Does Postoperative Glenoid Component Retroversion Following Anatomic Total Shoulder Arthroplasty Affect Clinical Outcomes? A Systematic Review and Meta-Analysis.

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INTRODUCTION: Surgeons commonly aim for less than 15 degrees of retroversion when positioning the glenoid component in anatomic total shoulder arthroplasty (aTSA). Currently, it is unclear if the costs and time invested in modifying glenoid version significantly improve clinical outcomes of aTSA. This study is a systematic review and meta-analysis seeking published evidence correlating the patient reported clinical outcomes of aTSA with the measured postoperative glenoid component version.Here we present a systematic review and meta-analysis seeking evidence that the clinical results of aTSA are associated with postoperative glenoid component version.

METHODS:

Studies reporting postoperative clinical outcomes and measurements of glenoid component version after primary anatomic shoulder arthroplasties were identified and submitted for meta-analysis. Our analysis included studies published in English with Level I-IV evidence reporting 2-year postoperative clinical outcomes and postoperative radiologic measurement of glenoid component version (at any time point) for primary aTSAs. Studies evaluating revision arthroplasty or arthroplasty for fracture, case reports, animal models, cadaveric models, in vitro biomechanical studies and those in pediatric patient groups were not considered. The degree of postoperative retroversion was classified as < 15 degrees and ≥ 15 degrees.

Study information was extracted by two separate authors blinded to the other, with disagreement settled via discussion and first author input.

Risk of bias was assessed via the Cochrane Risk of Bias in Non-randomized Studies (ROBINS-I) Tool version 2.0.

Meta-analysis was conducted if adequate sample of head-to-head comparisons of continuous outcomes were available. We defined an adequate sample as at least 3 cohorts of continuous data, and if categorical analysis was not possible, mean differences (MD) were calculated if 3 cohorts in each group were available.

RESULTS:

Fifteen articles (1190 shoulders) met criteria for inclusion in our systematic review and meta-analysis. When comparing patient reported outcome scores, range of motion, and complications for shoulders with < 15 or ≥ 15 degrees of glenoid component retroversion, no clinically significant differences were noted between the two groups.

ASES scores did not demonstrate statistically significant differences in outcome between groups with <15 or ≥ 15 degrees of measured postoperative retroversion (p=.81, Mean Difference -0.41, [-2.1-(3.2)].

No statistically significant differences were found when comparing external rotation for shoulders with <15 vs ≥15 degrees of postoperative version (p=.47, mean difference 0.89 [-1.8-(2.7)]). There was insignificantly increased forward flexion in the <15 degree group (p=.06, mean difference: 3.12 [-0.4-(6.6)]).

When evaluating complications and revisions, there were no statistically significant differences in complications or revision rate for shoulders with <15 vs ≥15 degrees of postoperative version.

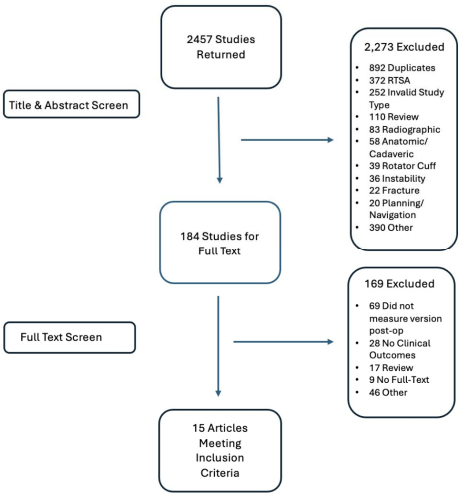
When evaluating radiolucencies for shoulders with <15 vs ≥15 degrees of postoperative version, shoulders with ≥15 degrees of postoperative retroversion had less radiolucency: a statistically significantly higher rate of no radiolucency (Lazarus 0 score) (p= 0.00021, OR .38, 95% CI (0.220, 0.638)).

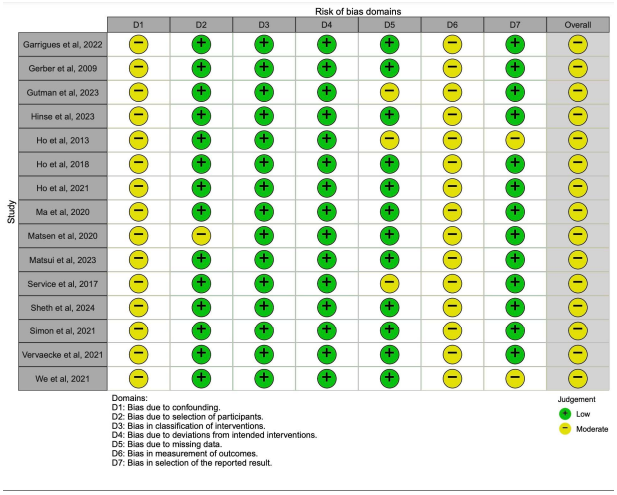
There was no statistically significant difference in the likelihood of being rated as a CPG 3 (Bone growth within the central-peg flanges8) for shoulders with <15 vs ≥15 degrees of postoperative version (p= 0.632, OR 1.378, 95% CI (0.547, 3.471)).

There was no statistical difference in external rotation between accepting vs correcting glenoid retroversion (p=.61, mean difference 0.74 [-2.1-(4.5)]). There was a significant increase in forward flexion in the corrected group (p=.0001, mean difference 10.06 [5.6-14.5]).

There were no statistically significant differences in complications or revision rate for accepting vs correcting glenoid retroversion.

DISCUSSION AND CONCLUSION: This review of the published literature did not find evidence that postoperative glenoid component retroversion of < 15 or ≥ 15 degrees was associated with clinically significant differences in patient outcomes. Future studies with long term follow-up will be necessary to demonstrate the effect of glenoid component retroversion on the clinical value, costs and complications of anatomic shoulder arthroplasty.


2457 Studies Returned
Title & Abstract Screen
2,273 Excluded
892 Duplicates
372 RTSA
252 Invalid Study Type
110 Review
83 Radiographic
58 Anatomic/ Cadaveric
39 Rotator Cuff
36 Instability
22 Fracture
20 Planning/ Navigation
390 Other
184 Studies for Full Text
Full Text Screen
169 Excluded
69 Did not measure version post-op
28 No Clinical Outcomes
17 Review
9 No Full-Text
46 Other
15 Articles Meeting Inclusion Criteria


Risk of bias domains
Study
D1
D2
D3
D4
D5
D6
D7
Overall
Garrigues et al, 2022
Gerber et al, 2009
Gutman et al, 2023
Hinse et al, 2023
Ho et al, 2013
Ho et al, 2018
Ho et al, 2021
Ma et al, 2020
Matsen et al, 2020
Matsui et al, 2023
Service et al, 2017
Sheth et al, 2024
Simon et al, 2021
Vervaecke et al, 2021
We et al, 2021
Domains:
D1: Bias due to confounding.
D2: Bias due to selection of participants.
D3: Bias in classification of interventions.
D4: Bias due to deviations from intended interventions.
D5: Bias due to missing data.
D6: Bias in measurement of outcomes.
D7: Bias in selection of the reported result.
Judgement
Low
Moderate