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Increased glenoid baseplate retroversion improves internal rotation following reverse shoulder arthroplasty

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A R T I C L E I N F O

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Level of evidence: Level III; Retrospective Cohort Comparison; Prognosis Study

Background: Internal rotation after reverse total shoulder arthroplasty is often unchanged or minimally improved. The primary purpose of this study was to investigate the effects of glenoid baseplate version on postoperative internal rotation. The secondary purpose to investigate the effects of baseplate retroversion on external rotation (ER) and patient-reported outcomes (PROs).
Methods: A retrospective review was performed on a prospectively maintained multicenter database of patients who underwent primary reverse shoulder arthroplasty using a 135° humeral prosthesis and lateralized glenoid with minimum 2-year clinical follow-up. Preoperative and postoperative radiographs were reviewed by 2 independent observers who assessed preoperative glenoid version and postoperative glenoid baseplate version. Patients were stratified by postoperative retroversion (<10°, 10°-19° or >20°) and change in version from preoperative to postoperative (ΔRV). Primary outcomes were internal rotation with the arm at 90° (IR90) and internal rotation estimated to nearest spinal level (IRspine). Secondary outcomes were active ER in adduction (ER0), active ER with arm at 90° (ER90), forward flexion (FF), and PROs. Linear regression analyses and 1-way analysis of variance analyses were used for comparisons.
Results: Two hundred seventy-four patients with a mean of 71 years of age were included in the study. Patients with >10° of postoperative baseplate retroversion gained 20° of IR90 ($P = .005$) without loss of ER90 ($P < .001$) compared to patients with <10° of baseplate retroversion. More than 10° of postoperative baseplate retroversion was associated with significantly improved Constant-Murley scores (41.5, $P = .007$) and Single Assessment Numeric Evaluation scores (45.4, $P = .047$) compared to patients with less than <10° of baseplate retroversion. Patients with a ΔRV increase of >10° had significantly improved IR90 ($P = .031$) without loss of ER90 ($P = .019$). There was no correlation between ΔRV and IRspine, ER0 or FF, or PROs.
Conclusion: With a 135° and lateralized glenoid, postoperative baseplate retroversion of >10° was associated with significantly improved IR90, ER90, Constant-Murley, and Single Assessment Numeric Evaluation scores at 2-year follow-up compared to <10° retroversion. Additionally an increased ΔRV from preoperative to postoperative appears to improve IR90 without limiting ER0 or FF. While baseplate retroversion does not improve IRspine, overall function appears to be improved and therefore consideration may be given to accepting retroversion or intentionally retroverting the baseplate if fixation allows.

While reverse total shoulder arthroplasty (rTSA) leads to reliable improvement in forward flexion, internal (IR) and external rotation (ER) may be unchanged or minimally improved, particularly with a medialized glenoid component.[13,27] Early mid-term results of the Grammont style rTSA published by Walch and Molé et al[26] in 2004 found no significant improvement in active IR or ER at the side from preoperative to postoperative evaluation, however slight improvement in active ER in abduction was significantly improved. Another study found ER improved by only 4° after rTSA with the Grammont reverse prosthesis,[2] while another reported a loss of 5° of ER.[29] However, modern rTSA prostheses with a more lateralized center of rotation have been found to improve ER up to 36°.[3,10,16]

IRB approval was obtained from Southern Oregon Institutional Review Board under study number SO IRB #: 15-001.

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Triplet et al[27] found that only 57% of rTSAs with a 135° humeral inlay prosthesis could achieve active IR to T12 vertebral level or higher compared to 86% of total shoulder arthroplasties. The same group of rTSA patients self-reported even lower subjective IR; only 32% felt that they could reach T12 or higher. Glenohumeral arthritis, an intact rotator cuff, preserved preoperative IR, lower body mass index (BMI), female sex, and increasing lateralization have been associated with improved IR postoperatively.[6,7,14,15,18,24,25,28,30] A multicenter retrospective review by Werner et al[28] studied active IR after rTSA in a 135° humeral inlay prosthesis with varying amounts of glenoid lateralization. They found that increasing glenoid-sided lateralization improved IR, with 6-8 mm yielding the best results; however, even with a lateralized glenoid approximately 50% of patients fail to achieve functional IR after rTSA.

