

The Use Of Recombinant Human Bone Morphogenetic Protein-2 In Revision Reverse Shoulder Arthroplasty With Glenoid Bone Loss On Secondary Revision Surgery Rates With Minimum 2-year Follow-up

John M. Abdelshaheed¹, Todd Phillips¹, Albert Mousad¹, Casey Beleckas¹, Jonathan C. Levy¹

¹Levy Shoulder to Hand Center at the Paley Orthopedic and Spine Institute, Boca Raton, FL
Jo567788@ucf.edu

Disclosures: J.M. Abdelshaheed: None. T. Phillips: None. A. Mousad: None. C. Beleckas: None. J.C. Levy: 1; Received royalties from any medical-related company – Enovis; Stryker; Exactech; Globus Medical; Innomed. 3B; Paid consultant of any medical-related company – Enovis; Stryker; Exactech; Globus Medical. 5; Received research or institutional support as a principal investigator from any medical-related company – Enovis; Stryker.

INTRODUCTION: Revision reverse shoulder arthroplasty (rTSA) in the setting of glenoid bone loss is associated with higher risks of mechanical failure and worse clinical outcomes when failure of glenoid implant osseointegration occurs. This study aims to identify the effects of recombinant human bone morphogenetic protein-2 (rhBMP-2) (INFUSE® Bone Graft, Medtronic Spinal and Biologics, Memphis, TN) on failures in revision rTSA cases involving glenoid bone loss.

METHODS: A retrospective review from 2014 to 2023 of a single surgeon repository utilizing a single reverse total shoulder implant system using a monoblock central screw baseplate was performed. All included patients underwent revision reverse shoulder arthroplasty with the use of rhBMP-2, together with the use of local autograft or allograft bone grafting. Patient-specific variables, radiographic parameters, and patient outcomes (American Shoulder and Elbow Surgeons (ASES) Score, Simple Shoulder Test (SST), Visual Analog Scale (VAS) - Pain, VAS - Function, and Single Assessment Numeric Evaluation (SANE)) were collected. Descriptive statistics were utilized to analyze rates of secondary procedure for glenoid-sided failure. Secondary outcomes included changes in patient reported outcome measures.

RESULTS SECTION: 38 patients met inclusion criteria with mean follow-up of 5.28 years. Femoral head allograft (36.8%), cancellous cubes (28.9%), and humeral autograft (26.3%) were the most common grafts utilized. There were 4 (10.6%) observed glenoid-sided complications. Two (5.3%) underwent a secondary revision operation for baseplate failure, while two (5.3%) had radiographic detection of glenoid sided loosening without mechanical symptoms. All-cause two-year implant survival was 94.7% and five-year implant survival was 90.0%. There were significant improvements in all patient-reported outcome measures ($p < .001$), as well as significant increases in forward elevation ($p < .001$).

DISCUSSION: The utilization of rhBMP-2 in a revision rTSA setting with glenoid bone loss demonstrates reliable improvements in function and patient-reported outcomes with a low baseplate failure rate (5.3%) requiring subsequent revision surgery. To our knowledge, this is the first series published on the outcomes of the use of rhBMP-2 in the revision shoulder arthroplasty setting.

SIGNIFICANCE/CLINICAL RELEVANCE: rhBMP-2 augmentation in revision rTSA may promote bone incorporation and baseplate stability, supporting improved outcomes and implant longevity in cases with glenoid bone loss.

	Pre-Operative	Post-Operative	p-value
<u>Patient-Reported Outcomes Measure</u>			
ASES Score	34.00	67.14	<.001
SST Score	2.86	7.26	<.001
VAS - Pain	5.54	2.31	<.001
VAS - Function	3.07	7.17	<.001
SANE	23.36	72.57	<.001
<u>Range of Motion</u>			
Forward Elevation	79.52	120.59	<.001
Abduction	63.39	85.59	<.001
External Rotation	31.94	33.09	0.418
Internal Rotation (Converted)	4.83	5.875	0.061

Table 1 – Patient-reported outcome measures and functional assessment of patient pre-operatively versus post-operatively