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Effects of Subscapularis Repair in the Reverse Total Shoulder Arthroplasty: Difference in Those with Intact or Poor Subscapularis Tendon

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Introduction

- Subscapularis tendon(SBS)
  - Plays important role in joint stability & range of motion (ROM) of shoulder
- Does repairing SBS in rTSA have relations with increased joint stability

Pros	Cons
Hansen et al. 2013 Bull Hosp Jt Dis *Oh et al. 2014 JSES* *Chalmers et al. 2014 JSES* *Cheung et al. 2018 JSES* *Edwards et al. 2009 JSES*	Wall et al. 2007 JBJS De Boer et al. 2016 Musc Surg Vourazeris et al. 2017 JSES Clark et al. 2012 JSES

Purpose

- No clinical studies were reported about comparing outcomes of rTSA depending on different pre-operative SBS quality until now.

Materials & Methods

- Retrospective comparative study
- From December 2015 to February 2019
- Patients who underwent rTSA with SBS repair
- 161 eligible patients
- Age : 75.5yrs (range, 65 – 95)
- Follow up period : 45.3months (range, 24 – 136)

Inclusion (292)	Exclusion (131)
Massive rotator cuff tear Cuff tear arthropathy Osteoarthritis	Revisional rTSA (27) Less than 2years of follow up period (87) Insufficient medical record (10) No pre-operative MRI (7)

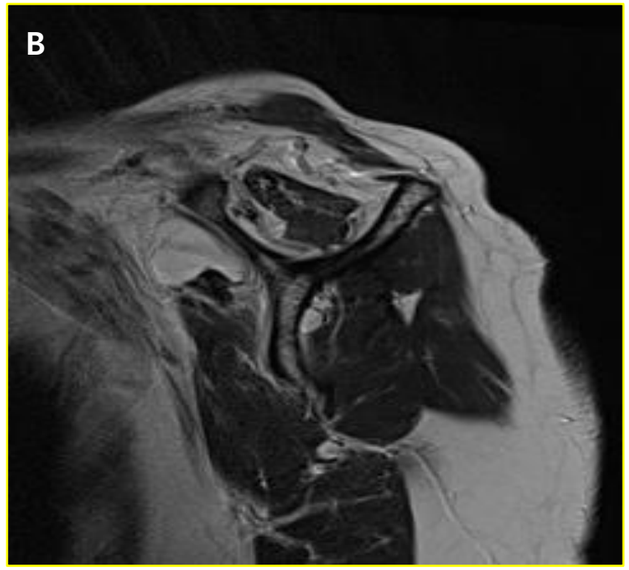
Implants

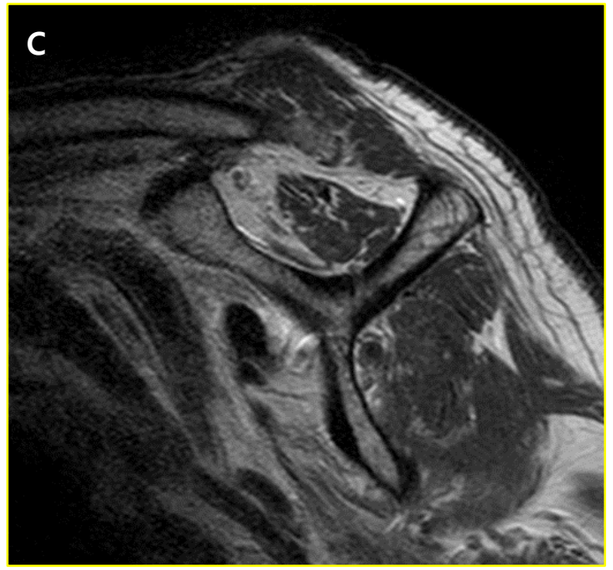
- Equinox Reverse® System (Exactech, U.S.A.) : 62
- Aequalis Ascend™ Flex (Tornier, U.S.A.) : 74
- Comprehensive® Reverse Shoulder System (Zimmer Biomet, U.S.A.) : 18
- DELTA XTEND™ (DePuy Synthes, U.S.A.) : 5

rTSA with SBS repair

- Group A (85) : no fatty degeneration of SBS
- Group B (44) : only intact lower portion of SBS
- Group C (32) : severe fatty degeneration of overall SBS

Variable	Group A (n = 85)	Group B (n = 44)	Group C (n = 32)	p value
Age, yr	75.5 ± 8.2	77.3 ± 7.8	73.4 ± 15.7	.252
Sex, M/F	20/65	13/30	12/20	.309
Dominant : non-dominant	60:25	33:11	22:10	.359





