

B2/B3 Debate in OA Argument for Augmented Glenoid TSA

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Conflicts of Interest

- DePuy- Synthes (R)
- DJO Orthopaedics (R, C)
- Wright - Tornier (R)
- Custom Orthopaedic Solutions (C)
- Lippincott Williams and Wilkins (R)

Consulting (C), Royalty (R)



Why has reverse TSA become
a popular (preferred) surgery for
treatment of B2 and B3 in
patients with intact rotator cuff
and OA?



The Historic Literature Support That Recommendation

- Patients operated on more than 10 years ago
- Used a standard all poly glenoid implant
 - Recurrent posterior subluxation
 - Early glenoid loosening
- Concluded:
 - Use a reverse TSA



Why?

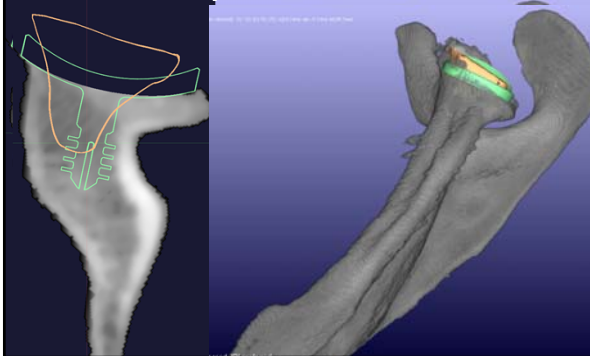
Incomplete correction results in eccentric loading and glenoid loosening

	Grade 1 n=20	Grade 2 & 3 n=46	Grade 1 vs. Grade 2/3
Last X-ray FU Time (years)	5.1 ± 1.8	3.3 ± 1.5	p=0.0006*
³ Postoperative Glenoid Version Retroversion > 15°	-15.2° ± 8.6° 10 (50%)	-10.5° ± 7.4° 12 (27%)	p=0.041* p=0.094
³ Postoperative Lazarus Lucency			
Grade 0	0 (0%)	36 (80%)	
Grade 1	2 (10%)	9 (20%)	
Grade 2	11 (55%)	0 (0%)	
Grade 3	4 (20%)	0 (0%)	
Grade 4	3 (15%)	0 (0%)	p<0.0001
Grade 5	0 (0%)	0 (0%)	




Why?

Correction of version with a standard implant results in medialization of the joint line and loss of the cortical bone




Is this conclusion still valid?

- Did not understand the 3D pre operative pathology as we understand today: B3 vs B3
- No 3D pre operative planning
- Post op x-rays did not define post op implant position

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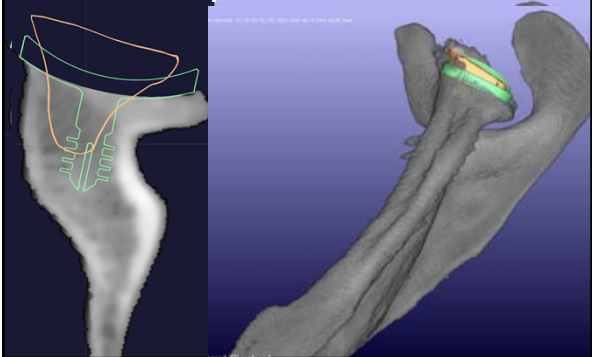
Patient Profile of the OA patient with posterior bone loss

- Most B2 glenoid are in
 - Men
 - Younger and more Active
- **Is this a good indication for a Reverse TSA?**

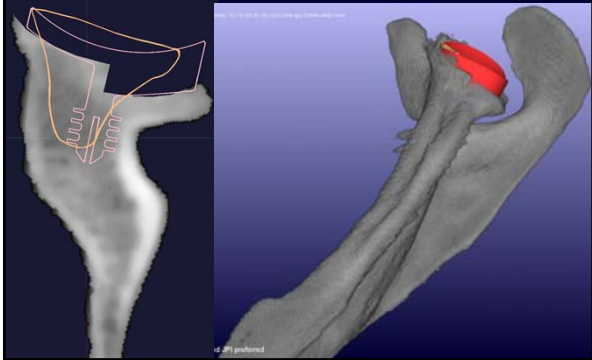
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What is the problem with a standard implant

Correction of version with a standard implant results in medialization of the joint line and loss of the cortical bone




Is there a better solution using an augmented glenoid component?



Our Hypothesis

- Anatomic TSA requires:
 - Correction and balance of the soft tissues
 - Balanced and functioning rotator cuff
 - Anatomic sized humeral head
 - Correction of version and inclination and restoration of the joint line
- Getting it right
 - 3D planning and templating and replication of the plan at surgery

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Is there evidence to support the use of augmented glenoid?

