Impact of remplissage on early postoperative stiffness and rotator cuff muscle elasticity in anterior shoulder instability patients

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COI Disclosure information

Presenter: Yoshimasa Saigo

I have no financial relationship to disclosure

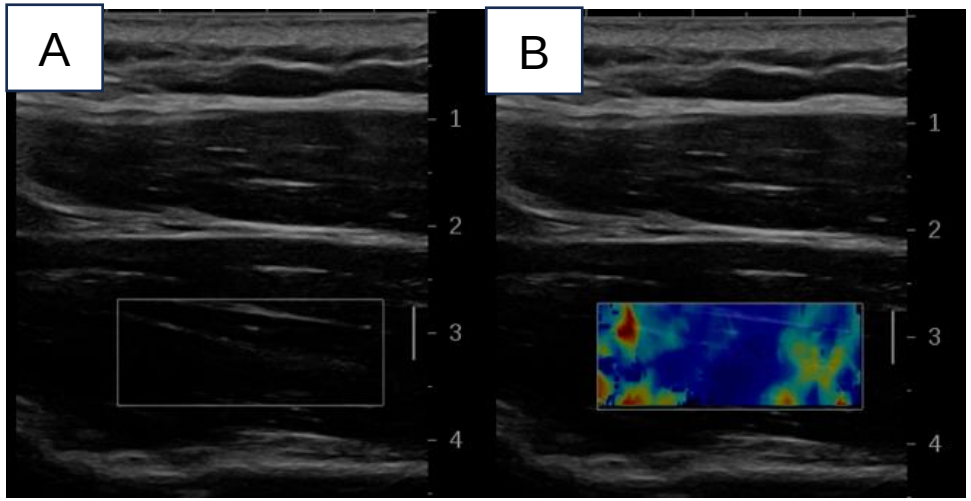
Background: Arthroscopic bankart repair with remplissage and range of motion (ROM)

- Arthroscopic bankart repair with remplissage (ABRR) is the surgery for anterior shoulder instability with off track or peripheral track patients.[1]
- Previously, several studies reported External rotation (ER) restriction after ABRR was minimum[2,3]
  - No significant difference at 2 years post-surgery in some studies
- However, current study revealed significant ER deficits at 6 months after ABRR[1]
  - 26% had >20° deficit in 1st ER compared to the opposite shoulder
  - 42% had >20° deficit in 2nd ER compared to the opposite shoulder

- No studies have evaluated the immediate postoperative changes and recovery course of range of motion (ROM) following ABRR
- No studies have detailed insights into early ROM adaptation and progression

Background: Shoulder muscle stiffness and ROM

- Shoulder muscle stiffness was measured by shear wave elastography (SWE)[4,5]
- High-stiffness areas are shown in red, and low-stiffness areas are shown in blue.



A: B-mode ultrasound image showing the suprasupinatus muscle.
B: B-mode image with overlaid elastgram.

- With the surgery intervention, particular muscles were increased stiffness and the muscle stiffness can be related to the restricted ROM[4]

While ER restriction after the remplissage procedure is documented.

No studies have investigated shoulder muscle stiffness changes after ABRR.

Purpose

To investigate the impact of remplissage on postoperative ROM recovery and changes in rotator cuff muscle stiffness measured by SWE

Methods: Patient characteristics and postoperative evaluation protocol

- Patient population :

  ABRR N:10, Age:26.9±6.8, Male:9, Female:1

  ABR N:5, Age:40.8±15.5, Male:3, Female:2

- Glenoid bone loss and on track or off track:

