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Use of Custom Glenoid Components for Reverse Shoulder Total Arthroplasty

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JOHNS HOPKINS MEDICINE

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Disclosures:

- As listed on AAOS website
- None related to this poster

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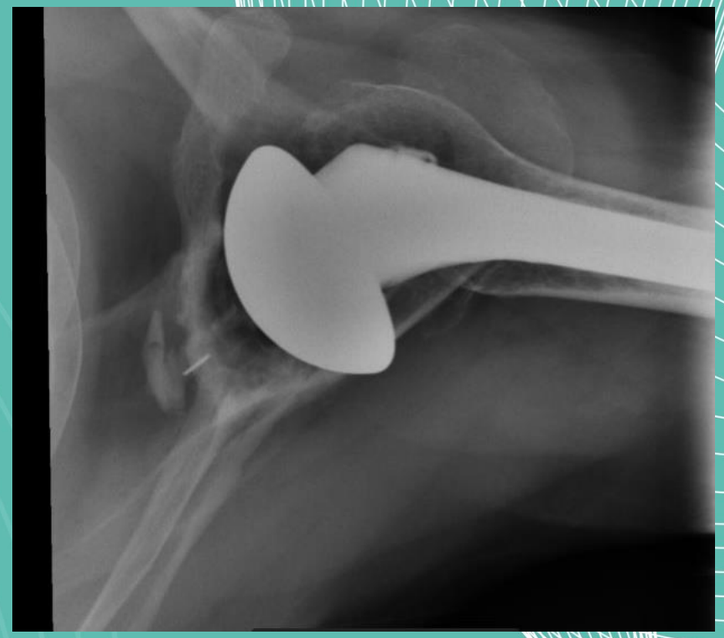
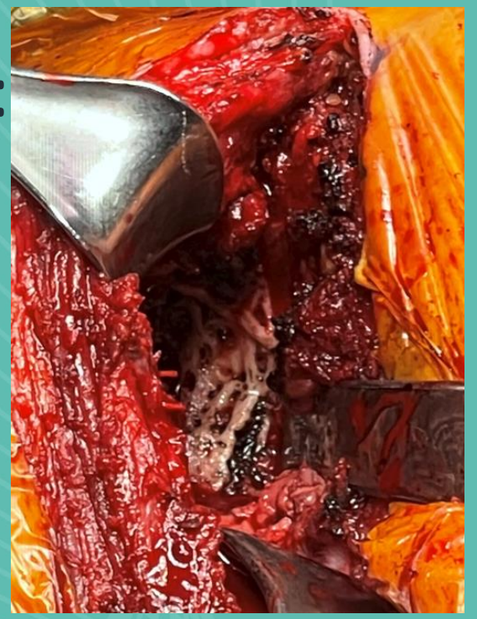
Introduction

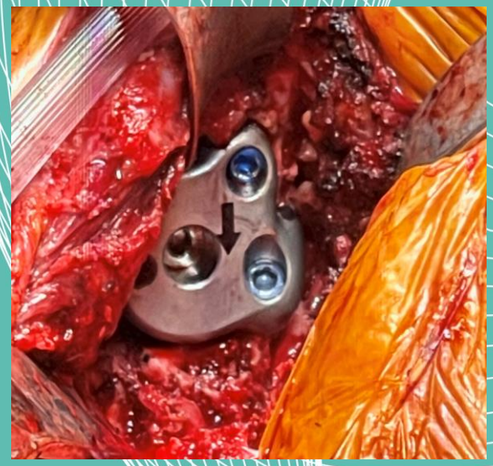
- Severe glenoid bone loss in reverse shoulder arthroplasty (RTSA) is a controversial topic
- Bone grafting may result in high failure rates
- Metal augmented glenoid baseplate: long term outcomes are awaited

