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Stress Shielding Effect on the Glenoid Morphology after Arthroscopic Bankart Repair: A Preliminary 3D-CT Study

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INTRODUCTION

- The factor in progressive anterior glenoid erosion after arthroscopic Bankart repair (ABR) or arthroscopic bony Bankart repair (ABBR) is the stress shielding effect (SSE).

- The SSE is often a precipitating factor that contributes to the cause of decreasing glenoid diameter width due to resorption of the anterior glenoid rim.

INTRODUCTION

- The SSE is studied and followed up in terms of pattern classification and severity, which can predict the progressive glenoid morphology change prognosis, including the chance of recurrence of shoulder instability after ABR or ABBR.

MATERIALS & METHODS

- A total of 202 shoulders performed the ABR and ABBR between January 2018 and April 2023 in a retrospective cohort study design.

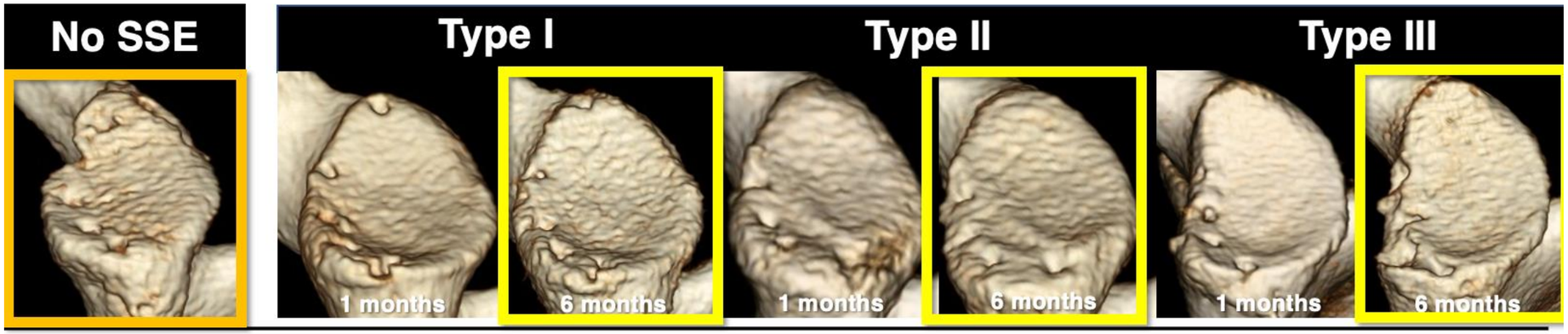
- At 12 months of follow-up, there were 89 shoulders that were classified in the without SSE group and 113 shoulders that were classified in the SSE group.

MATERIALS & METHODS

- The group without SSE is compared with the SSE group at 6 and 12 months postoperatively by 3D CT scan glenoid reconstruction.

- In terms of the comparative outcomes study, the percentage of glenoid defect change between 6 and 12 months, the distribution and incidence of SSE, and the rate of recurrence of shoulder instability.

