

Augmented Baseplates Yield Clinical and Radiographic Outcomes Comparable to Those of Standard Baseplates in rTSA

Arthrex Research

OBJECTIVE

Achieving appropriate glenoid alignment in reverse total shoulder arthroplasty (rTSA) with standard baseplates relies on asymmetric reaming, which may result in loss of subchondral bone and medialization of the joint line.^{1,2} Augmented baseplates, initially introduced to correct glenoid version and inclination while preserving bone stock,^{3,4} have expanded in use to non-deformed glenoids to minimize reaming while optimizing baseplate position and inclination.⁵

Despite their theoretical advantages, studies comparing augmented and standard baseplates report inconsistent findings.^{6,7} This may reflect differences in surgical indications and implant-related factors, particularly lateralization of the center of rotation (COR). The degree of lateralization achieved, which has not been accounted for in prior studies, has been shown to influence key biomechanical and clinical outcomes, including range of motion (ROM) and scapular notching.⁸⁻¹¹

The purpose of this study was to determine whether patients with augmented baseplates had comparable 2-year clinical and radiographic outcomes to those of patients with standard baseplates.

METHODS

A retrospective review of patients undergoing rTSA between August 2018 and November 2023 and enrolled in a multicenter, prospectively maintained shoulder arthroplasty specific database (ShARC registry) was performed. A total of 209 augmented cases were included and matched 1:1 to a standard baseplate group according to baseline demographic and implant-related variables, including age, sex, BMI, comorbidities, glenosphere size, and total metallic lateralization provided by the baseplate and glenosphere. Based on a previous study, an additional +2 mm was assigned to 10° augmented baseplates and +4 mm to 20° augmented baseplates when calculating total metallic lateralization to account for the increased effective lateralization associated with the reduced reaming depth when using augmented baseplates.¹²

A 135° inlay press-fit humeral component (Univers Revers; Arthrex, Inc.) and circular baseplate (Modular Glenoid System; Arthrex, Inc.) were used in all cases. Standard baseplates were available with 0 mm, +2 mm, or +4 mm of lateral offset. Augmented baseplates, in 10° and 20°

full-wedge configurations, were available with 0 mm or +2 mm of lateral offset. Fixation was achieved with either a central screw or post for standard baseplates or with a post for augmented baseplates.

Outcome Measures

Patient-reported outcomes (PROs) and ROM were evaluated preoperatively and at 2-year follow-up. PROs included VAS, ASES score, WOOS index, SANE score, Constant-Murley score, and Veterans RAND-12 mental score. ROM included active forward flexion (FF), external rotation in adduction (ERO) and at 90° of abduction (ER90), as well as internal rotation at 90° of abduction (IR90). Internal rotation was recorded to the nearest spinal level, with negative values indicating improvement.

At final follow-up, radiographic assessment of baseplate fixation and seating was performed using true anteroposterior and axillary lateral views. Complete glenoid seating was defined as >80% contact between the baseplate and the glenoid surface. No loosening was defined as the absence of radiolucent lines, screw breakage, or implant migration. Possible loosening was defined by the presence of radiolucent lines around the baseplate without evidence of implant migration or screw failure. Definite loosening was defined as the presence of implant migration or screw breakage.

RESULTS

Baseline demographic and implant-related characteristics were similar between groups, with no significant differences observed. However, a higher prevalence of preoperative glenoid wear, as determined by a greater proportion of Walch type B and C glenoids, was observed in the augmented group.

Both groups demonstrated significant improvements in PROs and ROM at 2-year follow-up (Table 1, standard; Table 2, augmented). The augmented group demonstrated a significantly greater, although not clinically meaningful, improvement in ASES score compared to the standard group (Table 3). No significant differences were observed in VAS pain, SANE, WOOS, or VR-12 scores between groups.