  ABRR: Bone loss 12.5%±0.2 , all cases were off or peripheral track

  ABR: Bone loss 11.9%±0.3, all cases were on track

- Minimum follow-up: 5 months

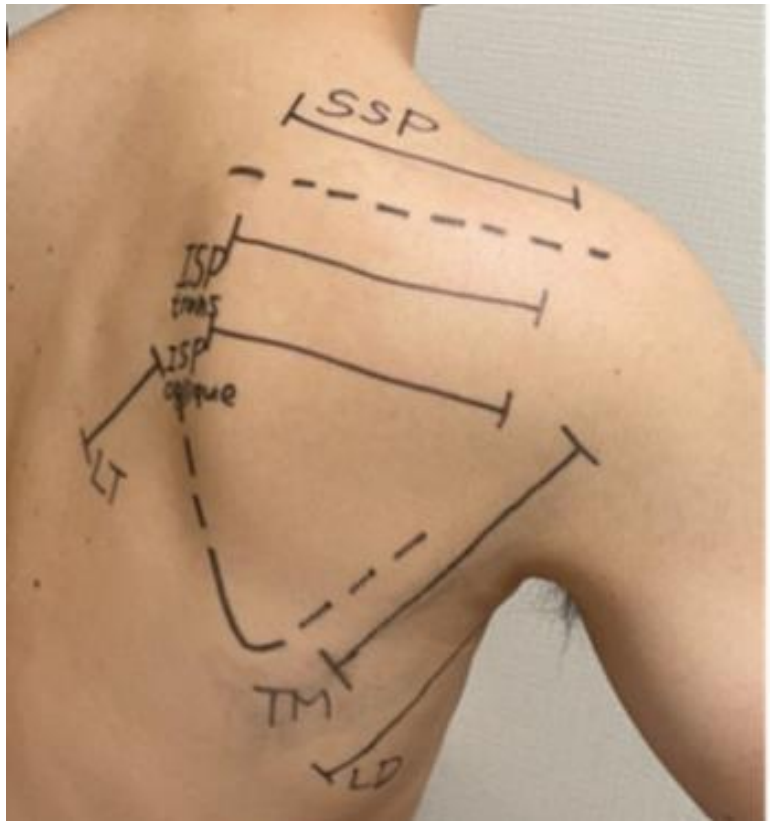
- ROM and RC muscle stiffness evaluation (before and every month after surgery)

  ROM with prone position: FE, ABD, 1st ER, 1st IR, 2nd ER, 2nd IR, 3rd ER, 3rd IR

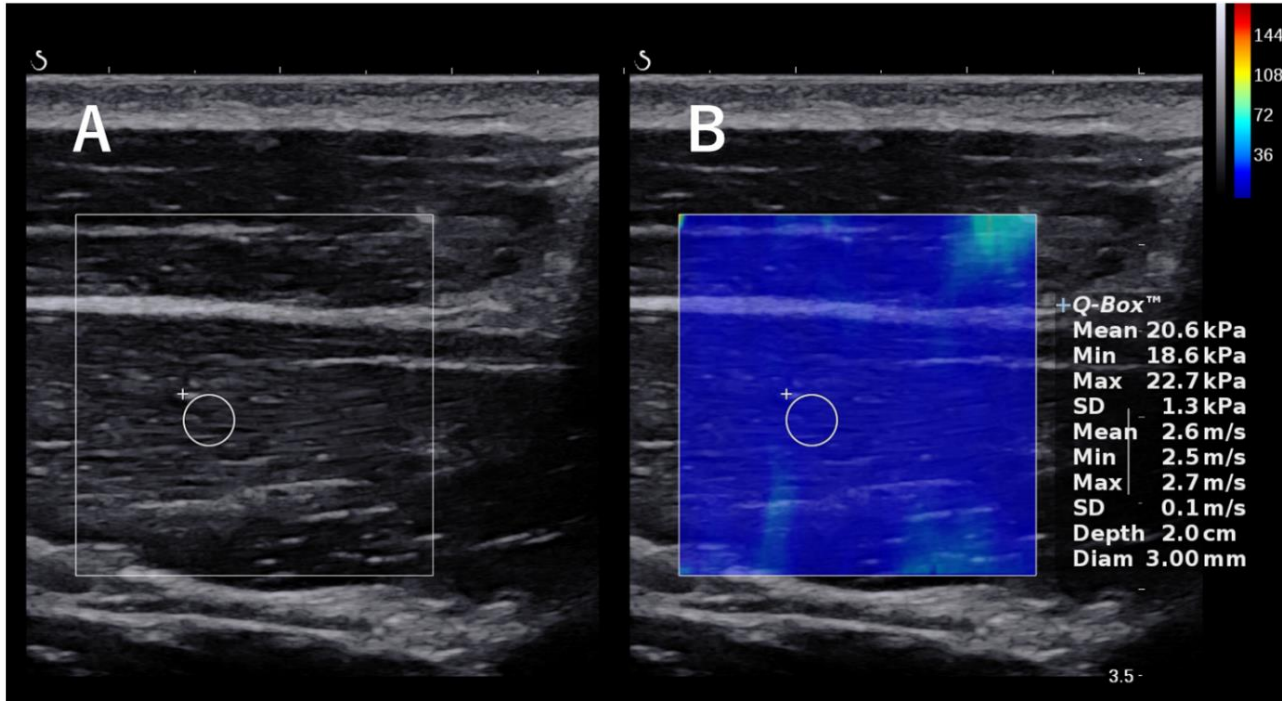
  RC muscle stiffness: Supraspinatus (SSP), Infraspinatus (ISP), Teres minor(TM)

