Clinical and Radiographic Outcomes of Scapholunate Ligament Tear Reconstruction Techniques: A Systematic Review and Meta-Analysis

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BACKGROUND

- Injury to the scapholunate (SL) interosseous ligament is one of the most common causes of carpal instability.
- Despite various treatment algorithms that consider stage of injury, extent of damage to secondary ligament stabilizers and arthritic changes[1], there is no consensus on the optimal technique for surgical management of SL instability.
- A systematic review and meta-analysis was conducted to comparatively review the available evidence of clinical and radiographic outcomes among 3 major technique groups (capsulodesis, tenodesis, and bone-tissue-bone reconstruction) (table 1) in order to better guide management of SL ligament injuries.

METHODS

- 1,172 patients from 42 studies were assessed (Figure 1), for which standardized data extraction and analysis was performed.
- The heterogeneity of patient-reported outcome measures necessitated a modified classification system to group results into categories comparable across studies.
- Weighted means were used to do comparisons for continuous variables using a generalized linear model, and number of events was used to do comparisons for categorical variables using a binomial distribution.

Table 1. Surgical procedures included under each technique category

Capsulodesis	Tenodesis	Bone-tissue-bone
Mayo capsulodesis	Brunelli tenodesis	Iliac crest (periosteal flap) graft
Blatt capsulodesis	Van den Abbeele modification of Brunelli tenodesis	Capitohamate ligament graft
Berger capsulodesis	Garcia-Elias 3-ligament tenodesis	Trapezoid to 2nd metacarpal graft
Viegas capsulodesis	Scapholunotriquetral tenodesis	Capitate to trapezoid ligament graft
Dorsal intercarpal ligament capsulodesis	Quadligament tenodesis	
Lavernia capsulodesis + primary SLIL repair	Almquist 4-bone tendon weave	
Mathoulin arthroscopic dorsal capsulodesis	Combined dorsal and palmar SLIL reconstruction	

RESULTS

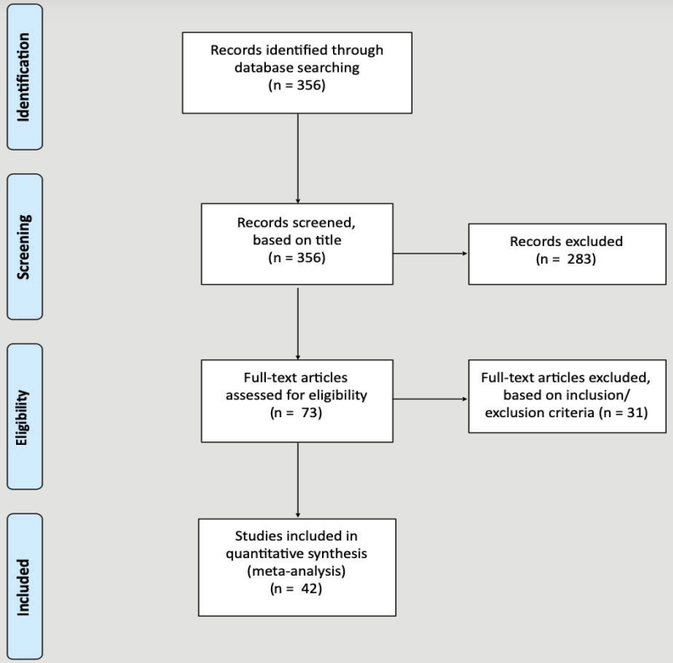

Figure 1. Flowchart of literature search and study selection process.

Table 2. Comparison of Patient-Reported Outcome Measures Across Techniques.

	DASH, QuickDASH	PRWE	MWS, MMWS
Capsulodesis	24.4 (20.7 - 28.2)	25.6 (21.8 - 29.3)	70.4 (65.0 - 75.8)
Tenodesis	19.4 (9.7 - 29.2)	37.8 (1.9 - 73.6)	77.3 (65.1 - 89.5)
Bone-tissue-bone	9.7 (4.3 - 15.2)	16.3 (10.4 - 22.2)	70.9 (61.8 - 80.0)

Note. DASH = Disabilities of the Arm, Shoulder and Hand, PRWE = Patient-Rated Wrist Evaluation, MWS = Mayo Wrist Score, MMWS = Modified Mayo Wrist Score

RESULTS CONT.

- VAS (Visual Analog Scale) score for postoperative pain was lowest in the bone-tissue-bone group at a mean of 0.9 (P = 0.0360).
- Bone-tissue-bone reconstruction had the highest percentage of “excellent” functional outcomes at 64.5% (P < 0.0001).
- DASH/QuickDASH score was best in bone-tissue-bone patients at a mean of 9.7 (P < 0.0001), while PRWE score was best in tenodesis patients at a mean of 37.8 (P = 0.0255).
- There were no statistically significant differences in grip strength, range of motion, or SL gap and SL angle among the 3 surgical techniques.

Table 3. Comparison of Categorized Patient-Reported Outcomes Across Techniques.

	Excellent	Good	Fair	Poor	Total
Capsulodesis	41 (12.32 %)	84 (27.36%)	145 (39.09%)	50 (15.48%)	320
Tenodesis	75 (28.14%)	86 (36.48%)	56 (21.02%)	19 (7.68%)	236
Bone-tissue-bone	20 (64.52%)	9 (29.03%)	3 (9.68%)	0 (0.00%)	32
Total	136	179	204	69	588

CONCLUSIONS

- Existing data demonstrates some benefit of bone-tissue-bone reconstruction over capsulodesis and tenodesis in pain reduction and functional improvement of the injured wrist.
- No significant differences among radiographic outcomes could be ascertained, possibly due to the heterogeneity of procedures and insufficient preoperative results reported which prevented analysis of differences between mean preoperative and postoperative values.
- This review provides a reference for future studies as well as highlights the need for higher-quality multi-center trials with longer-term follow-up and more standardized outcome measures.

REFERENCES

1. Kuo, C. E., & Wolfe, S. W. (2008). Scapholunate instability: current concepts in diagnosis and management. The Journal of Hand Surgery, 33(6), 998–1013.