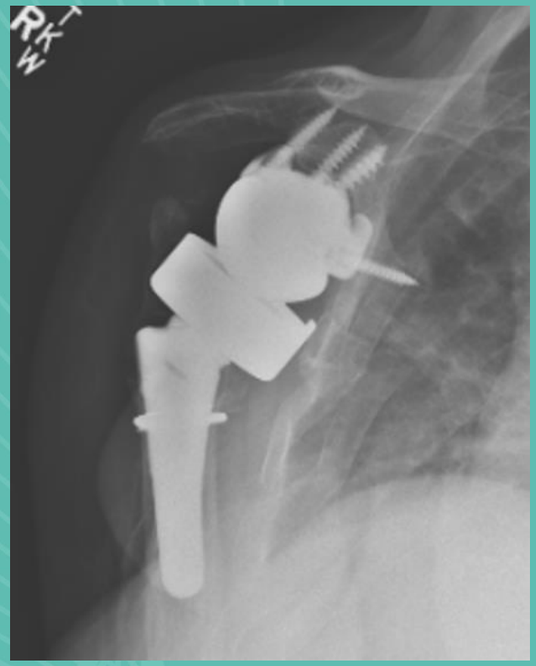




Introduction

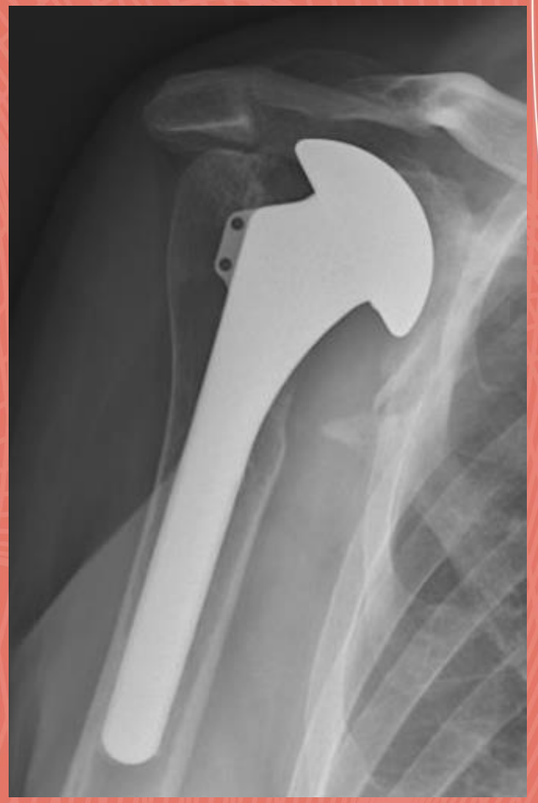
- Customized glenoid components have been reported to be a viable solution for patients with large bone defects
- However, there are only a few studies evaluating the strengths and limitations of using these implants

