Glenoid Wear Rates In Hemiarthroplasty With Concentric Glenoid Reaming Using a Metallic Humeral Head: Mid- to Long-Term Follow-Up

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INTRODUCTION:

Background

Management of glenohumeral arthritis in the young and active patient is often challenging because of prior surgery, high patient expectations, and extended patient longevity. While total shoulder arthroplasty is often considered in these patients, there are concerns with glenoid loosening and wear with high levels of activity over many years. Hemiarthroplasty with concentric glenoid reaming is an option in these active patients, but long-term glenoid wear and erosion is a concern. More recently, pyrocarbon humeral head hemiarthroplasty with or without concentric glenoid reaming has the potential benefit of better biocompatibility and therefore decreased glenoid wear rates. However, the amount and rate of wear with metallic humeral heads in this cohort of patients has not yet been clearly defined. Therefore, the objectives of this study were to answer the following questions:

1) What is the rate of glenoid erosion in patients undergoing hemiarthroplasty with concentric glenoid reaming with a metallic humeral head?

2) What is the impact of glenoid wear on pain and function?

METHODS:

Materials and Methods

Patient data was prospectively entered into an institutional shoulder arthroplasty database. Inclusion criteria included: 1) post-operative radiographs within 2 months of the surgical date, 2) post-operative radiographs done at a minimum of 4 years. All available post-operative radiographs were used for each patient in order to construct wear rates/curves. Medialization was determined by measuring the position of the humeral head center of rotation relative to a line drawn through the lateral edge of the acromion and parallel with the glenoid face. The number of millimeters of medialization was calculated between interval radiographs. Glenoid wear was categorized into minimal/mild (≤5mm), moderate (>5mm but below ≤10mm), or substantial (>10mm). Simple Shoulder Test (SST) scores were collected pre-operatively and annually for each patient.

RESULTS:

Results

Comparable radiographs at the early postoperative baseline and at subsequent evaluation were available for 113 shoulders with a mean radiographic follow-up of 6.7 ± 2.3 years. Of the included patients, 91% were male with an average age of 58.8 ± 9.5 years. At latest follow-up, minimal/mild glenoid wear was noted in 92 (81%) patients, moderate wear in 15 (13%) patients, and severe wear in 6 (5%) patients. At latest follow-up, the mean amount of glenoid wear was 2.9 ± 4.3 mm. Postoperative humeral head medialization rates were not linear. The majority of glenoid wear occurred in the first four years after ream-and-run arthroplasty (0.6mm/year) and plateaued thereafter (0.2mm/year) (Figure 1). SST scores at latest follow-up were not different in those with minimal/mild wear compared to those with moderate or severe wear (10.1 ± 2.4 vs. 9.5 ± 3.0, p=0.384) (Table 1).

DISCUSSION AND CONCLUSION:

Conclusion

This data represents the largest and longest follow-up analyzing hemiarthroplasty with concentric glenoid reaming utilizing a metallic humeral head. The results demonstrate that glenoid wear is not linear and occurs mostly within 4 years postoperatively, reaching an average of about 3mm, then plateauing. Improvement in clinical outcomes demonstrated no changes between minimal/mild wear and moderate/severe wear cohorts.

Figure 1: Glenoid wear rates after ream-and-run arthroplasty.

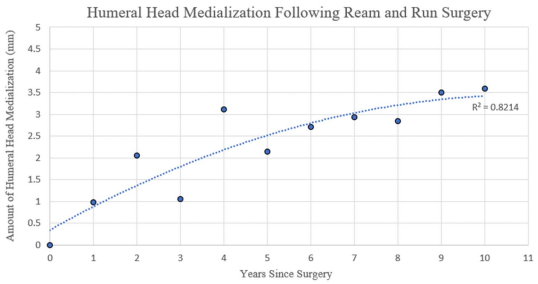

Table 1. Outcome scores by glenoid wear severity.

Variable	Number or Average [± SD (%)]	p-value
Glenoid Wear		
Minimal/mild	92 (81.4%)	
Moderate	15 (13.3%)	
Severe	6 (5.3%)	
Average Glenoid Wear (mm)	2.9 ± 4.3	
Mean Preoperative SST		
Minimal/mild wear	5.3 ± 2.5	0.847
Moderate/severe wear	5.1 ± 1.6	
Mean Postoperative SST		
Minimal/mild wear	10.1 ± 2.4	0.384
Moderate/severe wear	9.5 ± 3.0	
Change in SST		
Minimal/mild wear	4.8 ± 3.2	0.839
Moderate/severe wear	4.6 ± 2.7	
Mean Preoperative VAS		
Minimal/mild wear	6.6 ± 1.8	0.171
Moderate/severe wear	7.3 ± 1.9	
Mean Postoperative VAS		
Minimal/mild wear	2.0 ± 2.5	0.876
Moderate/severe wear	1.9 ± 2.8	
Change in VAS		
Minimal/mild wear	4.6 ± 2.6	0.308
Moderate/severe wear	5.4 ± 3.3	

*SST, Simple Shoulder Test; VAS, Visual Analog Scale for pain