

Initial Clinical Results of a Small, Curved-back Oval Baseplate in Reverse Total Shoulder Arthroplasty

Josie A. Elwell, PhD¹, Sean Grey, MD², Rahul Deshmukh, MD³, Jae Chul Yoo, MD⁴, Emilie V. Cheung, MD⁵, Lynn Crosby, MD⁶, Joseph Zuckerman, MD⁷, Thomas Wright, MD⁸, Pierre-Henri Flurin, MD⁹ Christopher P. Roche, MSE, MBA¹

¹Exactech, Inc., Gainesville, FL, ²Orthopaedic Center of the Rockies, Ft Collins, CO, ³Ascension St. Vincent's Riverside Hospital, Jacksonville, FL

⁴Department of Orthopaedic Surgery, College of Medicine, Sungkyunkwan University, Seoul, Republic of Korea, ⁵Department of Orthopaedic Surgery, Stanford University Medical Center, Redwood City, CA, ⁶Department of Orthopaedic Surgery, VA Medical Center, University of Nebraska, Omaha, NE

⁷NYU Langone Dept of Orthopedics, New York, NY, ⁸University of Florida Dept of Orthopaedics, Gainesville, FL, ⁹Clinique du Sport, Merignac, France

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INTRODUCTION: Reverse total shoulder arthroplasty (rTSA) is an increasingly popular choice in the treatment of degenerative conditions of the shoulder, generally involving rotator cuff deficiency. Reversal of the natural anatomy requires the convex portion of the implant, the glenosphere, to be affixed to the glenoid, which is accomplished via a baseplate. Various shapes and sizes of baseplate are available, including oval versus circular, curved versus flat back. Oval, curved-back baseplates were designed to maximize glenoid contact and minimize reaming, but were based on patient populations of average stature, which may have larger glenoid heights and widths than those of smaller stature^{1,2}. This has necessitated the design of more compact components to optimize both fixation and impingement-free range of motion within this smaller patient population. The aim of this study is to report early clinical and radiographic results of a small versus standard sized oval, curved back baseplates.

METHODS: Patient data from a prospectively enrolled, IRB approved database collected via standardized forms was reviewed retrospectively. Patients treated with primary rTSA using a single shoulder system (Equinox; Exactech, Inc.) after December of 2018, when both products were commercially available, with available 2-year minimum follow-up were included in the analysis. Exclusion criteria were revision or fracture indications. All patients were treated with either a non-augmented small or standard sized baseplate. Pre- and postoperative outcomes from the latest follow-up visit including range of motion (ROM), patient reported outcome metrics (PROMs), radiographic findings, complication rates, and revision rates were investigated and compared between the small versus standard baseplate cohorts using 2-tailed, unpaired t-tests, chi-squared test, or Wilcoxon rank sum test where appropriate and a value of $p < 0.05$ was considered statistically significant.

RESULTS SECTION: A total of 328 patients were included in the analysis: 80 in the small baseplate group and 248 in the standard. The small baseplate group consisted of 85% females with an average age of 70 ± 8 years at surgery, average height of 64 ± 4 inches, average weight of 172 ± 35 lbs, and average BMI of 29.5 ± 5.9 . The standard baseplate group consisted of significantly less females with 50% ($p < 0.001$), an average age of 72 ± 8 years at surgery, average height of 66 ± 4 inches ($p < .001$) and average weight of 186 ± 43 lbs ($p = .008$), and average BMI of 29.6 ± 5.9 ($p = 0.881$). Preoperative, postoperative, and pre-to-postoperative changes in ROM measures and PROMs are shown in Table 1. Scapular notching rates were 29.1% and 6.8% in the small and standard baseplate groups, respectively, with average grades of 1.1 ± 0.5 and 1.3 ± 0.6 . Of note, the glenospheres compatible with the small baseplate are available in diameters of 36 and 40mm, and all cases of scapular notching occurred with 36mm glenospheres. At latest follow-up there were zero complications in the small baseplate group and one complication of nerve pain in the standard baseplate group, with zero revisions in either group.