Results

Clinical Outcome Scores

Variable	Group A (n = 85)	Group B (n = 44)	Group C (n = 32)	p value
pVAS	0.29 ± 0.88	0.41 ± 1.04	0.19 ± 0.47	.541
pVAS ROM	1.48 ± 1.31	1.43 ± 1.66	1.56 ± 1.34	.206
ASES score	76.94 ± 16.71	77.79 ± 16.56	74.38 ± 16.74	.663

Muscle Strength

Variable	Group A (n = 85)	Group B (n = 44)	Group C (n = 32)	p value
FF (lbs)	8.9 ± 3.4	9.1 ± 3.5	8.9 ± 3.9	.955
Abd (lbs)	8.7 ± 3.4	9.2 ± 3.7	9.2 ± 3.7	.719
ER (lbs)	7.1 ± 3.1	7.0 ± 2.7	7.7 ± 3.7	.565
IR (lbs)	8.1 ± 3.0	8.0 ± 2.4	8.2 ± 3.9	.963

- Group A : no fatty degeneration of SBS
- Group B : only intact lower portion of SBS
- Group C : severe fatty degeneration of overall SBS

Results

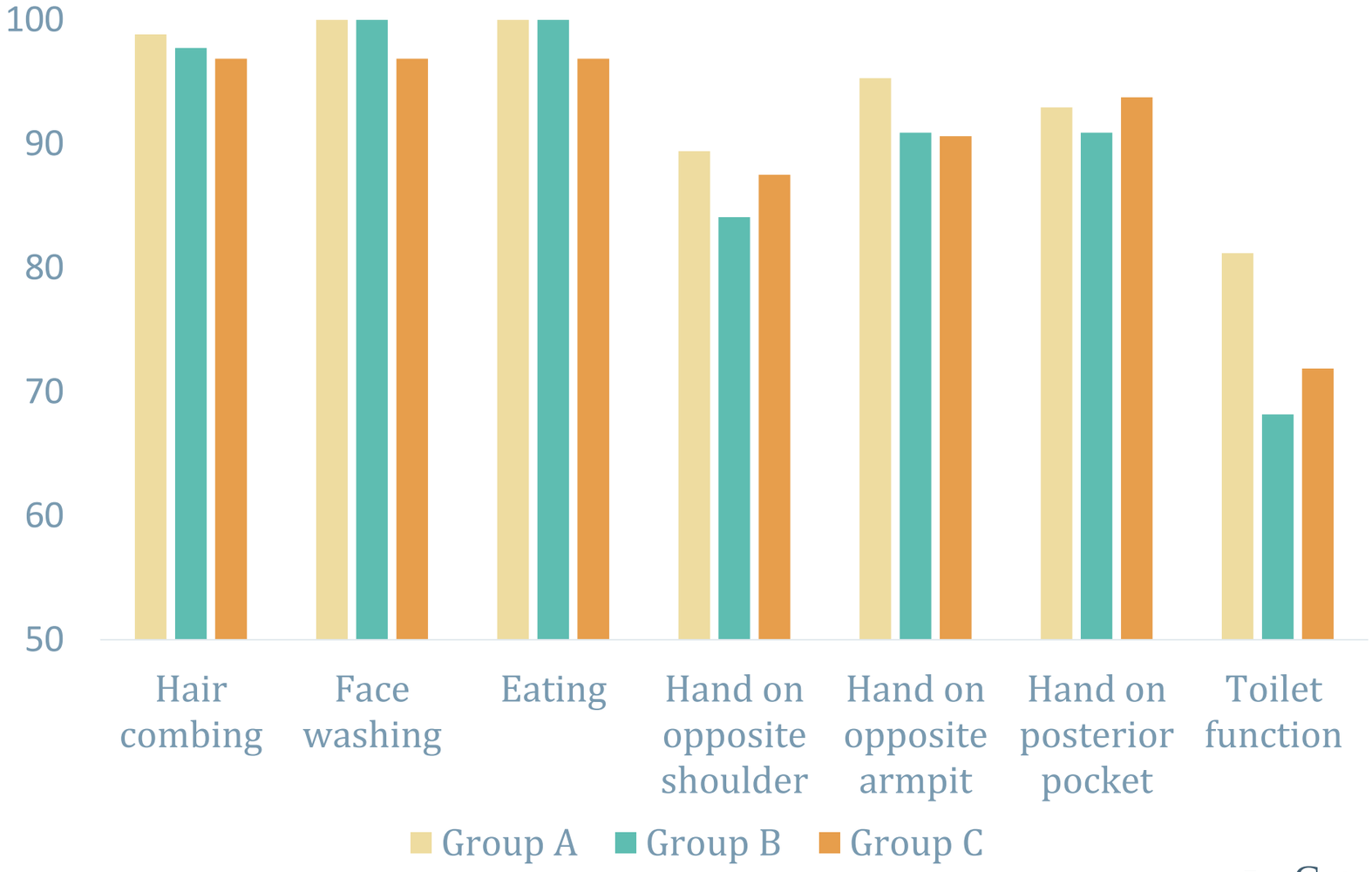
ROM

Variable	Group A (n = 85)	Group B (n = 44)	Group C (n = 32)	p value
FFa	137.4 ± 20.5	138.8 ± 17.7	129.6 ± 28.1	.154
FFp	148.8 ± 19.2	151.7 ± 15.4	150.0 ± 16.4	.682
Abd	94.5 ± 13.7	97.7 ± 13.9	91.6 ± 14.1	.169
ERs	**36.3 ± 16.4**	**39.7 ± 15.5**	**41.1 ± 13.9**	**.481**
ER 90˚	58.7 ± 19.1	58.6 ± 18.7	60.6 ± 19.6	.879
IR 90˚	**43.0 ± 18.3**	**40.4 ± 19.3**	**42.1 ± 15.3**	**.754**
IRp	3.9 ± 3.2	4.02 ± 3.4	4.3 ± 4.2	.858

- Group A : no fatty degeneration of SBS
- Group B : only intact lower portion of SBS
- Group C : severe fatty degeneration of overall SBS

Results

Activity of Daily Living (ADL)



- Group A : no fatty degeneration of SBS
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- Group C : severe fatty degeneration of overall SBS

Results

Complications

Variable	Group A (n = 85)	Group B (n = 44)	Group C (n = 32)
Scapular notching	**6 (7%)**	**4 (9.1%)**	**1 (3.1%)**

Group A
- Grade 1 : 5 (5.9%)
- Grade 2 : 1 (1.1%)
- Grade 3 : 0 (0%)

Group B
- Grade 1 : 3 (6.9%)
- Grade 2 : 1 (2.2%)
- Grade 3 : 0 (0%)

Group C
- Grade 1 : 0 (0%)
- Grade 2 : 1 (3.1%)
- Grade 3 : 0 (0%)

Variable	Group A (n = 85)	Group B (n = 44)	Group C (n = 32)
Acromial fracture	7 (8%)	4 (9.1%)	0 (0%)
Instability	**3 (3.4%)**	**0 (0%)**	**0 (0%)**