Methods: RC muscle stiffness evaluation

- Shear wave elastography (SWE) LOGIQ E10, GE Healthcare was used
- Probe placement for each muscle



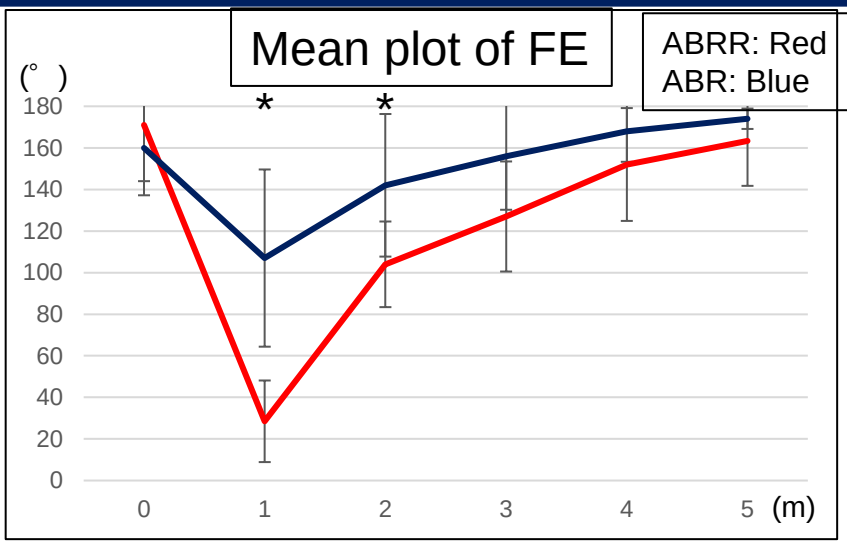
- Evaluation of SWE ultrasound

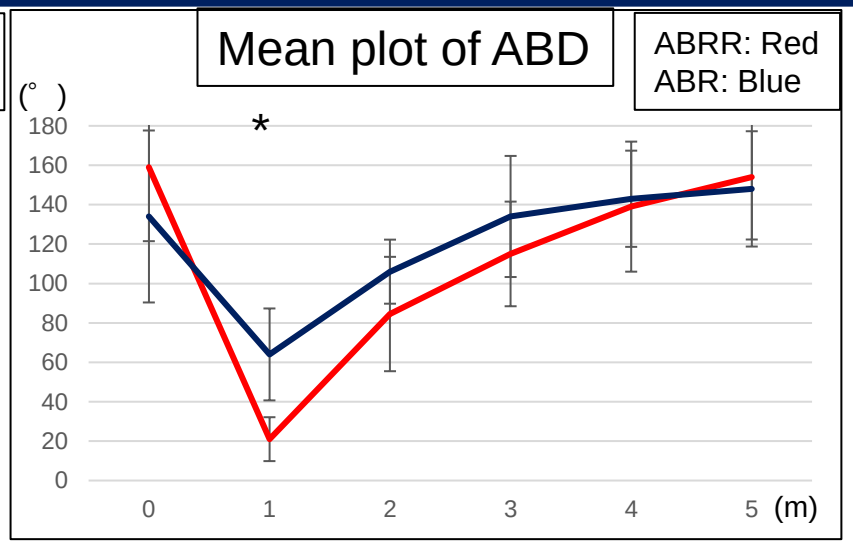


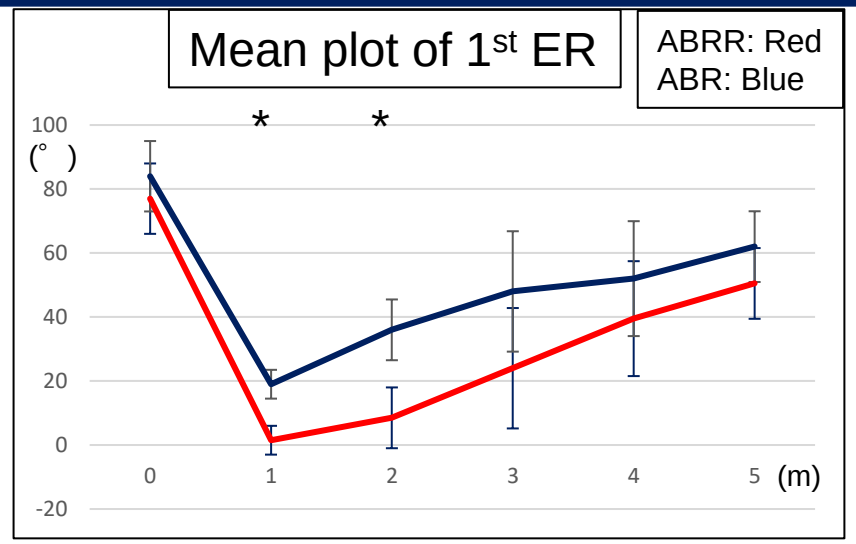
B mode image with overlaid elastogram.

The circular region of interest was set near the central part of the muscle[5]

