Reverse total shoulder arthroplasty demonstrates improved functional outcomes and equivocal mid-term survival compared to hemiarthroplasty following oncologic reconstruction in proximal humerus replacement

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INTRODUCTION: Proximal humerus replacement (PHR) after oncologic resection presents challenges due to disruption of the rotator cuff and capsule. Hemiarthroplasty (hPHR) preserves distal function but limits shoulder mobility. Reverse total shoulder arthroplasty (rPHR) may improve shoulder function, though outcomes remain unclear with resections near or below the deltoid tuberosity. This study compares functional outcomes, implant survivorship, and technical factors—including resection length and stem-to-resection length ratio—in patients undergoing hPHR or rPHR using endoprosthesis or allograft-prosthesis composite (APC) reconstruction.

METHODS: A retrospective review of 173 patients undergoing oncologic PHR from 1981–2024 was performed (146 hPHR; 27 rPHR). Mean follow-up was 59.3 ± 81.9 months (hPHR) and 24.9 ± 26.6 months (rPHR). Implant failures were classified by Henderson criteria. Shoulder range of motion (ROM)—abduction, forward flexion (FF), and external rotation (ER)—was assessed at final follow-up. Independent t-tests compared ROM; Pearson correlation evaluated ROM vs. resection length. Kaplan-Meier analysis assessed implant survival.

RESULTS: rPHR showed greater ROM than hPHR: abduction (108.8° vs. 32.4°), FF (109.6° vs. 33.8°), and ER (37.8° vs. 16.5°) (all $p < 0.001$). In rPHR, ROM did not correlate with resection length ($p > 0.7$), and stem-to-resection length ratio did not impact survival. APCs used below the deltoid tuberosity had worse FF (56° vs. 121°, $p = 0.04$). Time to failure was shorter in rPHR (2.1 vs. 55.2 months, $p = 0.0004$), though overall survival was similar ($p = 0.71$).

DISCUSSION AND CONCLUSION: rPHR yields superior ROM compared to hPHR without compromising implant survival. APCs below the deltoid tuberosity may limit function.