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Clinical Outcomes Literature Review Augmented All Poly Glenoids

- Rice et al CORR 2008 Wedge
- Wright Bul HJD 2013 Wedge
- Youdarian et al JSES 2016 Stepped
- Stephens et al 2015 Stepped
- Favorito et al JSES 2015 Stepped
- All level 4 studies less than 30 patients 2-3 year follow up
- Patients get better and complications low



Our Data

(in revision JBJS)

Demographics

- 71 cases B2 and B3 glenoid
- 64 ± 7 years old (range 51-80)
- 55/71 (77%) male
- Median follow-up 2.4 years (range 1.9-5.5)
- Walch B2 - 44 (62%)
- Walch B3 - 27 (38%)



Overall Outcomes

N=71	PREOP	POSTOP	P-value
Penn Score	30	89	<0.0001
Version	-24°	-12°	<0.0001
Centered?	11/71 (15%)	58/71 (82%)	<0.0001
Forward Flexion	114°	155°	<0.0001
External Rotation	23°	51°	<0.0001



Ability to correct to <15° is dependent upon severity of pre op pathology >27°/30% subluxation

	Postop Retroversion ≥ 15° (n=20)	Postop Retroversion < 15° (n=51)	P-value
Preop Version	-27°	-23°	0.04
Preop HSA-AP	-28%	-22%	0.03
Preop IS+TM Goutallier Grade ≥ 4	9/20 (45%)	12/51 (24%)	0.09
Postop HGA-AP	-7.9%	0.9%	0.002

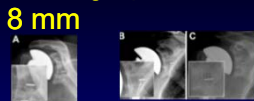


Correction of HH Subluxation is difficult with more than 30% pre op HH subluxation and Fatty Infiltration

	Posterior Subluxation (n=8)	NO Posterior Subluxation (n=63)	P-value
Age	60	65	0.06
Preop HSA-AP	-33%	-23%	0.02
Preop TM Goutallier Grade > 0	5/8 (62%)	13/63 (21%)	0.02
Preop IS+TM Goutallier Grade ≥ 4	5/8 (62%)	16/63 (25%)	0.04



More Bone Loss is Correlated with More Post op Osteolysis Radiographic Loosening



	Center Peg Lucency Grade 1 (n=13)	Center Peg Lucency Grade 2/3 (n=58)	P-value
Preop Central Joint-Line Medialization	5.6 mm	3.4 mm	0.03
Preop Posterior Bone Loss	7.3 mm	5.5 mm	0.02
Preop SSp Goutallier Grade > 0	11/13 (85%)	32/58 (55%)	0.06
Walch B2	6/13 (46%)	38/58 (66%)	0.22
Postop Penn Score <80	4/13 (31%)	5/58 (9%)	0.05
Reoperation Rate	3/13 (23%)	0/58 (0%)	0.005

More Pre op Retroversion (30°) and HH Subluxation (33%) is Correlated with Lower PENN Scores

	Penn < 80 (n=9)	Penn ≥ 80 (n=62)	P-value
Preop HSA-AP	-33%	-22%	0.0016
Preop Version	-30°	-24°	0.008
Reoperations	(22%)	(1%)	0.04



Argument for the Augmented Glenoid Component

- Augmented glenoid can
 - Correct Version
 - Correct Subluxation
 - Significant clinical improvement at 2-6 year follow-up
 - With good radiographic outcome
 - But this glenoid has limits of use



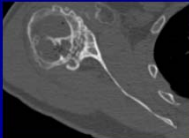
Outcome Comparison

- A well performed anatomic TSA is better than the best Reverse TSA over the first 10 years.
 - ROM
 - PROMs
 - Complications (stress fracture, notching)



**Avoid Step Tech
when there is: 30/30/8**

- > 30% of the humeral head diameter is subluxated posteriorly
- > 8 mm of posterior bone loss
- >= 30° retroversion
- Posterior cuff Fatty Infiltration >= 2 grade
- The above is most often correlated with severe B3 glenoid morphology



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Unanswered questions

- What is the **best type of augmented glenoid component?** Step, half wedge, full wedge?
- Are different shaped augments better for different shaped defects?
- Intermediate and long term outcomes?

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**Unanswered questions
For the same patient/pathology?**

- What are the differences between augmented anatomic TSA and a Reverse?
 - Complications outcome over time
 - Difficulty for revision
 - Differences between surgeons with different levels of experience

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