Result: Postoperative ROM differences between ABR and ABRR





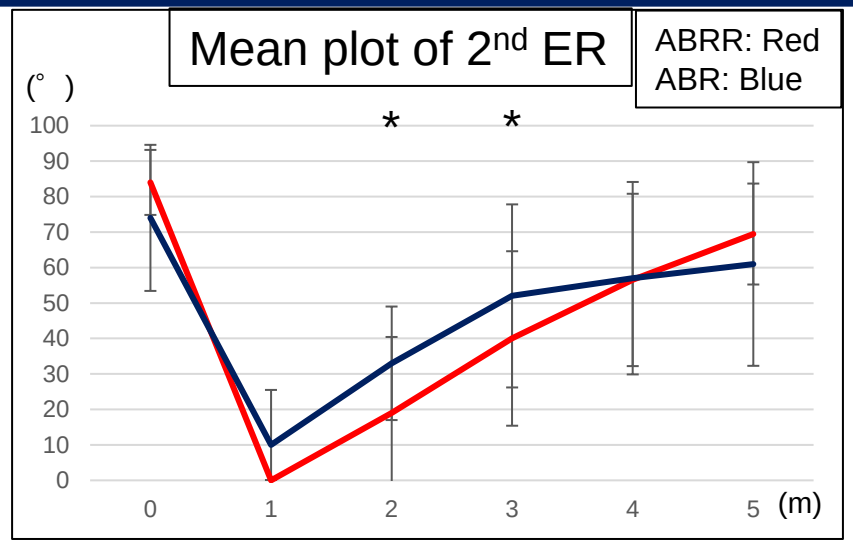


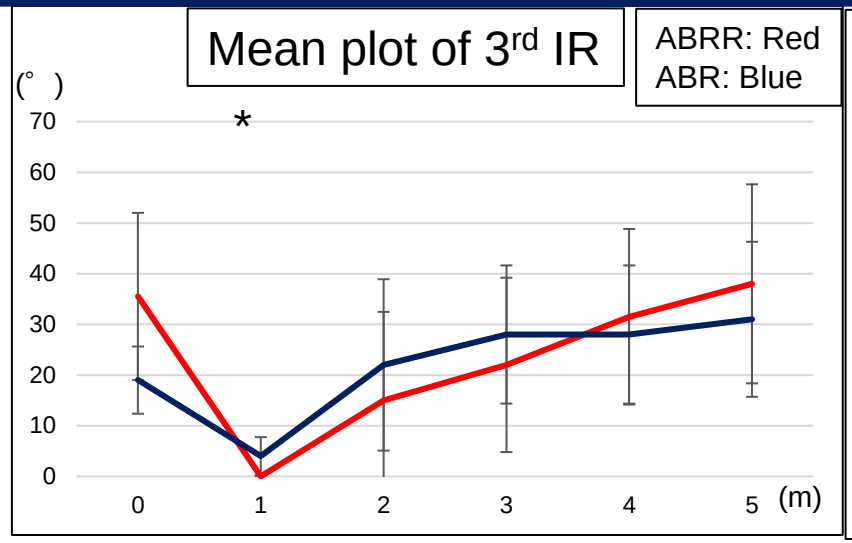
*: p<0.05 comparing surgeries

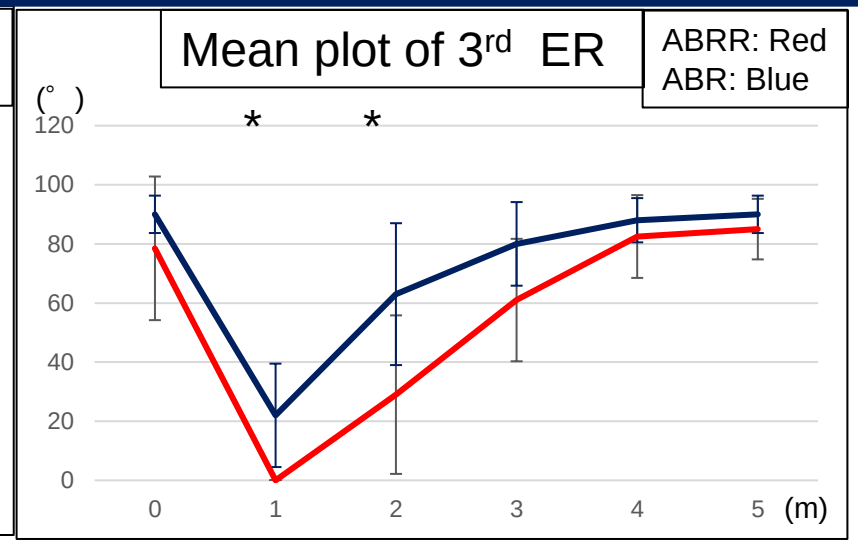
In ABRR group, comparing to ABR group

- FE is significantly lower in 1 and 2 month after surgery
- ABD is significantly lower in 1 month after surgery
- 1st ER is significantly lower in 1 and 2 months after surgery

