Analysis of functional outcomes following the use of hemi-hamate arthroplasty for the management of chronic proximal interphalangeal joint fracture dislocations

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INTRODUCTION:
Chronic fracture-dislocations involving the proximal interphalangeal (PIP) joint are challenging cases. We conducted this study to analyze the outcomes following hemi-hamate autograft reconstruction of such injuries and to compare our results with the existing literature

METHODS:
A retrospective analysis of 21 patients with chronic dorsal PIP fracture-dislocations that were managed with hemi-hamate autograft reconstruction was done. The average articular surface involvement was 64%. The average duration between injury and surgery was 9.4 weeks (range, 6 to 16). Quick DASH (Disabilities of Shoulder and Hand) scores, VAS (Visual Analog Scale) scores, range of motion of the PIP joints, DIP (distal interphalangeal) joints, and MCP (metacarpophalangeal) joints were measured during serial follow-up visits.
RESULTS:
Union and graft incorporation was seen in all cases. The average Quick DASH score at four weeks post-surgery was 66 and it improved to eight at one year (p-value<0.05). The average VAS score at four weeks post-surgery was 7.66 and it improved to 2.09 at one year (p-value<0.05).
The average VAS score at four weeks post-surgery was 7.66 and it improved to 2.09 at one year (p-value<0.05). The mean flexion of the MCP joint improved from 52.8° at the end of four weeks to 72.38° at one year (p-value<0.05). The average flexion at the PIP joint improved from 10.47° at the end of four weeks to 70.47° at one year (p- value<0.05). The average DIP flexion improved from 38.33° at the end of four weeks to 62.38° at one year (p-value<0.05). The average hand grip strength was 85% of the normal side.
DISCUSSION AND CONCLUSION:
PIP joint fracture-dislocations are challenging cases, the ideal treatment for which includes restoration of the joint congruity and early re-establishment of the range of motion. Surgical options including ORIF, VPA, and external fixation have been tried for the management of dorsal PIP fracture-dislocations of higher grades, but hemi-hamate arthroplasty is more advantageous for managing this difficult fracture pattern. VPA is usually successful when the fracture-dislocation involves less than 50% of the articular surface with the redislocation risk increasing when more than 50% of the articular surface is involved. Moreover, as the outcome is poorer when injuries more than six weeks old are dealt with VPA,hemi-hamate arthroplasty is the preferred modality for the management of chronic PIP joint fracture-dislocations. ORIF is difficult in the case of articular comminution. The present study evaluated the functional outcomes of hemi-hamate arthroplasty when used for the management of chronic PIP joint fracture-dislocations.
Wilson and Rowland introduced a method of reducing these fractures by open techniques followed by internal fixation. In their series of 15 patients, an average of 74° of range of motion at the PIP joint was seen. Ishida et al. introduced a technique of osteochondral grafting for restoring the damaged PIP joint. However, it was associated with only a moderate improvement in the range of motion. The use of a hemi-hamate autograft obtained from the distal aspect of the hamate for the reconstruction of these injuries was described in a series of five patients by Hastings et al. The mean articular involvement in this series was 73% and the arc of motion of the PIP joint was 77°. The grip strength was 81% as compared to the uninjured side with union seen in all cases. In a study involving 56 PIP fracture-dislocations that were managed surgically, redislocation was seen in six cases of which three were managed with ORIF and three with VPA. Another review concluded that ORIF was best for fractures with simple patterns because the range of motion of the PIP joint decreased as the number of involved fracture fragments increased. Williams et al. stated that reattaching the volar plate along with hemi-hamate arthroplasty was recommended as it acted as an additional stabilizer. They also concluded that this procedure was technically challenging and should be initially practiced in cadavers because of its learning curve.
The hamate cannot guarantee complete restoration of the articular surface and thus the aim of surgery should be the restoration of the volar buttress. Although complete restoration of the preoperative range of motion is difficult, HHA can lead to restoration of motion that would not lead to any limitation in performing activities of daily living. The findings of our study were comparable to previously described studies. The highlight of the study was that all the cases managed were chronic injuries. There are not many studies focusing exclusively on chronic PIP joint injuries. As this study was conducted during COVID-19, most of the patients were not able to seek timely treatment due to the imposed re- strictions, thereby leading to a delay in presentation. Limitations of our study included the retrospective nature, smaller sample size,

and the comparatively lesser duration of follow-up. Attrition was a major problem due to the COVID-19 pandemic restrictions and hence, the follow-up duration was lesser.

Hemi-hamate arthroplasty is a very good technique for the management of chronic PIP fracture-dislocations involving more than 50% of the articular surface. Although the technique has a longer learning curve, it is associated with favorable outcomes when performed well and when coupled with supervised dedicated physiotherapy as part of the post-operative protocol.