ORIGINAL RESEARCH PAPER
Volume - 10 | Issue - 08 | August - 2021 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

MORPHOMETRIC STUDY OF HAMATE BONE AND ITS SURGICAL IMPLICATIONS

Anatomy

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ABSTRACT

INTRODUCTION: The hamate bone (unciform bone) may be readily distinguished by its wedge-shaped form, and the hook-like process which projects from its volar surface. It is situated at the medial and lower angle of the carpus, with its base downward, resting on the fourth and fifth metacarpal bones, and its apex directed upward and lateral ward. The superior surface, the apex of the wedge, is narrow, convex, smooth, and articulates with the lunate. The inferior surface articulates with the fourth and fifth metacarpal bones, by concave facets which are separated by a ridge. The dorsal surface is triangular and rough for ligamentous attachment. The volar surface presents, at its lower and ulnar side, a curved, hook-like process, the hamulus, directed forward and lateral ward. This process gives attachment, by its apex, to the transverse carpal ligament and the Flexor carpi ulnaris; by its medial surface to the Flexor brevis and Opponens digiti quinti; its lateral side is grooved for the passage of the Flexor tendons into the palm of the hand. It is one of the four eminences on the front of the carpus to which the transverse carpal ligament of the wrist is attached; the others being the pisiform medially, the oblique ridge of the trapezium and the tubercle of the scaphoid laterally. The medial surface articulates with the triquetrum by an oblong facet, cut obliquely from above, downward and medialward. The lateral surface articulates with the capitate by its upper and posterior part, the remaining portion being rough, for the attachment of ligaments. The hamate articulates with five bones: the lunate proximally, the fourth and fifth metacarpals distally, the triquetrum medially, the capitate laterally. All hamate hooks had vascular foramen on them. These foramina were found predominantly on the radial base and ulnar tip of the hook of the hamate.

AIM AND OBJECTIVE: To assess gross morphological features with special emphasis on the dimensions and configurations of articular surface.

METHODOLOGY: This study was done on 50 capitate bones (25 left side and 25 right side) in Department of Anatomy of Osmania medical college and other medical colleges of Telangana region. The Hamate bone with visible trauma, pathology and fractures were excluded from study. During this study the parameters of Hamate which were measured are the length and- width of facet in proximal surface, nutrient foramina at radial base of hook of hamate, length of distal palmar angle, height of hook of hamate, circumference of hook were observed results were analysed and compared to previous studies.

RESULTS: The mean length of facet in proximal surface on right side is 18.2 and on left side is 18.1, width of facet in proximal surface on right side is 14.12 and on left side is 14.22, height of hamate hook on right side is 10.16 and on left side is 10.46, circumference of hook of hamate at the base on right side is 24.62 and on left side is 26.34,length of distal palmar angle on lateral surface on right side is 5.21 and on left side is 5.22,Width of facet on proximal surface on right side is 4.42 and on left side 4.52 and length of facet on proximal surface on right side is 5.07 and on left side 5.21.no vascular foramens were present on the bend of hook of hamate in present study,maximum were present at the radial base.

CONCLUSION: Hamate bone is most commonly injuried and fractured in baseball players, golfers and hockey players. It is usually associated with hairline fractures .Due to its relation to ulnar nerve causes tingling and numbness over medial one and half of digits. A detailed morphometric study of hamate will be helpful orthopaedic surgeons in wrist surgeries.

KEYWORDS

Hamate, Nutrient Foramen, Hook of Hamate.

INTRODUCTION:

Wrist injuries are common in any sport because of the complexity of the joint. Hamate is most commonly injuried in golfers, baseball players and hockey players.The hamate bone (unciform bone) may be readily distinguished by its wedge-shaped form, and the hook-like process which projects from its volar surface. It is situated at the medial and lower angle of the carpus, with its base downward, resting on the fourth and fifth metacarpal bones, and its apex directed upward and lateral ward. The superior surface, the apex of the wedge, is narrow, convex, smooth, and articulates with the lunate. The inferior surface articulates with the fourth and fifth metacarpal bones, by concave facets which are separated by a ridge. The dorsal surface is triangular and rough for ligamentous attachment. The volar surface presents, at its lower and ulnar side, a curved, hook-like process, the hamulus, directed forward and lateral ward. This process gives attachment, by its apex, to the transverse carpal ligament and the Flexor carpi ulnaris; by its medial surface to the Flexor brevis and Opponens digiti quinti; its lateral side is grooved for the passage of the Flexor tendons into the palm of the hand. It is one of the four eminences on the front of the carpus to which the transverse carpal ligament of the wrist is attached; the others being the pisiform medially, the oblique ridge of the trapezium and the tubercle of the scaphoid laterally. The medial surface articulates with the triquetrum by an oblong facet, cut obliquely from above, downward and medialward. The lateral surface articulates with the capitate by its upper and posterior part, the remaining portion being rough, for the attachment of ligaments. The hamate articulates with five bones: the lunate proximally, the fourth and fifth metacarpals distally, the triquetrum medially, the capitate laterally. All hamate hooks had vascular foramen on them. These foramina were found predominantly on the radial base and ulnar tip of the hook of the hamate.