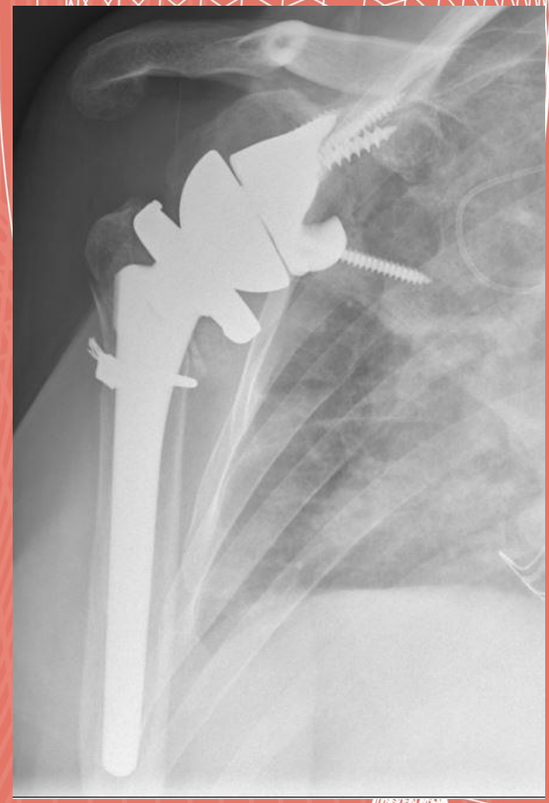




Purpose

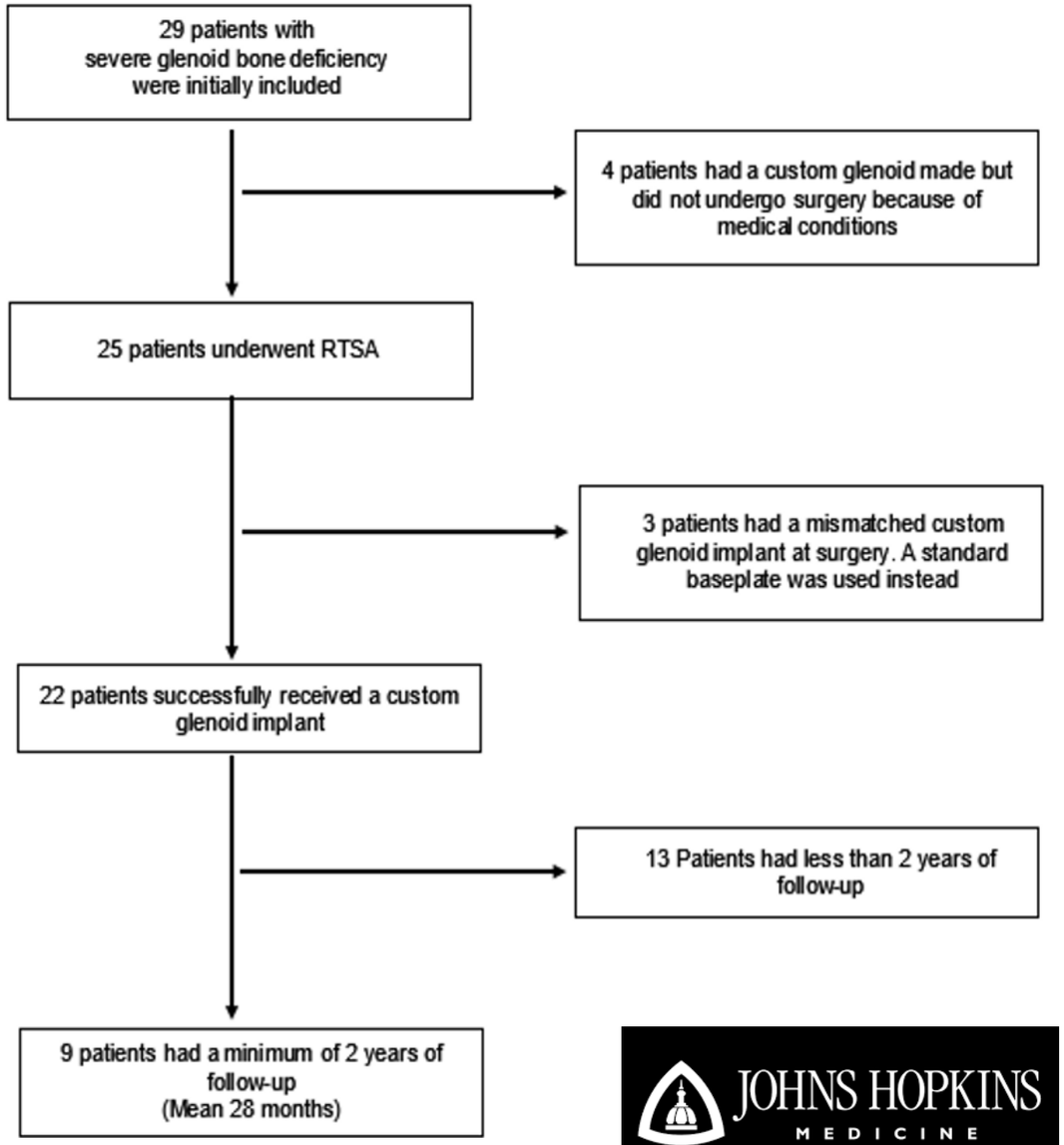
To evaluate short-term clinical and radiographic outcomes after RSA using a custom glenoid baseplate for severe glenoid bone loss done by single surgeon at one tertiary care institute.