Result: Postoperative ROM differences between ABR and ABRR







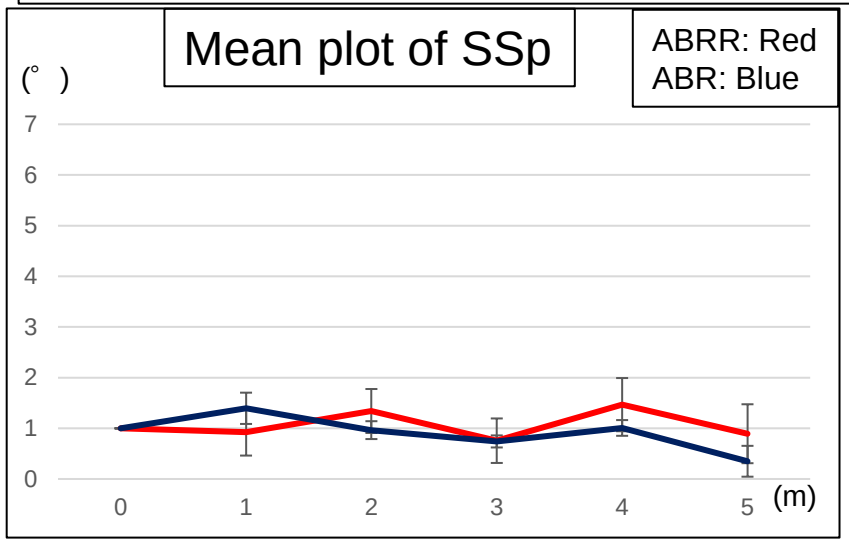
*: p<0.05 comparing surgeries

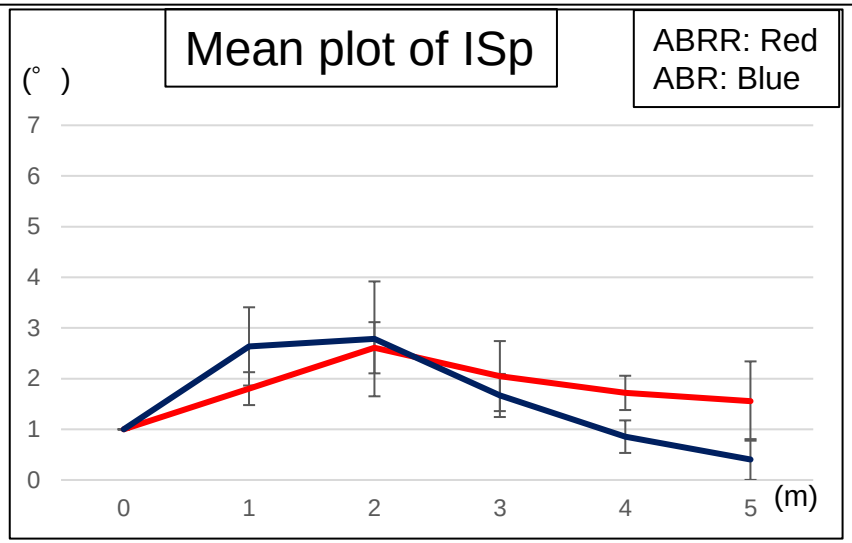
In ABRR group, comparing to ABR group

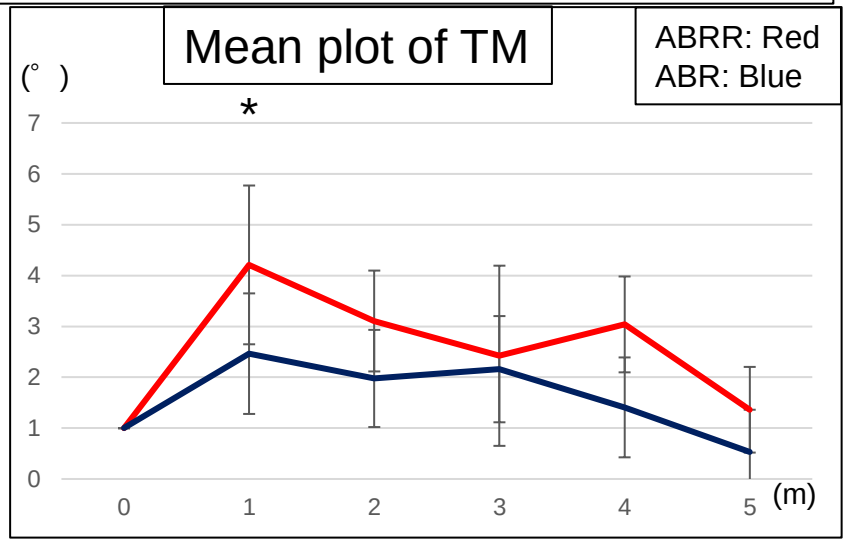
- 2nd ER is significantly lower in 2 and 3 month after surgery
- 3rd IR is significantly lower in 1 month after surgery
- 3rd ER is significantly lower in 1 and 2 months after surgery

Result: Postoperative RC muscle stiffness between ABRR and ABR

The ratio of elastography values divided by the pre-surgery score was used for standardization.







In ABRR group, comparing to ABR group

- SSp and ISp have no significant difference
- TM is significantly higher in 1 month after surgery

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*: p<0.05 comparing surgeries

Discussion: ROM recovery after surgery

· ABRR is more restricted ER in early phase after surgery

- Significant difference between surgery was observed in each position ER after 2 month
- >20° deficit to the other side was 26% in 1st ER and 42% in 2nd ER at 6 months[1]
- More than 1 year follow up, there were no significant difference in each ROM[2]

Current study

- Suture anchor position in the inferior quadrant has been shown to increase shoulder ER restriction in previous biomechanical studies.[7]

- As ROM, especially ER, recovers over time, postoperative rehabilitation and muscle activation can be effectively adapted to the remplissage procedure

Discussion: Stiffness recovery after surgery

- TM has Higher SWE value in ABRR in 1m after surgery

Muscle stiffness after the surgery

- TM in ABRR has more stiffness significantly compare to in ABR in 1m after surgery

Current study

- Upper trapezius and middle deltoid increases stiffness with loss of ROM after ARCR[8].

- In ARCR, stiffness of the upper trapezius and middle deltoid improves with time and rehabilitation, can contributing to ROM recovery by 12 months post-surgery[8].

- Muscle adaptation can be related to the muscle stiffness, evaluated by SWE

References

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