In addition to lateralization, another factor that may attribute to bony impingement and therefore affect rotation range of motion (ROM) is baseplate retroversion. Few studies have investigated the effects of glenoid component retroversion on rotational ROM after rTSA. In a virtual ROM study, Keener et al[17] found that postoperative IR increased with glenoid baseplate retroversion between 0° and 15°, while postoperative ER decreased. Clinically, Rohman et al[24] and Lansdown et al[20] found that glenoid baseplate retroversion had no significant effect on postoperative rotational ROM. Similarly, Elmallah et al[8] found no significant difference in postoperative ROM between glenoid baseplate retroversion ≤15° compared to retroversion >15°.

The primary purpose of this study was to investigate the effects of glenoid baseplate version on postoperative IR. The secondary purpose to investigate the effects of baseplate retroversion on ER and patient-reported outcomes (PROs). Our hypothesis was that increased glenoid baseplate retroversion and increased preoperative to postoperative retroversion (ΔRV) would be associated with improved postoperative IR.

Figure 1 Example of an adequate axillary radiograph. Note that the spinoglenoid notch is clearly visible.

Methods

Database and study patients

A retrospective review was performed on a prospectively maintained multicenter database on patients who underwent primary rTSA from 2015 through 2021. Inclusion criteria were (1) minimum 2-year follow-up and (2) primary rTSA performed with a 135° inlay humeral component. Exclusion criteria were (1) revision procedures, (2) rTSA for proximal humerus fractures, and (3) use of custom implants. Institutional review board approval and patient consent was obtained before study inception as part of the prospective database enrollment.

Surgical technique

rTSAs were performed at 12 sites. In all cases, a deltopectoral approach was used with a 135° neck shaft angle inlay humeral component (Univers Revers; Arthrex, Inc., Naples, FL, USA). For the glenoid, an anatomically shaped baseplate was used before 2018 (Universal Baseplate; Arthrex, Inc., Naples, FL, USA) and a modular circular baseplate (Modular Glenoid System; Arthrex, Inc.) was used from 2018 through 2021. Glenoid-sided lateralization occurred through the baseplate and/or glenosphere and varied from 0 to 8 mm in 2-mm increments based on surgeon preference, patient anatomy, and soft tissue tension. Humeral retroversion was not standardized. Humeral offset included the polyethylene liner and metallic spacer if used. Glenospheres with diameters ranging from 33 mm to 42 mm were implanted based on surgeon preference with a goal of matching to patient size and avoiding excessive anterior or posterior overhang. Subscapularis repair and postoperative rehabilitation were not standardized.

Patient characteristics and outcome measures

Patient characteristics and PROs were prospectively collected in a secure database. Baseline data collected included age, sex, BMI, dominant arm, and tobacco use. PROs and ROM were assessed at baseline and at final follow-up. PROs obtained included the American Shoulder and Elbow Surgeons (ASES), Constant-Murley, visual analog scale (VAS), Veterans Rand 12 Item Health Survey (VR-12), Western Ontario Osteoarthritis of the Shoulder (WOOS) Index, and Single Assessment Numeric Evaluation (SANE). Strength was measured in pounds using a dynamometer for Constant-Murley (CM) strength, ER strength, and belly press strength. ROM was measured by the treating surgeons' team with a goniometer for active forward flexion (FF), active ER in adduction, active ER with the arm at 90° (ER90), and IR with the arm at 90° (IR90). IR was also estimated to the nearest spinal level (IRspine). Implant size and surgical characteristics such as glenosphere diameter, glenoid-sided lateralization, subscapularis repair, and computed tomography (CT)-based preoperative planning were also recorded.