Methods: Patients

- Custom glenoid was created for 29 patients between 2017 and 2022 for severe extensive glenoid bone loss
- 22 underwent the surgery
- 9 had a follow up of 2 years



Characteristics of 9 Patients with Min 2 Years Follow Up

Patient No.	Age, yr	Sex	Follow-up, mo	Prior Arthroplasty	Presence of Implants	Indication for Surgery	Defect Classification
1	78.0	F	60	2	Hemiarthroplasty	Failed RTSA	Antuna, severe combined central and posterior
2	68.6	M	51	2	Hemiarthroplasty	Failed TSA	Antuna, severe combined central and anterior
3	65.2	F	48	0	None	Dislocation arthropathy	Walch, A2
4	80.3	F	24	0	None	Chronic anterior fracture dislocation	Walch, D
5	80.1	M	42	0	None	Cuff tear arthropathy	Favard E31 Walch A2; Hamada IIB; Frankle superior erosion
6	74.5	F	40	0	None	Degenerative arthritis	Walch, C
7	71.4	M	30	3	Hemiarthroplasty	Failed TSA	Antuna, severe combined anterior, central, and posterior
8	72.3	M	31	4	Antibiotic cement spacer	Infected RTSA	Antuna, severe combined anterior, central, and posterior
9	78.3	F	27	0	None	Cuff tear arthropathy	Favard E1; Walch D; Hamada IIB; Frankle anterior erosion

F, female; M, male; RTSA, reverse total shoulder arthroplasty; TSA, anatomic total shoulder arthroplasty.

Methods: Outcomes

- Patients were evaluated preoperatively and every year postoperatively for
  - Patient-reported outcome measures (ASES, SST, SANE, WOOS)
  - Range of motion
  - X-rays
- Intra- and post-operative complications were reported

Results: Mismatch of Custom implant and Glenoid

- Of 25 patients who had surgery, the custom implant was unable to be matched in 4 patients
- For these 4, time from CT scan to implantation averaged 7.6 months (range 6.1–10.7 months), compared with 5.5 months (range 2–8.6 months) for those implanted without difficulty.

Results: Improved Motion and Function at 2 Year F/U

Outcome	Mean (SD)		*P* value
	Preoperative	Postoperative	
Range of motion, °			
Abduction	73.9 (33.1)	95.6 (39.7)	0.03††
Flexion	73.9 (33.1)	100.0 (40.3)	0.03††
External rotation	46.7 (16.6)	60.0 (20.2)	0.05
External rotation (arm at side)	10.6 (23.8)	20.0 (21.7)	0.24
Internal rotation	17 (15.8)	6.1 (31.6)	0.39
Internal rotation (hand behind back)*	Buttock*	L4/L5*	0.02††
Functional outcome			
ASES	26.6 (22.6)	68.1 (26.6)	<0.01††
SST	4.0 (3.0)	8.0 (2.8)	0.02††
SANE	34.7 (22.0)	69.6 (27.3)	<0.01††
WOOS	32.7 (22.2)	64.1 (27.3)	<0.01††
Pain (visual analogue scale)	8.2 (1.3)	1.5 (2.3)	<0.01††
Report satisfaction, median (IQR)†	1.6 (1–2)†	3.7 (2–5)†	<0.01††

*Internal rotation rated ordinally as follows: 1, T10/T11; 2, T12/L1; 3, L2/L3; 4, L4/L5; 5, sacrum; 6, buttock; 7, hip/lateral thigh.