DISCUSSION: rTSA performed with small versus standard sized baseplates achieved similar clinical results that were statistically significant in terms of improvement in ROM and PROMs. Preoperatively, the small baseplate cohort generally had greater ROM in abduction, forward elevation, and external rotation, possibly as a result of a smaller average stature. However, PROMs including visual analog scale (VAS) pain, global shoulder function, Constant Score, American Shoulder and Elbow Society (ASES), and Shoulder Arthroplasty Smart (SAS) score were not significantly different. There were no significant differences in pre-to-post operative improvements in any metric and the only significant difference in postoperative measures was in external rotation, where small baseplates had greater motion. Although not significant, the small baseplate group had greater ROM in abduction and forward elevation too, likely due to the preoperative disparities. Radiographic findings showed higher rates of scapular notching in the small baseplate group. Complication and revision rates were similarly low among both groups, with only one complication of nerve pain in the standard baseplate group at latest follow-up. Future studies should seek to compare outcomes in matched cohorts and at longer term follow up to further confirm the favorable clinical results of a smaller, curved-back, oval baseplates in rTSA.

SIGNIFICANCE/CLINICAL RELEVANCE: This study presents a comparison of 2-year minimum clinical and radiographic outcomes of rTSA performed with small versus standard sized, curved-back, oval baseplates, finding that each are effective in relieving pain and restoring ROM and exhibit low complication and revision rates at early follow-up.

REFERENCES: 1. Jacobson et al. Glenohumeral Anatomic Study: A Comparison of Male and Female Shoulders with Similar Average Age and BMI. BHJD 2015;73(Suppl 1):S68-78. 2. Matsuki et al. Three-dimensional measurement of glenoid dimensions and orientations. JOS 2019;24:624-630.

Table 1. Preoperative, postoperative, and pre-to-postoperative changes in ROM (ABD = abduction, FE = forward elevation, IR score = internal rotation score, EXT ROT = external rotation) and PROMs (VAS = visual analog scale pain, ASES = American Shoulder and Elbow Society, SAS = Shoulder Arthroplasty Smart Score) for the small and standard baseplate groups.

		ABD	FE	IR SCORE	EXT ROT	VAS PAIN	SHOULDER FUNCTION	CONSTANT	ASES	SAS
Preop	Small	102.8 (48.4)	110.6 (48.2)	3.4 (1.9)	31.5 (21.4)	6.3 (2.4)	4.1 (2.7)	41.5 (18.3)	36.4 (18.3)	50 (16)
	Standard	82.7 (41.5)	95 (42.4)	3.2 (1.7)	25 (21)	6 (2.4)	4 (1.9)	37.3 (14.5)	37.7 (16.5)	47.4 (12.7)
	p-value	0.001	0.008	0.485	0.023	0.368	0.820	0.280	0.582	0.182
Postop	Small	140.4 (37)	151.6 (29.5)	3.7 (1.7)	45.4 (15.4)	1.4 (2.3)	8.2 (2)	66.6 (14.3)	80.2 (18.3)	74.4 (11.2)
	Standard	134.9 (29.7)	147.7 (24.3)	3.9 (1.6)	39.7 (17.9)	1.3 (2)	8.4 (1.9)	67.8 (13)	82.8 (17.4)	75.5 (11)
	p-value	0.251	0.319	0.384	0.033	0.648	0.433	0.703	0.255	0.529
Pre-to-postop	Small	42.4 (55.7)	46 (50.6)	0.5 (2.1)	15.1 (24.7)	-4.9 (2.8)	4.1 (3.2)	27.8 (16.1)	44.3 (19.9)	25.2 (16.4)
	Standard	53.1 (39.5)	53.9 (40.6)	0.7 (1.9)	15 (21.6)	-4.7 (2.8)	4.3 (2.6)	29 (17.4)	44.9 (21.2)	27.8 (14.3)
	p-value	0.123	0.249	0.529	0.974	0.597	0.590	0.807	0.817	0.294