Radiographic measurements

Preoperative and 2-year postoperative follow-up imaging was then reviewed by 2 fellowship-trained shoulder surgeons (LG, BC)

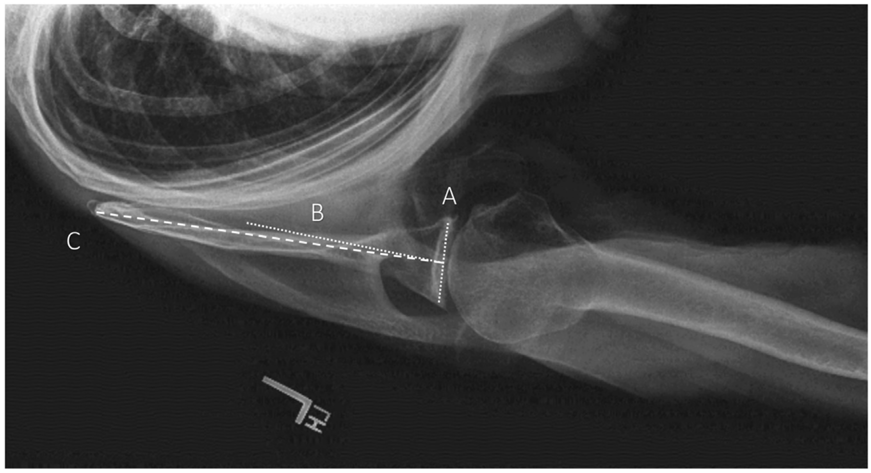

Figure 2 Preoperative axillary radiograph measuring glenoid version. A tangential line along the face of the glenoid was made (**A**) and then a line perpendicular to this was drawn (**B**). A third line was drawn from the mid-point of the glenoid along the long axis of the scapula (**C**). The angle between **B** and **C** is glenoid version.

to determine if adequate imaging had been obtained. If a patient had a preoperative CT or magnetic resonance imaging (MRI), glenoid version was measured on advanced imaging axillary sequences rather than plain radiographs. Axillary radiographs were deemed adequate if the spinoglenoid notch was clearly visible (Fig. 1).[21] Patients with inadequate or missing imaging were excluded. Preoperative and postoperative glenoid version was then measured in digital imaging and communications in medicine using Horos (Pixmeo, Bernex, Switzerland).[11,20] Preoperative glenoid version and postoperative glenoid baseplate version were measured as described by Lansdown (Figs. 2 and 3).[20]

Statistical analysis

Linear regression analyses were performed with 2-year follow-up PROs and ROM measures as the primary outcomes to evaluate the independent effect of glenoid retroversion while controlling for confounding variables. Preoperative glenoid version, postoperative glenoid version and ΔRV were assessed. Variables included in the regressions were: demographics (age, sex, BMI, tobacco history, and diabetes) and surgical characteristics (glenosphere diameter, glenoid-sided lateralization, subscapularis repair and CT-based preoperative planning) were analyzed. Separate regressions were performed for each ROM plane. Additionally, 1-way analysis of variance analyses were used to compare between groups stratified by postoperative retroversion and ΔRV. For all statistical analyses, a $P < .05$ was statistically significant. SPSS version 28 (IBM Corp., Armonk, NY, USA) was used.

Results

Patient demographics

A total of 416 patients met the inclusion criteria. Of those, 142 had inadequate or missing imaging studies. The final analysis was performed on 274 patients. Of the 274 patients, 131 (48%) patients' preoperative glenoid version was measured on plain radiographs. The remaining patients' preoperative glenoid version was measured on CT or MRI, which were 69 (25%) and 74 (27%), respectively. All postoperative imaging measurements were done on plain radiographs. Interobserver reliability was calculated as good to excellent reliability using the interclass correlation coefficient (ICC) (preoperative RV ICC = 0.867; postoperative RV