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DISCUSSION:

Circumference of Hamate hook: It was measured by winding a thread around the hook of the hamate bone at the base. A point was marked on the thread using the permanent marker, this thread was then placed on plain paper and dimension measured with a digital vernier calliper.

Height of hook of hamate: It was measured by directly using digital vernier from base to tip.

Length of distal palmar angle on lateral surface: The distal palmar angle on the lateral surface was identified and its length was measured vernier callipers**.**

FIG :1

RESULTS:

The mean length of facet in proximal surface on right side is 18.2 and on left side is 18.1, width of facet in proximal surface on right side is 14.12 and on left side is 14.22, height of hamate hook on right side is 10.16 and on left side is 10.46, circumference of hook of hamate at the base on right side is 24.62 and on left side is 26.34,length of distal palmar angle on lateral surface on right side is 5.21 and on left side is 5.22,Width of facet on proximal surface on right side is 4.42 and on left side 4.52 and length of facet on proximal surface on right side is 5.07 and on left side 5.21.no vascular foramens were present on the bend of hook of hamate in present study, maximum were present at the radial base.

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REFERENCES:

1. Ripujit Randhawa, Ravikant Sharma, JS Kullar, Gaurav Agnihotri. The Distal Row Carpal Bones - A Morphometric Treatise.
2. Arsic S, Vitkovic N, Manic M, Stojanovic M. Morphological Properties of the Hand Bones Important for their 3D Geometrical Modelling. ICT Forum 2014;130.
3. Prabhu L, Murlimanju B, Jiji P, Pai M. Vascular Foramina of the Capitate Bone of the Hand – an Anatomical Study World Academy of Science, Engineering and Technology International Journal of Medical and Health Sciences 2015;2:8
4. De Lange A, Kauer JM, and Huiskes R. Kinematic Behavior of the Human Wrist Joint: A Roentgen-Stereophotogrammetric Analysis. J. Orthop. Res. 1985; 3(1):56–64.
5. Ruby LK, Cooney WP et al. Relative Motion of Selected Carpal Bones: A kinematic analysis of the normal wrist. J. Hand Surg. 1988;13(1):1–10.
6. Farago D and Kiss R M. Geometric and mechanical characterization of human carpal bones - A preliminary study. Periodica Polytechnica Civil Engineering.2020;64(1):138-43.
7. Goss BC, Agee J M. Dynamics of Intracarpal Tunnel Pressure in Patients with carpal tunnel syndrome. J. Hand Surg. Am. 2010;35(2):197–206.
8. Xiu KH, Kim JH, and Li ZM. Biomechanics of the transverse carpal arch under carpal Bone loading Clin. Biomech. 2010; 25(8): 776–80.
9. Garcia-Elias M, Sanchez-Freijo JM, Salo JM, and LluchA L. Dynamic changes of the transverse carpal arch during flexionextension of the wrist: Effects of Sectioning the Transverse Carpal Ligament. J. Hand Surg. 1992;17(6):1017–9.
10. Kuhlmann N, Tubiana R, and Lisfranc R. Contribution of Anatomy to the understanding of carpal tunnel compression syndromes and sequelae of decompression operations. Rev. Chir. Orthop. Reparatrice Appar. Mot. 1978;64(1): 59–70.
11. Flores LP, Cavalcante TF, Neto OR, and Alcantara FS. Quantitative analysis of the variation in angles of the carpal arch after open and endoscopic carpal tunnel release. Clinical Article. J. Neurosurg. 2009;111(2): 311–6.
12. Gartsman GM, Kovach JC, Crouch CC, Noble PC, and Bennett JB. Carpal arch alteration after carpal tunnel release. J. Hand Surg. 1986;11(3):372–4.