Clinical Outcomes Following Use of Proximal Hamate Reconstruction for Proximal Pole Scaphoid Non-unions: A Case Series

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INTRODUCTION: Proximal hamate osteochondral autograft for reconstruction of proximal scaphoid fracture nonunion can lead to union and satisfactory patient-reported outcomes (PROs) and improved range of motion (ROM).

METHODS: A retrospective review identified patients treated with this surgery from two institutions with a minimum 6-month follow-up. Primary clinical outcomes included: duration of nonunion prior to surgery, wrist and forearm ROM, time to radiographic union, and PROs. Descriptive statistics were performed to report mean, range, and standard error for patient demographics, mechanism of injury, functional outcomes of the PRO surveys, and follow-up timeframe

RESULTS SECTION: Four patients were included with a mean age of 24 years old (75% male). All injured their non-dominant hand. The mean interval from nonunion presentation to reconstruction was 3.9 years (range, 0.6-9). Two patients had a failed prior surgical intervention at an outside hospital. All achieved radiographic union by 12 weeks. The average ROM achieved on flexion/extension and supination/pronation was 67.5% and 100%, respectively, as compared to the contralateral side at the final follow-up. The mean Disabilities of the Arm, Shoulder, and Hand (*Quick*DASH) score was 17.6 (SD, 13). No complications were identified (Table 1 and Figure 1).

DISCUSSION: This surgical technique allows minimal donor site morbidity, no additional incisions with no significant risk of adverse events, a sizeable graft that can be rigidly fixed to the scaphoid, no need for microvascular technique, and the harvest of the stout volar capitohamate ligament to repair the dorsal aspect of the scapholunate ligament. All cases achieved a union of the proximal scaphoid pole reconstruction with proximal hamate osteochondral autograft. Motion achieved 67% of the contralateral side in flexion/extension. PRO demonstrated minimal disability with no reported complications or secondary procedures at a 12.8-month average follow-up. The primary limitations of this study include its retrospective design, small sample size, and relatively short-term follow-up limiting the investigation's ability to comment on maintenance of carpal alignment, development of arthrosis, and potential sequelae relating to donor site harvest/morbidity. Future prospective studies with standardized outcomes measurements may improve a critical understanding of the true incidence of complications related to proximal hamate harvest and to graft incorporation, particularly relating to potential radioscaphoid arthritic changes, development of ulnar-sided pathology following excision of the hamate proximal pole, and need for secondary procedures.

SIGNIFICANCE/CLINICAL RELEVANCE: All cases achieved a union of the proximal scaphoid pole reconstruction with proximal hamate osteochondral autograft. This surgical technique allows a sizeable local graft that anatomically resembles the proximal scaphoid pole and can be rigidly fixed to the scaphoid.

REFERENCES:

1. Elhassan B, Noureldin M, Kakar S. Proximal Scaphoid Pole Reconstruction Utilizing Ipsilateral Proximal Hamate Autograft. *Hand*. 2016;11:4. p 495-499.
2. Saruhan S, Savran A, Yıldız M, et al. Reconstruction of proximal pole scaphoid non-union with avascular necrosis using proximal hamate: A four-case series. *Hand Surg Rehabil*. 2021;40:6. p 744-748.

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IMAGES AND TABLES:

Table 1. Current study demographics and outcomes.

Case	Age/Sex (M/F)	Non-union time at presentation (months)	Type of fixation	Size of hamate graft (length x width mm)	Supplementary fixation	SL recon/repair	Radiographic union and time to union (weeks)	Latest clinical follow up	ROM affected wrist F/E/S/P (at latest follow up)	ROM at latest follow up F+E/S+P (%)	VAS Last 24 hours/Rest/ active	SF12, PCS/MCS	QDASH	Preoperative SLA/CLA/RLA	Postoperative SLA/CLA/RLA
1	18/M	12	Cannulated screw x2	8.7 x 7.6	CL and SC K-wire transfixation for 6 weeks	Repair	yes, 12	11 months	65/57/80/80	74/100	0/0/20	29.1/62.1	29.5	85/17/32	60/15/30
2	35/M	108	Cannulated screw x2	10.6 x 9	CL K-wire transfixation for 6 weeks	Repair and suture anchor x1	yes, 10	6 months	45/50/80/80	63/100	3/1/4	38.4/60.3	27.3	55/15/12	50/12/5
3	20/M	8	Cannulated screw x2	10.6 x 8.8	CL K-wire transfixation for 12 weeks	Repair and suture anchor x2	yes, 12	14 months	60/63/80/80	71/100	0/0/0	47.5/47.9	11.4	85/17/37	65/15/30
4	23/F	60	Cannulated screw x1 and K-wire x 1	8 x 6.7	SC and SL K-wire transfixation for 12 weeks	Repair and capsulodesis	yes, 12	20 months	40/50/85/80	62/100	0/0/0	50.9/55	2.3	87/25/20	65/15/17

Figure 1. A-B) Preoperative and C-D) postoperative anteroposterior and lateral X-rays of all cases 1 through 4 from top to bottom row. Case # 4, has the lateral preoperative x-ray view missing.

Table 1. Note: M, male; F, female; R, right; L, left; K, Kirschner; CL, capitolunate; SC, scaphocapitate; SL, scapholunate; ROM, range of motion; F, flexion; E, extension; S, supination; P, pronation; VAS, visual analog scale; SF-12, 12-item short-form survey; PCS, physical component score; MCS, mental component score; *Q*DASH, Quick Disabilities of the Arm, Shoulder, and Hand score; SLA, scapholunate angle; CLA, capitolunate angle; RLA, radiolunate; mm, millimeters; UTA, unable to assess due to lack of computed tomography.