerus (N=133)	96.7%	96.7%	96.7%	96.7%	96.7%	-
Overall (N=170)	93.4%	89.0%	82.1%	82.1%	82.1%	82.1%
<b>Patient Survival</b>						
Low Grade or Benign (N=32)	95.0%	95.0%	95.0%	95.0%	95.0%	-
High Grade IIA/IIB (N=61)	67.5%	60.3%	51.6%	51.6%	51.6%	51.6%
Stage III/Metastatic (N=69)	29.5%	15.3%	7.7%	7.7%	-	-
<b>Limb Salvage</b>						
	92.5%	88.9%	88.9%	88.9%	88.9%	88.9%

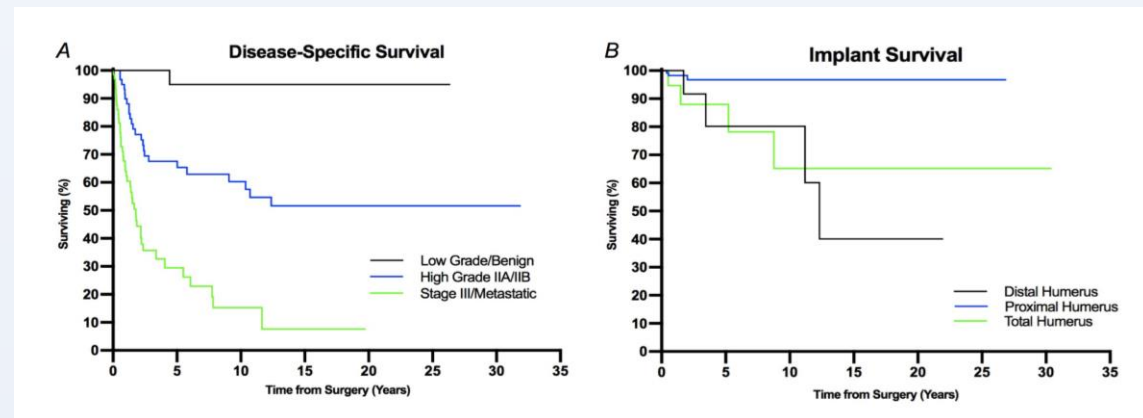


Figure 1A-B: Kaplan-Meier survival curves demonstrating disease-specific patient survival (Figure 1A), and implant survival (Figure 1B).

Table 2: Modes of Endoprosthetic Failure

Mode of Failure	Incidence (n)
Aseptic loosening	1.8% (3)
Structural Failure	3.5% (6)
Tumor Progression	2.4% (4)
Infection	0.6% (1)
<b>Total</b>	<b>8.2% (14)</b>

Incidence of local recurrence: 7.6% (13/170)  
Incidence of amputation: 5.3% (9/170) (100% of amputations performed for tumor progression)

Table 3: Range of Motion following PHR

	rTSA	Hemi
Mean Abduction	125.0°	35.7°
Mean Forward Elevation	120.0°	36.7°

## CONCLUSIONS

- Endoprosthetic reconstructions for musculoskeletal tumors of the upper extremity demonstrate excellent long-term durability, especially of the proximal humerus
- Tumor progression is the most common cause of failure of upper extremity limb salvage
- Reverse total shoulder arthroplasty may have improved functional outcomes and can be considered in patients undergoing proximal humerus replacement