†Expressed as median (interquartile range). ††Significant value ($P < .05$)

ASES, American Shoulder and Elbow Surgeons; IQR, interquartile range; RTSA, reverse total shoulder arthroplasty; SANE, Single Assessment Numeric Evaluation; SD, standard deviation; SST, Simple Shoulder Test; WOOS, Western Ontario Osteoarthritis of the Shoulder Index

Results: Complications

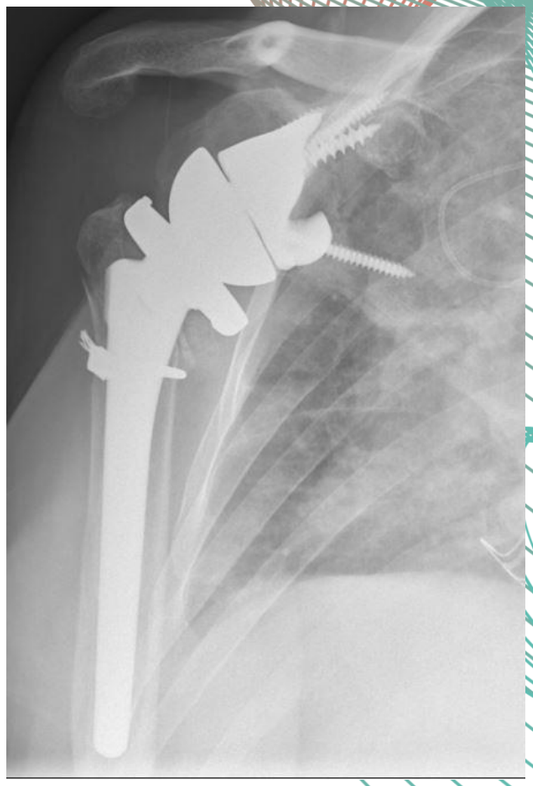
Periprosthetic fracture 37%

Complication in 22 patients who had custom glenoid	N (%)
Central Screw no Compression (“Spinner”)	8 (36.3%)
Toggling of implant	4 (18.1%)
Complete missed screw trajectory	2 (9.1%)
Unexpected positive culture (*C. acnes*)	6 (27.2%)
Acromial/scapular fracture	1 (4.5%)
Greater tuberosity fracture	5 (22.7%)
Proximal humeral fracture	2 (9.1%)

Conclusions

Use of Custom Glenoid Components for Reverse Shoulder Total Arthroplasty

- Prolonged time of >6 months from CT scan to device implantation resulted in additional bone loss rendering the implants unusable
- Satisfactory short-term radiographic and clinical follow-up at a minimum of 2 years can be achieved with a well-fitting device



References

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- 1. Antuna SA, Sperling JW, Cofield RH, Rowland CM. Glenoid revision surgery after total shoulder arthroplasty. J. Shoulder Elbow Surg. 2001 Jun;10(3):217–224. doi:10.1067/mse.2001.113961
- 2. Bercik MJ, Kruse K, Yalizis M, Gauci M-O, Chaoui J, Walch G. A modification to the Walch classification of the glenoid in primary glenohumeral osteoarthritis using three-dimensional imaging. J. Shoulder Elbow Surg. 2016 Oct;25(10):1601–1606. doi:10.1016/j.jse.2016.03.010
- 3. Bodendorfer BM, Loughran GJ, Looney AM, Velott AT, Stein JA, Lutton DM, et al. Short-term outcomes of reverse shoulder arthroplasty using a custom baseplate for severe glenoid deficiency. J. Shoulder Elbow Surg. 2021 May;30(5):1060–1067. doi:10.1016/j.jse.2020.08.002
- 4. Boon AJ, Smith J. Manual scapular stabilization: its effect on shoulder rotational range of motion. Arch. Phys. Med. Rehabil. 2000 Jul;81(7):978–983. doi:10.1053/apmr.2000.5617
- 5. Chalmers PN, Boileau P, Romeo AA, Tashjian RZ. Revision reverse shoulder arthroplasty. J. Am. Acad. Orthop. Surg. 2019 Jun 15;27(12):426–436. doi:10.5435/JAAOS-D-17-00535