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Osteoarthritis of the shoulder treated with shoulder arthroplasty: Radiographic and clinical outcomes

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Disclosures:

I have no disclosures

Dr. Frankle is a consultant and receives royalties from DJO Surgical, Inc.

This talk will include discussion of the off-label use of a medical device.



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Introduction

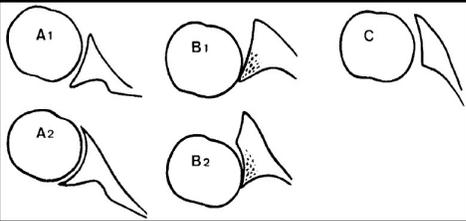
- Total shoulder arthroplasty is a reliable treatment for end-stage OA
- Keys to success
 - Good surgical technique
 - Proper sizing
 - Proper soft tissue balance
 - Solid fixation



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Introduction 

- Pathology in OA is varied - Described by Walch in 1999



Introduction 



A1 A2 B1 B2 C

Introduction 

- Glenoid bone deficiency may be addressed by:
 - Eccentric reaming
 - Bone grafting
 - Augmented glenoid



Introduction 

- Hussey et al. JSES 2015
 - Studied TSA outcomes of eccentric (B1, B2) vs concentric OA (A1, A2)
 - Outcomes of TSA good in both groups
 - More pain in the eccentric group (p=0.015)
 - More glenoid components at risk of failure in the eccentric group**

	Concentric Group	Eccentric Group	P-value
Gross Loosening	11/196 (5.6%)	18/148 (12.2%)	0.03

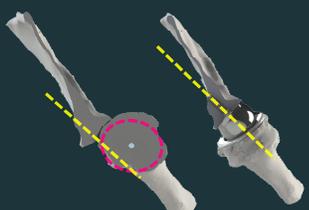
Introduction 

- Early loosening = Early revision
- Revision = Greater Cost
 - Cost of Primary TSA: \$15,935
 - Cost of Revision RSA: \$37,449

	Concentric	Eccentric
Gross Loosening	(5.6%) 5.6/100	(12.2%) 12.2/100
Cost of Revision per 100 patients	\$209,714	\$456,878

Introduction 

- Some surgeons have begun performing RSA for OA with posterior erosion and intact cuff
 - No need to balance
 - Better fixation
 - Re-centers the joint



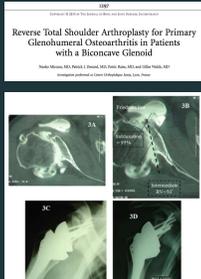
Introduction 

- In our experience, RSA is a useful tool to address severe shoulder pathology found in OA



Introduction 

- Mizuno et al. JBJS 2013
- 27 patients with OA and B2 glenoid
- At 54 months:
 - Constant score 31 → 76
 - Forward elevation 89° → 152°
 - External rotation 3° → 27°
 - Internal rotation from Buttock → T12
- Complication rate 15%
- Scapular notching 37%



Purpose 

- Purpose:
 - Review our experience treating osteoarthritis of the shoulder with an intact rotator cuff using arthroplasty
 - Determine the frequency and specific indications for which RSA was selected instead of TSA
 - Compare the clinical and radiographic outcomes of RSA and TSA

Methods 

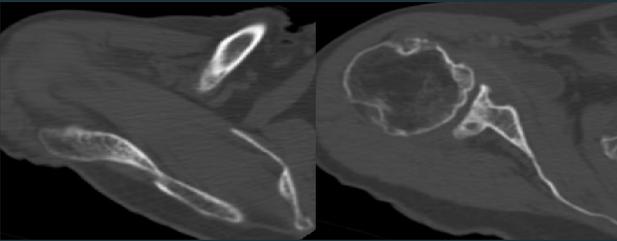
- We reviewed 1000 consecutive TSA and RSA performed for OA with intact rotator cuff
- Patient demographics
- Preoperative function, pain, motion
- Preoperative CT scans for glenoid morphology
- Postoperative function, pain, motion, complications
- Postoperative radiographs