MATERIALS & METHODS



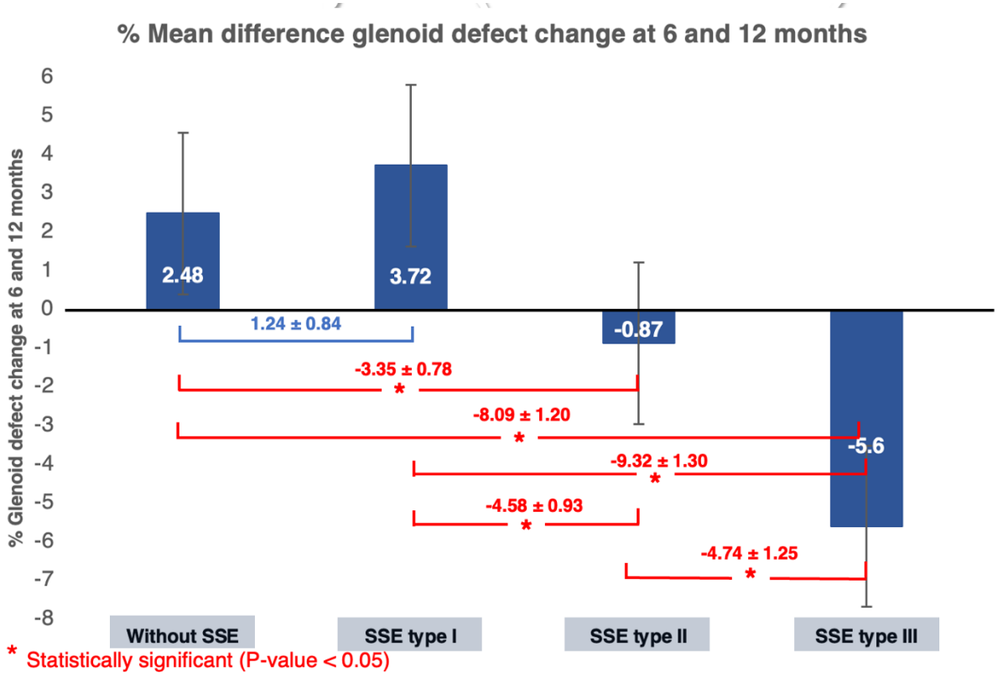
	Type I	Type II	Type III
Degrees of severity	Mild	Moderate	Severe
Degrees of slope SSE	Less than 30°	30° to 60°	More than 60°
Extended suture anchor involvement	Negative (involved in front of the suture anchor)	Positive (Suture anchor involvement)	Positive (Suture anchor involvement)
Tunnel suture anchor enlargement	Negative	Negative	Positive

RESULTS

	No SSE group (n=89)	SSE group (n=113)		
		Type I	Type II	Type III
Number of patient (%)	89 (44.06%)	42 (20.79%)	54 (26.73%)	17 (8.42%)

- The SSE group is found in 113/202 shoulders (55.94%), and Type II is the most common finding in the SSE group (47.79%, 54/113).

RESULTS



- The mean difference in percentage glenoid defect change between 6 and 12 months is not significant between the groups without SSE and the Type I group (1.24 ± 0.84, P = 0.87).

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RESULTS

Group comparison		Glenoid defect change at 6 and 12 months[α]		Mean difference[β]	95% Confidence interval	P-value
First group	Second group	First group	Second group			
Without SSE	Type I	2.48 ± 3.57	3.72± 3.52	1.24 ± 0.84	-1.02 to 3.49	0.87
Without SSE	Type II	2.48 ± 3.57	-0.87 ± 5.96	-3.35 ± 0.78 *	-5.42 to -1.27	< 0.0001
Without SSE	Type III	2.48 ± 3.57	-5.60 ± 5.70	-8.09 ±1.20 *	-11.27 to -4.90	< 0.0001
Type I	Type II	3.72± 3.52	-0.87 ± 5.96	-4.58 ±0.93 *	-7.05 to -2.11	< 0.0001
Type I	Type III	3.72± 3.52	-5.60 ± 5.70	-9.32 ±1.30 *	-12.78 to -5.86	< 0.0001
Type II	Type III	-0.87 ± 5.96	-5.60 ± 5.70	-4.74 ±1.25 *	-8.08 to -1.40	0.001

[α] Data are shown as % ± standard deviation. SSE, stress shielding effect

[β] Bonferroni post hoc analysis compared between without SSE group and subtype of the SSE group. Data are shown as % ± standard deviation

* Statistically significant (P-value < 0.05)

- The mean difference of percentage glenoid defect change between 6 and 12 months is significant between without SSE VS Type II, without SSE VS Type III, and Type II VS Type III (-3.35 ± 0.78 (P < 0.0001), -8.09 ± 1.20 (P < 0.0001), and -4.74 ± 1.25 (P = 0.001), respectively).

RESULTS

- The recurrence rate of instability at minimal 2 years follows up in between groups is not related to that between the groups without SSE and SSE (6.74% (6/89) and 4.42% (5/113), respectively (P = 0.52)).

CONCLUSION

- In terms of morphologic glenoid change at 6 to 12 months, Type I of the SSE classification has the potential for positive glenoid morphology change, similarly to those without the SSE group.

- The SSE influences the progression of glenoid erosion in both Type II and III. Although, the SSE group and those without SSE are not related to the increasing rate of shoulder instability.

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