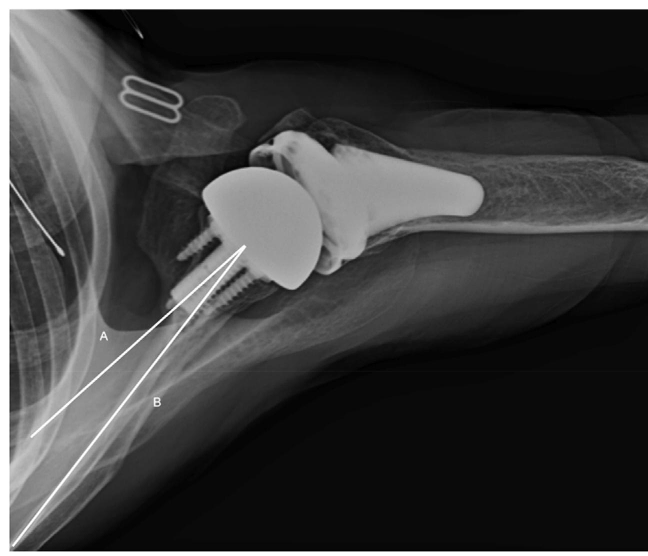

Figure 3 Postoperative axillary radiograph measuring glenoid baseplate version. A line bisecting the longitudinal axis of the glenoid baseplate boss, post or screw was drawn (**A**) and then a line was drawn along the scapular axis (**B**). The angle between those 2 points is glenoid baseplate version.

ICC = 0.756).[19] The mean age was 70.6 ± 7.3 year old, 51% were male, and the mean BMI was 30.2 ± 6.1.

Postoperative glenoid baseplate retroversion

Postoperative baseplate retroversion was <10° in 83 patients, 10°-19° in 129 patients, and >20° in 62 patients. There were significant improvements in IR90 and ER90 at 2 years postoperative with baseplate retroversion >10° (IR90: <10° vs. 10°-19°, $P = .005$; <10° vs. >20°, $P = .001$) (ER90: <10° vs. 10°-19°, P=<.001; <10° vs. >20°, $P = .002$). There were no significant differences in IRspine, ER0, or FF based on baseplate retroversion. CM scores were significantly improved at 2 years postoperative with baseplate retroversion 10° or more (<10° vs. 10°-19°, $P = .007$; <10° vs. >20°, $P = .037$). SANE scores were significantly improved with baseplate retroversion of 20° or more when compared to <10° (<10° vs. >20°, $P = .047$). There was no correlation between 2-year postoperative

Table I
Multivariable linear regression: outcomes stratified by postoperative baseplate retroversion.

	<10° RV (N = 83)		10°-19° RV (N = 129)		>20° RV (N = 62)		ANOVA post hoc (*P* values)		
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	<10° vs. 10°-19°	<10° vs. >20°	10°-19° vs. >20°
ROM (Change from baseline to 2 y)									
Active FF (degrees)	33	40	49	40	46	42	.024	.158	.901
Active ER in adduction (degrees)	14	29	17	21	21	25	.791	.291	.556
Active ER at 90° (degrees)	21	37	41	33	41	36	<.001	.002	.999
Active IR (spinal level)	0	4	−1	4	−1	4	.144	.625	.748
Active IR at 90° (degrees)	7	27	20	31	25	27	.005	.001	.615
PROs (Change from baseline to 2 y)									
ASES	37.5	21.7	42.7	24.2	46.0	23.0	.276	.086	.631
VAS pain	−4.2	2.7	−4.6	3.2	−4.7	2.6	.610	.502	.933
SANE	34.3	33.9	45.4	34.3	47.8	30.9	.052	.047	.892
Constant-Murley	32.3	19.2	41.5	21.0	41.1	20.9	.007	.037	.990
WOOS	44.5	27.4	48.6	24.4	48.9	24.3	.495	.565	.997
VR-12 Mental	4.7	11.3	4.1	13.1	2.4	9.4	.928	.502	.649

RV, retroversion; *ANOVA*, analysis of variance; *PROs*, patient-reported outcomes; *Std. Dev*., standard deviation; *ASES*, American Shoulder and Elbow Surgeons; *VAS*, visual analog scale; *SANE*; Single Assessment Numeric Evaluation; *WOOS*, Western Ontario Osteoarthritis of the Shoulder Index; *VR-12*, Mental, Veterans Rand 12 Item Health Survey; *ROM*, range of motion; *FF*, forward flexion; *ER*, external rotation; *IR*, internal rotation.

