

EVIDENCE-BASED ORTHOPAEDICS

In Older Adults with 3- or 4-Part Dislocated Proximal Humeral Fractures, Reverse Shoulder Arthroplasty Improved Anterior Elevation and Constant Score, but Not DASH Scores, Quality of Life, or Radiographic Outcomes Compared with Hemiarthroplasty

Laas N, Engelsma Y, Hagemans F, Hoelen M, van Deurzen D, Burger B. Reverse or hemi shoulder arthroplasty in proximal humerus fractures: a single-blinded prospective multicenter randomized clinical trial. *J Orthop Trauma.* 2021;35(5):252-8.

Question: In older adults with dislocated 3- or 4-part proximal humeral fractures, what are the effects of reverse shoulder arthroplasty (RSA) compared with hemiarthroplasty (HA) on range of motion and function?

Design: Randomized (unclear allocation concealment), blinded (radiograph assessors), controlled trial with 12 months of follow-up. The trial was stopped early due to low recruitment and belief by participating surgeons that RSA resulted in superior outcomes compared with HA.

Setting: 3 level-I trauma centers in the Netherlands.

Patients: 33 Dutch-speaking patients ≥ 65 years of age (mean age, 75 years; 58% women) who presented to the emergency department (ED) with an isolated 3- or 4-part dislocated proximal humeral fracture suitable for arthroplasty. Exclusion criteria were American Society of Anesthesiologists score >3 , previous osteosynthesis of the shoulder, ≥ 1 -month delay before presenting to the ED, or glenoid bone defect $>30\%$ or $>15^\circ$ retroversion of the glenoid. 1 patient died before the intervention and 1 refused surgery. 79% completed 6-month follow-up, 58% completed primary outcomes, and 76% completed secondary outcomes at 12-month follow-up.

Intervention: Patients were allocated to RSA ($n = 17$) or HA ($n = 14$) with a cemented-stem Tornier AEQUALIS fracture shoulder prosthesis (Wright Medical) through the anterior deltopectoral or deltoid-splitting approach. All patients received a shoulder immobilizer to prevent active external

rotation for 6 weeks and physiotherapist training for $\leq 30^\circ$ passive flexion and abduction in the first 6 weeks, then extended to 90° of active and passive flexion, abduction, and external rotation. After 3 months, there were no movement restrictions.

Main outcome measures: Primary outcomes were active range of motion and Constant score at 3 weeks and 3, 6, and 12 months. Secondary outcomes included Disabilities of the Arm, Shoulder and Hand (DASH) score, quality of life (Short Form-12 Health Survey), pain (visual analog scale [VAS], score range, 0 to 10), and radiographic outcomes (tuberosity healing and heterotopic ossification).

Main results: The RSA group had less internal rotation than the HA group at 6 weeks (median, 20° versus 50° , respectively; $p < 0.001$) but not at 3, 6, or 12 months. The RSA group had greater anterior elevation versus HA at 6 (median, 105° versus 80°) and 12 months (median, 110° versus 90°), and abduction at 12 months (median, 90° versus 75°) (all $p < 0.05$). Groups did not differ for external rotation at any time point. The RSA group had higher Constant scores compared with the HA group at 6 and 12 months (Table I). Groups did not differ for pain at 6 weeks or 3 or 6 months, but the RSA group had lower pain scores at 12 months (median VAS, 1.0 vs. 2.5; $p = 0.05$). Groups did not differ for DASH or quality of life measured at 3 and 12 months or radiographic outcomes measured at 12 months.

Conclusion: In older adults with dislocated 3- or 4-part proximal humeral fractures, RSA showed superior range of

TABLE I Reverse shoulder arthroplasty (RSA) versus hemiarthroplasty (HA) in older adults with dislocated 3- or 4-part proximal humeral fractures

Outcome	Time point	Median scores		P value
		RSA	HA	
Constant score*	3 weeks	26	27	0.78
	3 months	38	41	0.72
	6 months	60	41	0.01
	12 months†	51	32	0.05

*Measure of shoulder function: score range, 0 to 100 (higher score = better function; minimal clinically important difference, 5.7 to 9.4 points). †58% follow-up.

motion in anterior elevation and Constant score compared with HA but not improved DASH scores, quality of life, or radiographic outcomes.

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Commentary

An acute 3- or 4-part dislocated proximal humeral fracture can present a challenging scenario for the treating surgeon. Surgical management is influenced by many factors, including age, activity level, medical status, expectations, and fracture pattern. The well-designed trial by Laas and colleagues attempted to determine if surgical intervention (RSA versus HA) results in better outcomes for older patients with acute dislocated proximal humeral fractures.

Thirty-three patients were randomized, and 58% of patients (18 of 31) had primary outcomes available at 12 months. Patients in the RSA group had significantly better anterior elevation, Constant scores, and lower VAS pain scores at the time of final follow-up (12 months). The improvement in Constant scores (19 points at 6 and 12 months) was clinically significant (minimal clinically important difference, 4.7 to 9.6). However, the authors found that the 2 groups had similar DASH and Short Form-12 Health Survey scores as well as radiographic tuberosity healing.

Despite the small number of patients and short follow-up, Laas and colleagues found that RSA had better improvement in both anterior elevation and clinical outcome (Constant scores). In fact, the trial was terminated early before the calculated study sample size was reached because “there was a growing belief among the participating surgeons that RSA was superior to HA.” The findings are supported in the literature. Both Bonneville

et al.¹ and Lädermann et al.² found that RSA had better elevation and clinical outcome than HA for complex proximal humeral fractures.

In older patients with dislocated proximal humeral fractures, RSA will result in less pain, better range of motion (elevation), and functional outcomes than HA. However, the surgeon must be cognizant of potential complications and set reasonable expectations for patients about postoperative outcome.

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Disclosure: The Disclosure of Potential Conflicts of Interest form is provided with the online version of the article (<http://links.lww.com/JBJS/G710>).