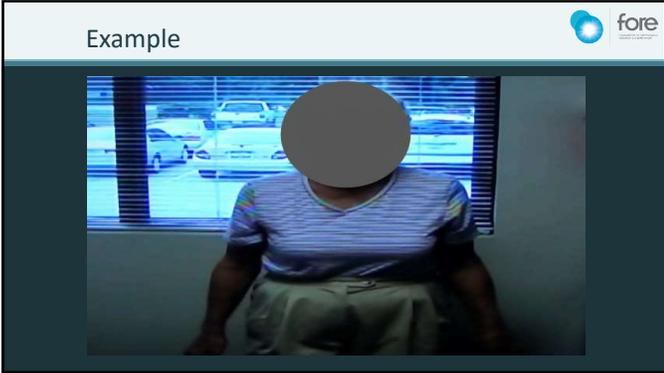


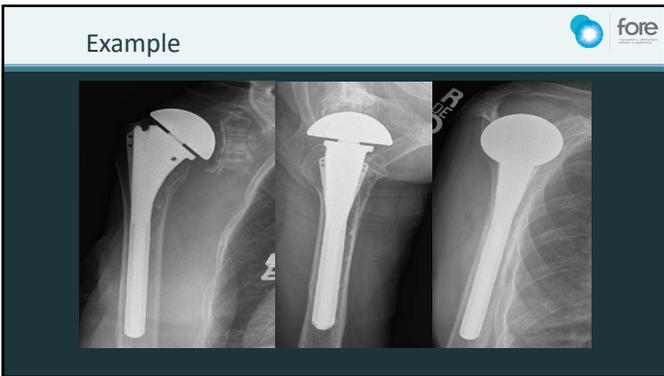
Example 



Example 

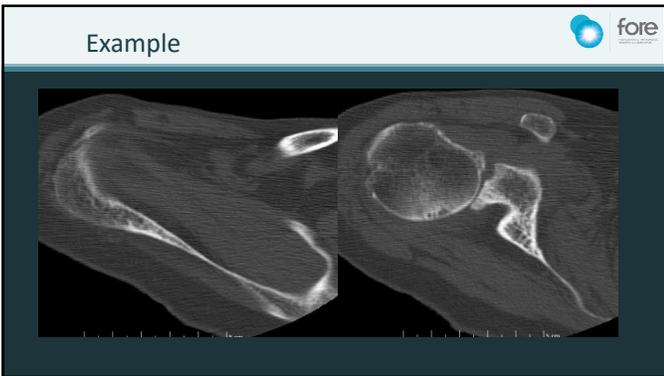


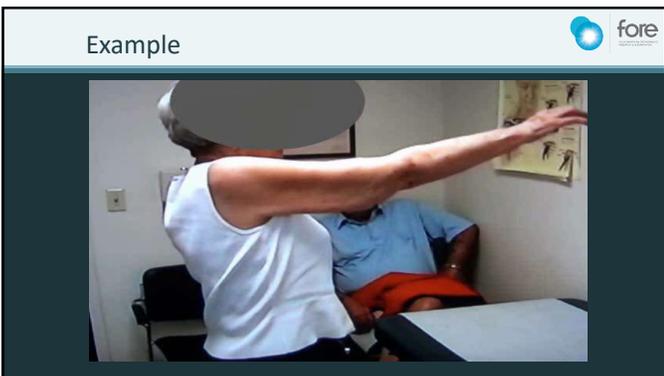


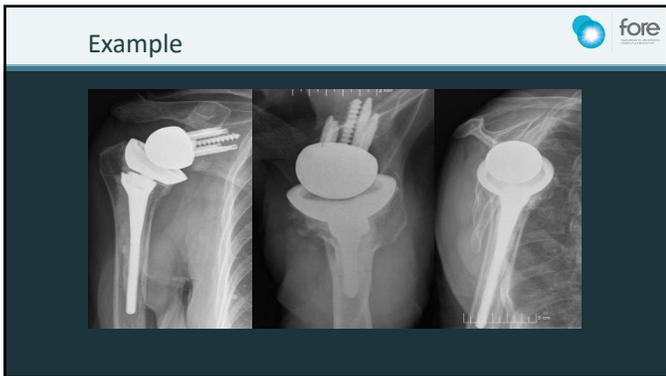


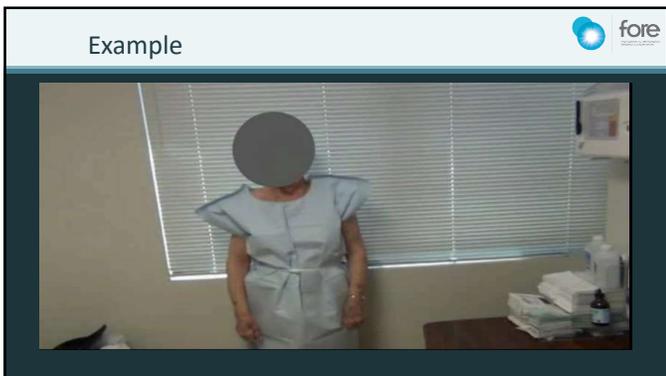












Results fore

	A1	A2	B1	B2	C
n=	426	209	104	218	43

Cohen's Kappa:
 - Interobserver reliability = 0.54 (0.35-0.73)
 - Intraobserver reliability = 0.64 (0.44-0.76)

