

Reverse shoulder arthroplasty for  
proximal humeral fractures:  
outcomes comparing  
primary reverse arthroplasty for fracture  
versus  
reverse arthroplasty after failed osteosynthesis

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# Background

- Locking plate system → ○ improvement in Fx fixation  
✗ a relatively high complication rate

- Failed ORIF →

- ✓ Osteonecrosis
- ✓ Malunion/Nonunion
- ✓ Posttraumatic OA
- ✓ Humeral head collapse

*(Brunner, J Orthop Trauma, 2009)*

*(Orelud, JSES, 2010)*

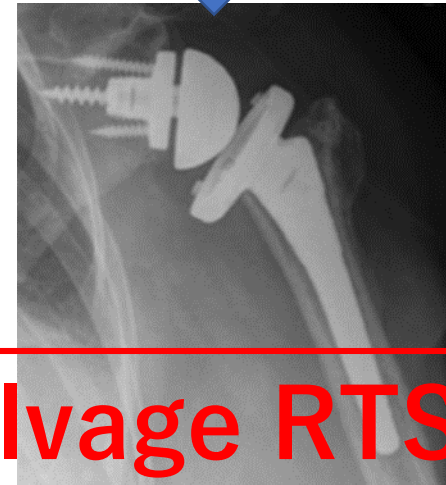
Surgical treatment of proximal humeral fractures (PHFx) in the elderly pose challenges in decision making

Which ? → few reports



**Primary RTSA**

VS



**Salvage RTSA**

# Purpose

To evaluate the outcomes of

patients with failed osteosynthesis who undergo salvage RTSA

compared with

patients undergoing primary RTSA

for PHFx

# Material and Method

- Retrospective study Between 2003 and 2013
- All cases : Neer classification Type3 or 4
  - ✓ acute Primary RTSA 18 cases
  - ✓ Salvage RTSA 26 cases with prior ORIF
- Age: Av. 75 yrs(60-88)
- F/U : Av. 3yrs (2-6)

# Material and Method

## ➤ Outcome measure

- ✓ ASES shoulder score (0-100) *(American shoulder and elbow surgeon)*
- ✓ Radiographic analysis : component loosening etc.

Include Range of motion  
Satisfaction

## ➤ *Statically : unpaired Student T test*

*Fisher exact test*

*Kaplan-Meier survival test*

*log-rank test*

# Patient demographics

	Salvage RTSA (n=26)	Primary RTSA (n=18)	P value
Side			.74
Right	12	9	
Left	14	9	
Follow-up, y	2(2-6)	3(2-5)	.14
Age, y	70(54-87)	75(60-88)	.13
Gender			.18
Male	3	4	
Female	23	14	
BMI, kg/m <sup>2</sup>	32.5	31.4	.71
Neer classification			.58
3 part	11	9	
4part	15	9	

Salvage RTSA ≐ Primary RTSA

# Clinical outcomes

## Salvage RTSA vs Primary RTSA

	Salvage RTSA (n=26)	Primary RTSA (n=18)	Difference(95% CI)	P value
<b>ASES</b>	64.6	70.6	5.9(1.69-14)	.211
Active range of motion				
Forward flexion(° )	130	133	3.1(14-29)	.785
External flexion(° )	42	36	5.93(13-25)	.518
Satisfaction	5.2	4.8	0.4(0.5-1.4)	.371

Salvage RTSA ≐ Primary RTSA



# Clinical outcomes of RTSA with failed ORIF

## Before RTSA vs After RTSA

	Before salvage RTSA (n=26)	After salvage RTSA (n=26)	Difference (95% CI)	P value
<b>ASES</b>	24.7	63.0	38 (33-43)	<.0001
Active range of motion				
Forward flexion (°)	51	133	82 (65-96)	<.0001
External flexion (°)	1	42	41.5 (27-53)	<.0001
Satisfaction	1.0	5.6	4.6 (4-5)	<.0001

Before RTSA    ÷    After RTSA

# Clinical outcomes of 3 part Fx Salvage RTSA vs Primary RTSA

	Salvage RTSA (n=11)	Primary RTSA (n=9)	Difference(95% CI)	P value
<b>ASES</b>	62.3	66.6	4.2(6-14)	.373
Active range of motion				
Forward flexion(° )	146	114	31.6(10-63)	.048
External flexion(° )	46	33	12.2(15-39)	.338
Satisfaction	6.2	5	1.2(1-3)	

Salvage RTSA ÷ Primary RTSA

# Clinical outcomes of 4 part Fx Salvage RTSA vs Primary RTSA

	Salvage RTSA (n=15)	Primary RTSA (n=9)	Difference(95% CI)	P value
<b>ASES</b>	62.5	73.3	10.7(6-28)	.187
Active range of motion				
Forward flexion(° )	127	147	20(12-53)	.189
External flexion(° )	40	38	1.6(21-24)	.872
Satisfaction	5.1	4.5	0.5(0.12-1)	0.095

Salvage RTSA ≐ Primary RTSA

# Complication

	Salvage RTSA (n=28)	Primary RTSA (n=16)	P value
Complication	2	1	.782
Dislocation	1	0	.331
Aseptic loosening	1	0	.331
Reoperation	0	1	.331

Early phase

Excluding : heterotopic ossification

prosthetic joint infection 1.5 years after the index arthroplasty

# Clinical outcome -Salvage vs Primary RTSA-

➤ Acute arthroplasty for PHFx → good early outcomes

✓ Systematic review by Ferrel

- Forward flexion Av.118°
- External rotation Av.20°
- ASES score Av.64.7

*(Ferrel, J Orthop Trauma, 2015)*

➤ Only Salvage RTSA → few reports

In this case

Salvage RTSA ≐ Primary RTSA

# Complication -Salvage vs Primary RTSA-

➤ Reoperation rate : up to 4%

higher early infection

lower recurrent instability, early loosening

*(Cazeneuve, Orthop Traumatol Surg Res, 2011)*

*(Ferrel, J Orthop Trauma, 2015)*

In this case

Salvage RTSA : heterotopic ossification, instability

**Early phase**

component loosening

Primary RTSA : prosthetic joint infection 1.5 years

**Late phase**

after the index arthroplasty

# Limitation

- ✓ Retrospective design
- ✓ At a single institution and involved several surgeons
- ✓ No standardized algorithm for the treatment of the initial PHFx
- ✓ Not all patients were treated initially at the institution
- ✓ The follow-up time for these patients is relatively short

# Conclusion

- Although RTSA after failed ORIF has a higher rate of complications compared with acute RTSA, the revision and reoperation rate as well as clinical outcomes and shoulder function remained comparable.
- Salvage RTSA still has the potential to achieve good outcomes if osteosynthesis fails.