

Outcomes of Hemi-Hamate Arthroplasty for Proximal Interphalangeal Joint Reconstruction

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INTRODUCTION:

Dorsal fracture-dislocation at the proximal interphalangeal (PIP) joint is common and may result in lasting pain and stiffness. If repair is not possible, reconstruction in the form hemi-hamate arthroplasty (HHA) is a viable alternative option. This technique has become popularized over the last decade, however, outcome studies are limited. We report on outcomes of a large series of patients who underwent hemi-hamate arthroplasty for acute and chronic PIP joint fracture-dislocations.

METHODS:

A patient list of those who underwent hemi-hamate arthroplasty was generated over eight-year period from two fellowship trained orthopaedic surgeons at single institution. Primary outcome measures evaluated are postoperative PIP joint range of motion and patient-reported outcomes including VAS pain and DASH scores. Secondary outcomes included complications and need for revision surgery. Statistical analysis including averages, proportions and two sample independent t-Tests were performed. Subgroup analyses were performed between primary and secondary hemi-hamate arthroplasty groups. Logistic regressions were also performed to identify correlations between range of motion and gender, smoking status, small finger versus all other digits, and acute versus chronic injuries (6 weeks).

RESULTS:

Thirty-eight patients were included in the study over a twelve-year period. The ring finger was the most commonly involved digit. Preoperative motion of PIP joint averaged 14.7 degrees of extension to 26.7 degrees of flexion. Postoperative PIP range of motion on average was 78.5 degrees in flexion (n=38, range 25-100 degrees) and 22.7 degrees in extension (n=38, range 0-60 degrees). Distal interphalangeal (DIP) flexion improved by 29-degrees postoperatively (23.3 degrees preoperative vs. 51.8 degrees postoperative) (Table 1). Grip strength in the operative side was 80% that of the contralateral hand at time of final follow up. Follow up averaged 8.2 months (range: 2 months – 3 years).

Three patients underwent prior surgery before HHA in the form of open reduction internal fixation or volar plate arthroplasty. Subgroup analysis demonstrated primary HHA postoperative arc to be 21.3 degrees extension to 80 degrees flexion. Those that underwent HHA as a secondary procedure demonstrated postoperative extension and flexion to be 29.7 and 65 degrees, respectively (p=0.12 and p=0.27, respectively) (Table 2).

VAS pain scores were obtained and improved by 3 points (4.5 points preoperative vs. 1.5 points postoperative, p<0.01). Furthermore, DASH scores improved 22.5 points postoperatively (37.5 points preoperative vs. 15 points postoperative, p<0.01). Logistic regression analysis did not demonstrate any correlation between tested variables. Joint stiffness was most frequently reported following the procedure, and seven of 38 (18%) underwent tenolysis. There was minimal morbidity at the hemi-hamate harvest site and there were no cases of joint instability or hardware failure. Two patients demonstrated graft collapse/resorption, although, no patients required revision surgery.

DISCUSSION AND CONCLUSION:

Hemi-hamate arthroplasty leads to functional PIP range of motion and improvement in patient-reported outcome scores. Those that undergo HHA as a secondary procedure may experience diminished terminal motion postoperatively. Complications are minor and persistent joint instability is uncommon. Hemi-hamate arthroplasty is a viable, reproducible option with good outcomes for acute and chronic dorsal PIP joint fracture-dislocations.

Table 1: Perioperative Range of Motion for Total Study Population

	Average Preoperative Value	Average Postoperative Value	Average Perioperative Change	P-Value
PIP Extension (degrees)	14.7 (n=25) (0-50)	22.7 (n=38) (0-60)	7.9	0.08
PIP Flexion (degrees)	26.7 (n=24) (0-71)	78.5 (n=38) (25-100)	51.8	>0.01*
DIP Extension (degrees)	2.9 (n=23) (0-30)	3.3 (n=38) (0-40)	0.4	0.77
DIP Flexion (degrees)	23.3 (n=25) (0-55)	51.8 (n=38) (20-90)	28.5	>0.01*

* indicates statistical significance

Table 2: Perioperative Range of Motion for Subgroups

	Total Population Average Value	Primary Group Average Value	Secondary Group Average Value	P-value Primary-Salvage
Preoperative PIP Extension (degrees)	14.7 (n=25) (0-50)	14.1 (n=25) (0-39)	16.7 (n=3) (0-50)	0.53
Preoperative PIP Flexion (degrees)	26.7 (n=24) (0-71)	28.5 (n=24) (0-71)	36.8 (n=3) (0-70)	0.13
Preoperative DIP Extension (degrees)	2.9 (n=23) (0-30)	3.2 (n=23) (0-25)	16.7 (n=3) (5-30)	0.78
Preoperative DIP Flexion (degrees)	23.3 (n=25) (0-55)	23.8 (n=25) (0-55)	43.3 (n=3) (15-90)	0.23
Postoperative PIP Extension (degrees)	22.7 (n=38) (0-60)	21.3 (n=36) (0-60)	29.7 (n=3) (14-50)	0.12
Postoperative PIP Flexion (degrees)	78.5 (n=38) (25-100)	80.0 (n=36) (25-100)	65.0 (n=3) (30-85)	0.27
Postoperative DIP Extension (degrees)	3.3 (n=38) (0-40)	2.6 (n=36) (0-20)	13.33 (n=3) (0-40)	0.43
Postoperative DIP Flexion (degrees)	51.8 (n=38) (20-90)	56.5 (n=36) (20-90)	56.0 (n=3) (45-70)	0.90