Table 1. Comparison of Baseline and 2-Year Follow-up Functional Outcomes for Standard Baseplates (n = 209)

Outcome measure	Baseline		2-year follow-up		P value
	Mean	SD	Mean	SD	
PROs					
ASES	41.7	17.8	80.5	18.8	< .001
VAS Pain	5.5	2.5	1.4	2.2	< .001
SANE	32.9	23.2	74.9	25.4	< .001
WOOS	38.4	18.2	83.2	20.3	< .001
VR-12 Mental	48.8	12.0	53.9	9.3	< .001
ROM					
Active FF (degrees)	100	40	141	25	< .001
Active ERO (degrees)	32	21	48	19	< .001
Active ER90 (degrees)	28	29	61	24	< .001
Active IR (spinal level*)	L5	3	L3	3	< .001
Active IR90 (degrees)	17	20	39	22	< .001

Table 2. Comparison of Baseline and 2-Year Follow-up Functional Outcomes for Augmented Baseplates (n = 209)

Outcome measure	Baseline		2-year follow-up		P value
	Mean	SD	Mean	SD	
PROs					
ASES	41.1	18.2	85.2	15.5	< .001
VAS Pain	5.6	2.6	1.0	1.7	< .001
SANE	32.0	22.9	77.1	26.2	< .001
WOOS	39.6	18.0	86.7	17.0	< .001
VR-12 Mental	49.5	11.6	54.5	8.6	< .001
ROM					
Active FF (degrees)	106	42	149	27	< .001
Active ERO (degrees)	34	23	54	19	< .001
Active ER90 (degrees)	34	32	69	26	< .001
Active IR (spinal level*)	L5	3	L3	4	< .001
Active IR90 (degrees)	28	31	50	27	< .001

Table 3. Improvement in Augmented rTSA Versus Standard Baseplate rTSA Outcomes From Baseline to 2-Year Follow-up

Outcome measure	Augmented baseplate (n = 209)		Standard baseplate (n = 209)		P value
	Mean change	SD	Mean change	SD	
PROs					
ASES	44.5	21.4	38.9	22.8	.010
VAS Pain	-4.6	2.8	-4.1	2.9	.074
SANE	45.3	36.0	42.8	33.7	.464
WOOS	47.5	21.2	44.8	23.2	.215
VR-12 Mental	5.1	11.2	5.2	11.6	.929
ROM					
Active FF (degrees)	41°	42°	41°	38°	.999
Active ERO (degrees)	19°	25°	18°	22°	.664
Active IR90 (degrees)	36°	38°	32°	36°	.270
Active IR (spinal level*)	-2	4	-1	4	.011
Active IR90 (degrees)	21°	35°	20°	27°	.744

* Spinal levels were derived from converted numerical values. Due to rounding, the magnitude of improvement may not be fully reflected by the displayed spinal levels.

Complete glenoid seating (>80% baseplate-to-glenoid contact) was achieved in 89.5% of standard baseplates and 85.6% of augmented baseplates ($P = .236$), and bicortical central fixation was present in 82.8% and 76.1% of cases, respectively ($P = .090$). In both groups, 199 patients (95.2%) demonstrated no radiographic evidence of baseplate loosening ($P = .999$).

In a multivariable logistic regression analysis of the augmented cohort, complete glenoid seating was independently associated with lower odds of baseplate loosening (OR, 0.21; 95% CI, 0.05–0.87; $P = .033$). Bicortical post fixation, augment size (10° vs 20°), and lateralization category (≤ 4 mm vs ≥ 6 mm) were not significantly associated with loosening.

CONCLUSION

Augmented baseplates resulted in clinical and radiographic outcomes comparable to those of standard baseplates in the Modular Glenoid System (Arthrex Inc.) when controlling for implant-related factors, including lateralization. Although preoperative glenoid wear was more prevalent in the augmented cohort, this observation is consistent with indications that may require augmentation. Despite this difference, more than 95% of cases demonstrated no evidence of baseplate loosening, and clinical and radiographic outcomes remained comparable between groups.

The augmented group demonstrated greater, although not clinically meaningful, improvement in ASES score, as well as 1 spinal level greater improvement. Other PROs and ROM were similar between both groups.

In the augmented group, baseplate seating of <80% emerged as a significant factor associated with radiographic findings in multivariable analysis.

References

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