The Relationship between Native Glenoid Size and Outcomes with Various Baseplate and Glenosphere Sizes after Reverse Total Shoulder Arthroplasty

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Background
Modern reverse total shoulder arthroplasty (rTSA) platform systems offer multiple baseplate (BP) and glenosphere (GS) options to better fit each patient's unique anatomy. Patient at the extremes of anatomic size may be poorly served with traditional implants. It is imperative to understand the relationship between implant size, native glenoid morphometry, and outcomes after rTSA.

Methods
A retrospective review of a multicenter database of a single rTSA system was performed. Primary rTSA with available native glenoid measurements and 2-year minimum follow-up were included. This system offers small and standard baseplate (BP) designs and varying glenosphere (GS) sizes for each baseplate. Two cohorts were formed based on native glenoid width above or below median. Within each of these native glenoid size cohorts, small and standard BP clinical outcomes were compared irrespective of GS size. GS size was then incorporated, resulting in four cohorts for each native glenoid size: A-small BP/small GS-36mm, B-small BP/large GS-40mm, C-standard BP/small GS-36mm/38mm, D-standard BP/large GS-42mm/46mm.

Results
1,727 rTSAs were included (overall: 450 small/1277 standard BP; small native glenoid cohort: 359 small/505 standard BP; large native glenoid cohort: 91 small/772 standard BP). When stratified by BP design only, both native glenoid size cohorts showed no differences in outcomes or prevalence of scapular notching, complications, or revisions (small native glenoid cohort: 5%/3.3%/0.8% vs 5.2%/2.4%/1.4%, p=1/0.5299/0.5329; large native glenoid cohort: 6.6%/7.7%/4.4% vs 4.3%/4.3%/2.8%, p=0.2953/0.1808/0.3313). When stratified by both baseplate design and glenosphere diameter, the small native glenoid patients showed better postop abduction in group A vs B (A:130.5±28.7 vs B:118.7±34.1, p=0.0246). In large native glenoid patients, Groups C/D demonstrated greater postop abduction and ER vs Group B (Abduction - B:107.7±39.8 vs C/D:131.7±29.3/130.3±27.1, p=0.0008/0.0015; ER - B:30.5±19.6 vs C/D:42.9±18.5/40.2±16.8, p=0.0065/0.0479). For small native glenoids, when implanted with a small BP, the small GS outperformed the large GS. Conversely, for large native glenoids, the large BP, regardless of GS size, outperformed the small BP and large GS combination.

Conclusion
rTSA can produce excellent clinical results in small and large native glenoids. However, greater range of motion was observed using a small baseplate in small native glenoids, while larger native glenoids demonstrated better post-opeartive abduction and ER when a large basepalte was used. Further study is needed to identfiy the optimal glenoid size cut offs for each baseplate type.