- Group A : no fatty degeneration of SBS
- Group B : only intact lower portion of SBS
- Group C : severe fatty degeneration of overall SBS

Discussion

- Pre-operative SBS quality does not affect outcomes after rTSA with SBS repair
  - Pre-operative SBS FI & muscle atrophy does not affect post-operative ROM, clinical scores
- In this study
  - Pre-operative SBS quality does not affect post-operative ROM
  - But ERs & IRp tend to decrease in better quality SBS

- Scapular notching
  - SBS repaired : 10.4%, non-repaired : 10.7%
    No significant differences were noted in scapular notching rate
    Most of scapular notching grades were 0 or 1
- In this study
  - There was more scapular notching in better SBS quality
  - Most of scapular notchings were grade 1 in our study

Discussion

- Acromial fracture
  - Cadaver study : Center of rotation(COR) relocated inferomedially Repaired SBS in rTSA act as antagonist to deltoid. It may increase incidence of acromial fracture clinically
  - Increased deltoid length is risk factor of acromial fracture after rTSA
- In this study
  - There were more acromial fractures in better quality SBS

- Instability
  - Repair or non-repair of SBS shows no correlation about instability after rTSA
  - Instability after rTSA was related with SBS deficiency
- In this study
  - There were 3 instabilities (only in good quality SBS)

    Traumatic dislocation : 1

    Non- traumatic dislocation : 2

Conclusion

- No clinical differences were noted in pain, ASES score, ROM, and muscle power
- In good quality SBS group, overall ADL showed better results
- But there was a tendency to limit ROM and more complications occurred

- Despite the tendency to limit ROM and complications, repairing better SBS quality shows better results than poor SBS quality in ADL
- Therefore, we may repair SBS but have to pay careful attention to complications

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