Results 

TSA	RSA
936 	64 

Results 

- When did we perform RSA?
 - 5% of A1
 - 6% of A2
 - 2% of B1
 - 10% of B2
 - 21% of C



Much more common to perform TSA regardless of pathology

Results 

- Comparison between RSA (n=64) and TSA (n=936)

	RSA	TSA	Total
A1	20	406	426
A2	12	197	209
B1	2	102	104
B2	21	197	218
C	9	34	43
Total	64	936	1000

Results 

- Comparison RSA (n=64) and between TSA (n=936)

	RSA	TSA	sig (p=)
A1	31%	43%	0.01
A2	19%	21%	0.27
B1	3%	11%	0.002
B2	33%	21%	0.13
C	14%	4%	0.003

Results 

- Comparison of outcomes data for RSA (n=28) and TSA (n=509)

	RSA	TSA	sig (p=)
n=	27	509	
ASES	75	77	0.47
FE	143°	155°	0.35
ER	45°	60°	0.33
IR	T12	T12	0.69
VAS pain	2.4	2.2	0.32
SST	7.2	8.2	0.58

TSA follow-up:
56 mo. (24-136)

RSA follow-up:
44 mo. (24-88)

Results 

- Comparison of the change (Δ) in each clinical parameter

	RSA	TSA	sig (p=)
n=	27	509	
Δ ASES	37	36	0.87
Δ FE	56°	61°	0.78
Δ ER	29°	37°	0.56
Δ IR	2 levels	2 levels	0.16
Δ VAS pain	-3.0	-3.6	0.56
Δ SST	4.3	5.6	0.10

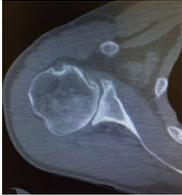
TSA follow-up:
56 mo. (24-136)

RSA follow-up:
44 mo. (24-88)

Results 

- Subgroup analysis patients undergoing RSA and TSA for eccentric OA

	RSA	TSA	sig (p=)
Age	73.4	66.1	0.1
Follow-up	44	59	0.21
ASES	62	39	0.25
FE	93°	160°	0.15
ER	23°	63°	0.08
IR	L3	L3	0.89
VAS pain	4.8	2.4	0.09
SST	8	8.2	0.9



Results 

- All TSA with 2+ years follow-up evaluated radiographically (n=509)
 - Loosening (n=23)
 - Progressive radiolucent lines (n=51)
 - 11 revisions
- All RSA also evaluated
 - Mean 38.5 months
 - 4 loose components (6.3%)
 - 1 revision



Results 

- Why did we perform RSA?
 - Bone loss or eccentric wear – 41 cases (64%)
 - Rocking glenoid component – 8 cases (13%)
 - Poor bone support – 6 cases (9%)
 - Poor soft tissue balance – 6 cases (9%)
 - Inflammatory OA – 2 cases (6%)
 - Indeterminate – 1 case (1.5%)

Results 

- Other factors
 - Contralateral arthroplasty in 17 (27%) patients who underwent RSA
 - 4 patients unhappy with their prior surgery
 - Additional 2 patients w/ later contralateral TSA → cuff failure



Results 

- Other factors
 - Preoperative discussion
 - Told RSA would be performed - 8
 - Told RSA or TSA possible - 34
 - No discussion documented – 22
 - 82% of these were A1 or A2 glenoid



Why perform RSA for OA? 

- Constraint may overcome external forces that remain



Why perform RSA for OA? 

- Better glenoid fixation regardless of bone stock
 - Uncemented fixation on the glenoid
 - Ability to modify version to find solid central fixation
 - Supplemental fixation with locking screws



Why perform RSA for OA? 

- Greater ease of surgery!
 - Easier surgery makes a good outcome more likely
 - We have studied this
 - Preliminary data confirms:
 - Easier surgery = better outcome
 - Surgery performed "better" leads to better outcomes
 - General surgery data agrees with this as well



Conclusions 

- We perform RSA for OA with intact cuff in 6.4% of cases
- Factors influencing decision to perform RSA include posterior glenoid erosion and inability to balance the shoulder during surgery
- Early clinical outcomes are similar between TSA and RSA
- 20% of TSA glenoid components at risk of loosening when implanted into Walch B glenoid
- Although currently off-label use, RSA has a role in the treatment of OA with intact rotator cuff

Thank you