ASES, VAS, WOOS or VR-12 scores and postoperative baseplate retroversion (Table I).

Multivariable linear regression demonstrated that greater postoperative retroversion was associated with improved IR90 (β = 0.165; 95% confidence interval [CI], 0.093-0.867; *P* = .015) and ER90 (β = 0.294; 95% CI, 0.623-1.586; *P* < .001) at 2 years postoperatively. In regards to strength, greater preoperative retroversion was associated with greater postoperative belly press strength (β = 0.149; 95% CI, 0.016-0.178; *P* = .019) and greater ER strength (β = 0.216; 95% CI, 0.068-0.208; *P* < .001). In regards to PROs, multivariable linear regression demonstrated that greater postoperative retroversion was associated with higher ASES (β = 0.155; 95% CI, 0.066-0.665; *P* = .017) and CM scores (β = 0.198; 95% CI, 0.146-0.696; *P* = .003) at 2 years postoperatively (Table I).

ΔRetroversion

Comparing preoperative to postoperative retroversion, the ΔRV was as follows: 88 patients were found to be anteverted from their preoperative version, 134 patients had retroversion increased by 0°-10°, and 52 patients had an increase by >10° of retroversion. IR90 was on average 13° greater with a ΔRV that was >10° of increased compared to any amount of anteversion (*P* = .031). The group with an increase in ΔRV by >10° also had a mean 11° gain of IR90 compared to a 0°-10° increase in ΔRV (*P* = .046). ER90 was on average 17° greater with ΔRV of >10° compared to any amount of anteversion (*P* = .019) There was no correlation between FF, ER0 or IR and ΔRV, or between postoperative ASES, VAS, SANE, CM, WOOS, or VR-12 scores and ΔRV (Table II).

Multivariable linear regression demonstrated a greater ΔRV was associated with a loss in ER90 (β = −0.161; 95% CI, −1.012 to −0.135; *P* = .011) and a decrease in ER strength (β = −0.125; 95% CI, −0.139 to −0.012; *P* = .019) (Table III).

Discussion

The primary findings of the current study was that 2-year postoperative IR90 was improved with postoperative baseplate retroversion >10° and with a ΔRV increase from preoperative to postoperative of >10°. Additionally, ER90 was higher with postoperative baseplate retroversion >10°, and associated with improved CM and SANE scores at 2 years postoperative. There was no significant correlation between PROs and any change in retroversion from preoperative to postoperative. Both postoperative glenoid baseplate retroversion and ΔRV increase of 10° or more improve rotational ROM, specifically IR90. Interestingly, there was no observed loss of ER90 with increased baseplate retroversion.

There have been previous studies with similar findings in regards to postoperative baseplate retroversion and ROM; however, majority of these have been computer models. Permeswaran et al[23] found that neutral glenoid retroversion produced the greatest impingement-free ROM in a computer model with a 145° neck shaft angle humeral prosthesis, while increased retroversion reduced the rate of subluxation. The computer modeling performed by Keener et al[17] with a 135° and 145° neck shaft angle humeral prostheses found that IR was maximized with a 135° neck shaft angle and increasing glenoid retroversion; however, in their study this came at a cost of loss of ER. Another computer model by Budge et al[4] also found that increasing glenoid retroversion increased ER in a 155° neck shaft angle humeral prosthesis. Maximum ER was reached with 0°-20° of glenoid retroversion with some loss in IR.

