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Optimizing RTSA Glenoid Fixation The Case for a Press-fit Cage Peg Baseplate

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Disclosure

- I receive royalties from Exactech for design of a shoulder arthroplasty system
- I serve on the Boards/Advisory Boards of Hip Innovation Technology, J3 Personica, Gold Humanism Foundation, Apostherapy and the Musculoskeletal Transplant Foundation

Glenoid in RTSA

Goals:
1. Secure baseplate fixation
2. Correct patterns of wear
3. Restore glenoid version
4. Lateralize to restore anatomy
5. Minimize associated issues-i.e. scapular notching
6. Implant longevity

Successful Glenoid Fixation in RTSA

Depends on:

1.The surgeon: experience , expertise

2.The implant: design, options available

3.The patient i.e. the glenoid: bone quality, deformity

Glenoid Baseplate Fixation Failure

Predominate failure mechanism = aseptic glenoid loosening.

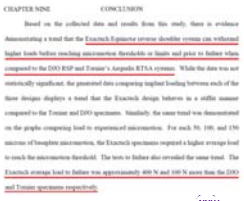
Laboratory Testing

- To address this issue, we began work with the ASTM in 2010 to develop a testing standard to evaluate initial glenoid fixation with rTSA that was unanimously approved in 2014.
- 6 publications on rTSA glenoid fixation:

Independent Head to Head Testing*

- Independent testing concluded that the Equinoxe device had better fixation with superior results for each glenoid fixation test.
- The other tapered peg device had next best fixation for each test.
- The screw baseplate had worst fixation.

* Clemson University (2016)



CHAPTER NINE CONCLUSION

Based on the collected data and results from this study, there is evidence demonstrating a trend that the Exactech Equinoxe reverse shoulder system can withstand higher loads before reaching micromotion thresholds or limits and prior to failure when compared to the DJO RSP and Tornier's Aequalis RTSA systems. While the data was not statistically significant, the generated data comparing implant loading between each of the three designs displays a trend that the Exactech design behaves in a stiffer manner compared to the Tornier and DJO specimens. Similarly, the same trend was demonstrated on the graphs comparing load to experienced micromotion. For each 50, 100, and 150 microns of biosphere micromotion, the Exactech specimens required a higher average load to reach the micromotion threshold. The tests to failure also revealed the same trend. The Exactech average load to failure was approximately 400 N and 100 N more than the DJO and Tornier specimens respectively.

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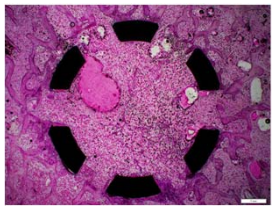
Design Matters: Press-fit Cage Peg Ongrowth vs. Thru-growth

- Ideally obtain stable initial fixation to ensure long-term bony in-growth



Cross section of retrieved specimen demonstrating bone thru-growth

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Design Matters: Press-fit Cage Peg

- Ideally match glenoid curvature to minimize glenoid reaming and bone removal

S36 Bulletin of the Hospital for Joint Diseases 2013;71(Suppl 2):S36–40

Comparison of Bone Removed with Reverse Total Shoulder Arthroplasty

Christopher P. Roche, M.S., M.B.A., Phong Diep, B.S., Matthew A. Hamilton, Ph.D., Pierre-Henri Flurin, M.D., and Howard D. Routman, D.O.

Table 2 Glenoid Bone Volume Removed by Reaming with 0 and 15° of Inferior Tilt

Volume (cm³)	Cortical Glenoid Bone Removed	Cancellous Glenoid Bone Removed	Total Glenoid Bone Removed
36 mm Delta III (0° tilt)	1.1	2.5	3.6
36 mm Delta III (15° tilt)	1.4	3.6	5.0
32 mm RSP (0° tilt)	1.1	2.6	3.7
32 mm RSP (15° tilt)	1.3	4.7	6.0
38 mm Equinoxe (0° tilt)	1.1	2.2	3.3

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Design Matters: Press-fit Cage Peg

- Ideally maximize glenoid surface area to reduce and distribute pressure

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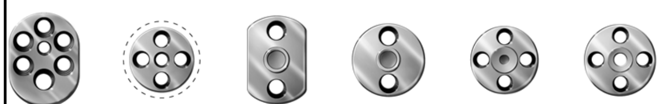
Equinoxe baseplate has significantly more surface contact area in a computer study.



quinoxe Glenoid Baseplate
5mm Wide x 34mm Tall
Screw Hole Options

Grammont Baseplate (Depuy/Tornier)
25mm Circle or 29mm Circle (Dashed)
4 Screw Hole Options

Zimmer Anatomica Baseplate
23mm Wide x 34mm Tall
2 Screw Hole Options

Zimmer Trabecular Metal Baseplate
28mm Circle
2 Screw Hole Options

DJO RSP Baseplate
26mm Circle
4 Screw Hole Options

Biomet Comprehensive Baseplat
28mm Circle
5 Screw Hole Options

Design Matters: Press-fit Cage Peg

Achieve fixation centrally for best bone while inferiorly positioning to avoid notching

4.5mm Offset Cage Peg provides between 2.5, 4.5, & 6.5mm of inferior glenosphere offset for glenosphere sizes of 38, 42, and 46mm, respectively

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Design Matters: Press-fit Cage Peg

Address a variety of wear patterns & morphologies

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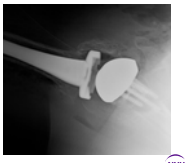
Does the clinical data backup the laboratory testing?

- 1310 primary rTSA with an average follow-up of 42 months
- 18 patients (1.37%) incidence of either revision for aseptic glenoid baseplate loosening or radiographic loosening with screw fracture



Press Fit Design vs. Other Designs

- Aseptic glenoid loosening rate of 1.37% is very favorable compared with 3.5% rate reported in the Zumstein in JSES meta-analysis

Problems, complications, reoperations, and revisions in reverse total shoulder arthroplasty: A systematic review

Matthias A. Zumstein, MD[a,b], Miguel Pinedo, MD[a,d], Jason Old, MD, FRCSC[a,c], Pascal Boileau, MD[a,*]

Bottom Line

Use of a press fit glenoid baseplate with screw fixation is supported by laboratory and clinical data