A Multicenter Comparison of Reverse Total Shoulder Arthroplasty Versus Hemiarthroplasty for Endoprosthetic Reconstruction Following Oncologic Resection of the Proximal Humerus

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INTRODUCTION: The purpose of this study was to compare the complication rate and functional outcome of reverse total shoulder arthroplasty (rTSA) and hemiarthroplasty (HA) endoprosthetic reconstruction (EPR) in patients undergoing proximal humeral resection for primary or metastatic bone tumors.

METHODS:

Patients undergoing oncologic resection and proximal humerus EPR with rTSA or HA at six institutions between 2010 and 2024 were retrospectively reviewed. In total, 295 patients were included, with 154 (52%) HA and 141 (48%) rTSA. Eighty-six percent (n=121) rTSA were performed by orthopaedic oncologists without shoulder surgeon collaboration. Patient, tumor, and surgical details were collected. Complications and functional outcomes were compared with Fischer exact tests. Median final follow-up was 18.6 months (rTSA) and 12.2 months (HA) (p=0.247).

RESULTS: At final follow up, the reoperation rate was 28% with rTSA and 8% with HA (p<0.0001). Dislocation was the indication for first reoperation in 18 rTSA (46%) versus 3 HA (2%) (p=0.0004). Acute dislocation occurred in 24 rTSA (17%) and 3 HA (2%) (p<0.0001), whereas 23 HA (15%) demonstrated chronic dislocation in the form of anterosuperior escape. Humeral aseptic loosening rate was 2% (3% rTSA, 1% HA); glenoid aseptic loosening in rTSA patients was 1%. Fifty-four rTSA (38%) had final forward elevation (FE) > 90 degrees, while only 10 HA (6%) did (p<0.0001). Conversely, 91 HA (59%) had active FE <45 degrees compared to only 22 rTSA (16%) (p<0.0001).

DISCUSSION AND CONCLUSION: Modular rTSA has significantly improved active FE when compared to HA, but with higher reoperation rates primarily driven by instability.

Table 2. Outcomes

	All n = 295 (%)	rTSA n = 141 (48%)	HA n = 154 (52%)	p-value*
All-Cause Reoperation	52 (18)	39 (28)	13 (8)	**<0.0001**
Indication for First Reoperation				0.176
Prosthetic Joint Infection	5 (2)	2 (1)	3 (2)	
Aseptic Wound Dehiscence	1 (1)	1 (1)	0 (0)	
Acute Prosthetic Dislocation	21 (7)	18 (13)	3 (2)	
Periprosthetic Fracture	4 (1)	3 (2)	1 (1)	
Mechanical Implant Failure	2 (1)	2 (1)	0 (0)	
Aseptic Loosening	5 (2)	4 (3)	1 (1)	
Local Recurrence/Progression	5 (2)	8 (6)	3 (2)	
Deltoid Tear	1 (1)	1 (1)	0 (0)	
Aseptic Loosening				0.107
Humeral-Sided	5 (2)	4 (3)	1 (1)	
Glenoid-Sided	1 (1)	1 (1)	--	
Periprosthetic Fracture	5 (2)	3 (2)	2 (1)	0.673
Prosthetic Joint Infection	9 (3)	4 (3)	5 (3)	0.999
Acute Dislocation	24 (8)	24 (17)	3 (2)	**<0.0001**
Anterior Humeral Escape	23 (8)	--	23 (15)	**<0.0001**
Local Recurrence	39 (13)	21 (15)	18 (12)	0.492
Mechanical Failure	3 (1)	3 (2)	0 (0)	0.108
Final Forward Elevation				**<0.0001**
<45 degrees	113 (38)	22 (16)	91 (59)	
45-90 degrees	74 (25)	48 (34)	26 (17)	
>90 degrees	64 (22)	54 (38)	10 (6)	
Missing/Unknown	44 (15)	17 (12)	27 (18)	

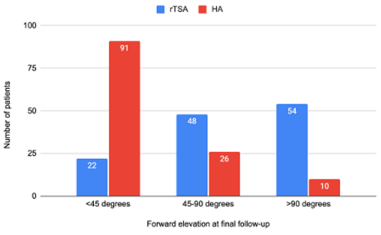

Table 1. Patient and tumor characteristics.

	All n = 295 (%)	rTSA n = 141 (48%)	HA n = 154 (52%)	p-value*
Patient Factors				
Age, y, mean (SD)	54.7 (19.9)	56.6 (18.4)	52.9 (21.1)	0.210
Sex				0.416
Male	148 (50)	67 (48)	81 (53)	
Female	147 (50)	74 (52)	73 (47)	
Tumor Factors				
Diagnosis				**0.009**
Primary Bone Sarcoma	105 (36)	41 (29)	64 (42)	
Primary Soft Tissue Sarcoma	7 (2)	3 (2)	4 (3)	
Benign Aggressive Bone Tumor	11 (4)	7 (5)	4 (3)	
Lymphoma/Leukemia	11 (4)	1 (1)	10 (6)	
Myeloma/Plasmacytoma	24 (8)	14 (10)	10 (6)	
Metastatic Disease	137 (46)	75 (53)	62 (40)	
Primary Bone Sarcoma Histology				0.389
Chondrosarcoma	51 (49)	24 (59)	27 (42)	
Ewing Sarcoma & Ewing Family	11 (10)	4 (10)	7 (11)	
Fibrosarcoma of Bone	1 (1)	0 (0)	1 (2)	
Malignant Giant Cell Tumor of Bone	2 (2)	1 (2)	1 (2)	
Osteosarcoma	36 (34)	10 (24)	26 (41)	
Synovial Sarcoma of Bone	1 (1)	1 (2)	0 (0)	
Undifferentiated Pleomorphic Sarcoma of Bone	3 (3)	1 (2)	2 (3)	
Benign Aggressive Bone Tumor Histology				0.661
Chondroblastoma	2 (18)	2 (29)	0 (0)	
Desmoplastic Fibroma	1 (9)	1 (14)	0 (0)	
Giant Cell Tumor of Bone	2 (18)	0 (0)	2 (50)	
Unicameral Bone Cyst	1 (9)	1 (14)	0 (0)	
Synovial Chondromatosis	1 (9)	1 (14)	0 (0)	
Enchondroma	2 (18)	1 (14)	1 (25)	
Missing/Unknown	2 (18)	1 (14)	1 (14)	
Soft Tissue Mass	169 (57)	82 (58)	87(56)	0.814
Pathological Fracture	176 (60)	84 (60)	92 (60)	0.999
Glenoid Involvement by Tumor	15 (5)	5 (4)	10 (6)	0.296