Few clinical studies have evaluated the relationship between baseplate retroversion and ROM. A previous single retrospective review of 217 patients who underwent rTSA with a 145° neck shaft angle humeral prosthesis concluded that there was no significant difference in functional outcomes or ROM based on glenoid baseplate retroversion.[8] Similarly, Lansdown et al[20] retrospectively analyzed 177 patients and found that there were no significant differences associated with glenoid baseplate retroversion and both PROs and ROM. It is possible that no significant difference was detected based on grouping of retroversion for analysis. Our study analyzed 3 distinct groups for both baseplate retroversion and ΔRV which may allow for a significant difference to be more easily detected. Previous systematic reviews evaluating glenoid retroversion and its effect on ROM in rTSA agree that neutral and increasing glenoid retroversion can lead to improved outcomes and rotational ROM.[1,13] One previous study in young athletic patients with intact rotator cuffs showed that IR and ER strength was increased with increasing retroversion in a multivariate model controlling for confounding variables.[5] This may be an important consideration for patients with any intact rotator cuff with rTSA. Our study is unique as it is the only study analyzing the effects of postoperative glenoid baseplate retroversion and change in glenoid baseplate version from preoperative to postoperative in rTSA with a 135° neck shaft angle humeral prosthesis and its effects on ROM and PROs.

Our findings suggest that it may be advantageous to accept retroversion, and perhaps even consider intentional retroversion to

Table II
Multivariable linear regression: outcomes stratified by postoperative ΔRV.

	>0° anteversion (N = 88)		0°-9.99° RV (N = 134)		>10° RV (N = 52)		ANOVA post hoc (P value)		
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Ante. vs. 0°-10° RV	Ante. vs. >10° RV	0-10° vs. >10° RV
PROs (Change from baseline to 2 y)									
ASES	40.9	20.9	41.3	24.7	45.1	23.7	.992	.566	.584
VAS pain	−4.2	2.6	−4.5	3.1	−4.7	2.9	.742	.686	.961
SANE	43.8	34.7	41.1	33.1	44.8	34.4	.830	.985	.779
Constant-Murley	36.5	20.4	38.1	21.0	43.6	20.6	.847	.136	.251
WOOS	49.0	25.7	45.9	25.5	48.9	24.2	.670	.999	.752
VR-12 Mental	3.6	12.6	4.3	11.5	3.2	11.3	.911	.972	.824
ROM (Change from baseline to 2 y)									
Active FF (degrees)	42	36	43	44	48	39	.996	.687	.694
Active ER at side (degrees)	19	26	16	22	18	27	.621	.992	.787
Active ER at 90° (degrees)	28	35	36	36	45	35	.250	.019	.264
Active IR (spinal level)	0	4	−1	4	−1	4	.940	.635	.769
Active IR at 90° (degrees)	14	28	16	29	27	30	.920	.031	.046

RV, retroversion; *ANOVA*, analysis of variance; *PROs*, patient reported outcomes; *Std. Dev*., standard deviation; *Ante*., Anteversion; *ASES*, American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form; *VAS*, visual analog scale; *SANE*; Single Assessment Numeric Evaluation; *WOOS*, Western Ontario Osteoarthritis of the Shoulder Index; *VR-12*, Mental, Veterans Rand 12 Item Health Survey; *ROM*, range of motion; *FF*, forward flexion; *ER*, external rotation; *IR*, internal rotation.

Table III
Multivariable linear regression: outcomes stratified by RV.

	Preoperative RV		Postoperative RV		Δ RV	
	ß coefficient	P	ß coefficient	P	ß coefficient	P
PROs (Change from baseline to 2 y)						
ASES	0.58	.374	0.155	.017	−0.063	.301
VAS Pain	−0.05	.449	−0.083	.205	0.024	.687
SANE	0.038	.578	0.114	.089	−0.051	.415
Constant-Murley	0.073	.273	0.198	.003	−0.083	.181
WOOS	0.061	.358	0.106	.100	−0.034	.577
ROM (Change from baseline to 2 y)						
Active FF (degrees)	0.098	.137	0.099	.129	−0.011	.849
Active ER in adduction (degrees)	0.121	.067	0.116	.076	−0.011	.856
Active ER at 90° (degrees)	0.040	.549	0.294	<.001	−0.161	.011
Active IR (IRspine) (degrees)	−0.061	.386	−0.011	.880	−0.024	.703
Active IR at 90° (degrees)	0.069	.311	0.165	.015	−0.064	.313
Strength (Change from baseline to 2 y)						
CM strength (pounds)	0.107	.072	0.005	.933	0.048	.373
ER strength (pounds)	0.020	.728	0.216	<.001	−0.125	.019
BP strength (pounds)	0.149	.019	0.060	.344	0.039	.513

RV, retroversion; *B*, Beta; PROs, patient-reported outcomes; *ASES*, American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form; *VAS*, visual analog scale; *SANE*; Single Assessment Numeric Evaluation; *WOOS*, Western Ontario Osteoarthritis of the Shoulder Index; *ROM*, range of motion; *FF*, forward flexion; *ER*, external rotation; *IR*, internal rotation; *CM*, Constant-Murley; *BP*, belly press; *IRspine*, internal rotation estimated to nearest spinal level.

improve outcomes. However, technical considerations are apparent. First, placing the baseplate in retroversion is technically challenging. Second, we believe baseplate fixation must be the primary goal. It has been shown that increasing the retroversion of polyethylene glenoid component in anatomic total shoulder arthroplasty is associated with increased micromotion at the bone-cement interface and increased stress within the glenoid bone.[9] Similar concerns of the effect of increasing retroversion on glenoid baseplate with rTSA have also been raised. The computer model by Friedman et al[12] demonstrated that increasing glenoid baseplate retroversion was associated with increasing micromotion, but well below the threshold for bony ingrowth to occur.

This study has several limitations. First, this is retrospective analysis of a prospective database which brings limitations and bias to analyses. Second, there was a potential confounder of a higher percentage of glenoid lateralization of 6 mm or more in the increased retroversion groups, which could also account for improved ROM.[27] This is likely the effect of a more retroverted glenoid requiring additional reaming, causing a more medial glenoid that then requires greater glenoid lateralize of the components to provide a stable shoulder, or a reflection of efforts to restore the joint line as retroversion is usually accompanied by glenoid wear. Additionally, more glenoid-sided lateralization brings the humerus further away from structures that may cause impingement with IR, like the coracoid or conjoint tendon for example. Further studies understanding the significance of our findings in relation to the premorbid joint line are needed. Third, humeral retroversion was not standardized among surgeons. Humeral version may have an effect on rotational ROM that was not accounted for in this study. Fourth, the management of the subscapularis was not standardized among surgeons. Repair of the subscapularis could be a confounding factor as it may affect rotational ROM. Fifth, majority of the preoperative glenoid version measurements and all of the postoperative baseplate version measurements were done on plain radiographs. Although our interobserver correlation was good to excellent agreement, this does leave room for human error in the measurement of version. Readers must be cautious when interpreting glenoid version measured on axillary radiographs rather than CT or MRI as exemplified by Nyffeler et al.[22] This study found that glenoid version measured on CT had excellent interobserver reproducibility. This was compared to poor reproducibility when measured on radiographs. A maximum of 35° difference was reported with radiographic measurement compared to 4° on CT. While glenoid version measured on CT may be more accurate, CT is significantly more expensive and subjects patients to 26 times more radiation than a plain radiographs as pointed out by Matsen et al.[21] Sixth, preoperative diagnosis was not reported. Patients with severe glenoid deformity due to osteoarthritis with a functional rotator cuff may experience improved outcomes, specifically ROM and strength, when compared to rotator cuff arthropathy patients. Seventh, our regression models detected very small increments of change and do not necessarily represent clinically significant findings. Lastly, this was a multicenter study that included several surgeons. Although the implants were similar, surgical technique and postoperative rehabilitation likely varied.

Conclusion

With a 135° and lateralized glenoid, postoperative baseplate retroversion of >10° was associated with significantly improved IR90, ER90, CM and SANE scores at 2 years follow-up compared to <10° retroversion. Additionally, an increased ΔRV from preoperative to postoperative appears to improve IR90 without limiting ER0 or FF. While baseplate retroversion does not improve IRspine, overall function appears to be improved and therefore consideration may be given to accepting retroversion or intentionally retroverting the baseplate if fixation allows.

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