ARTHROSCOPIC AND MACROSCOPIC EVALUATION OF THE LUNATE MEDIAL FACET

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ABSTRACT

Objective: To evaluate the correlation between the presence of a lunate medial facet and the incidence of ligament lesions of the wrist and arthrosis of the proximal pole of the hamate. This study was carried out on cadavers. Methods: Arthroscopic evaluation and dissection were performed on cadaver wrists. Results: There was a clear, statistically significant correlation between arthrosis of the proximal pole of the hamate and the presence of a medial facet on the lunate. Conclusion: Arthrosis of the proximal pole of the hamate is correlated with the presence of a type II lunate. Level of Evidence III, Study of nonconsecutive patients; without consistently applied reference ''gold'' standard.

Keywords: Wrist joint. Osteoarthritis. Wrist injuries.

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INTRODUCTION

Interest in evaluating the prevalence of the lunate medial facet arose mainly after the study by Viegas et al.[1], who observed that the lunate may or may not present a medial articular facet that, when present, articulates with the hamate. The authors labeled the lunates that do not have the medial facet type I, and those with this facet, type II. Literature establishes prevalence of 44 to 73% of type II lunates.[1-4]

The association between the presence of this joint and the appearance of midcarpal arthrosis in some patients, was called the hamate-lunate impingement syndrome,[2] which is characterized by:

-Presence of an articulation between the lunate and the hamate, medial facet or hamate lunate facet (HLF);

-Cartilage erosion with exposure of the subchondral bone of the proximal pole of the hamate.

There are accounts of association of the hamate-lunate impingement syndrome with chronic lesions of ulnar carpal structures, mainly with lesion of the pyramidal-lunate interosseous ligament.[5] The aim of this study is to analyze the prevalence of the lunate medial facet and to correlate it with the presence of degenerative and ligamentous alterations in the wrist.

MATERIALS AND METHODS

Twenty cadaver wrists were obtained from the Coroner's Service (SVO) of the city of São Paulo, in the period between October 2004 and October 2005, and taken to the arthroscopy laboratory. The cadavers were analyzed from the census-related and anthropometric point of view: age, race, sex, weight, height and causa mortis. These data were compared at the end of the study. (Table 1).

Wrists of cadavers whose causa mortis compromised the wrist joint were excluded from this survey.

All the wrists were submitted to arthroscopic evaluation of the midcarpal and wrist joint, followed by anatomical dissection with macroscopic study.

The arthroscopic procedure was executed in conformity with the norms of the arthroscopy laboratory of IOT-HC-FMUSP, where the metacarpals and forearm bones are initially transfixed, in the transverse direction, by two 3.0 mm Steinmann wires. Then the wrists are fixed to the laboratory's standard distraction stabilizer in the vertical position.

Portals 3/4 and 4/5 were used to evaluate the wrist joint while the ulnar and radial midcarpal portals were used to evaluate the joint of the same name.

The anatomical dissection, using a magnifying glass, was intended to investigate the data obtained in the arthroscopy and to measure, in millimeters, the width of the lunate medial facet. The diameter of the head of the capitate, capitate length and presence of other carpal ligament lesions were also gauged.

The dorsal carpal ligaments were respected in opening the dorsal wrist capsule in order to avoid significant anatomical damage prior to the observation of the medial facet, as well as of the interosseous ligaments.

All the authors declare that there is no potential conflict of interest referring to this article.

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Table 1. *Census and anthropometric characteristics of the cadavers.*

Side	**Right** **11**	**Left** **09**		
Sex	Male 15	Female 05		
Age	Minimum – Maximum 41 – 87 years	Mean 65.2 years		
Height	Minimum – Maximum 1.50 – 1.90 m	Mean 1.71 m		
Weight	Minimum – Maximum 48 – 81 kg	Mean 61.2 kg		
Race	White 17	Black 01	Brown 01	Asian 01

Source: Coroner's Service of the City of Sao Paulo.

The data obtained were submitted to statistical analysis by Fisher's exact test for the exact variables and by the Mann-Whitney nonparametric test for the continuous variables.

RESULTS

Among the 20 wrists studied we observed the presence of 13 lunate medial facets, which indicates prevalence of 65%. (Table 2).

The size of the facets measured at the point of their maximum width ranged from 1 to 7mm with mean size of 3.84mm. The length of the capitate and the diameter of its head were also evaluated. As regards capitate length, the mean value found was 26mm (variation:22-31mm) and as regards diameter of the head of the capitate, we obtained the mean value of 14.8mm (variation:10-18mm).

In 38.5% of the wrists (5 wrists) with a type II lunate, we observed arthrosis of the proximal pole of the hamate, and of these, three wrists had concomitant arthrosis of the lunate medial facet. We did not observe any degenerative alteration of the proximal pole of the hamate in wrists with a type I lunate. (Table 2) Table 3 presents only data obtained in wrists with a type II lunate, divided into two groups according to the presence or absence of arthrosis in the proximal pole of the hamate.

Table 2. *Distribution of comparative data among wrists with type I and II lunates.*

	Type I lunate	**Type II lunate**
Prevalence	35%	65%
Mean age	71 years	64 years
Mean height	1.76m	1.71m
Mean weight	55kg	64.2kg
Associated lesion of the HIL	6 wrists (85%)	5 wrists (38,5%)
Associated lesion of the SIL	5 wrists (71%)	7 wrists (53,8%)
Associated lesion of the TFCC	5 wrists (71%)	4 wrists (30,8%)
Midcarpal synovitis	1 wrist (14%)	8 wrists (61,5%)
Capitate length	25.5mm	26.2mm
Diameter of the head of the capitate	16mm	14.2mm

HIL: hamate-lunate interosseous ligament. SIL: scapho-lunate interosseous ligament. TFCC: triangular fibrocartilage complex. Source: Arthroscopy laboratory.

Table 3. *Distribution of comparative data on wrists with type II lunate, with and without arthrosis of the proximal pole of the hamate.*

	Presence of arthrosis at the proximal pole of the hamate	**Absence of arthrosis at the proximal pole of the hamate**
Prevalence	38.5%	61.5%
Mean size of the lunate medial facet	3.8mm	3.87mm
Mean age	65.2 years	67 years
Mean height	1.68m	1.73m
Mean weight	66.4kg	59.4kg
Associated lesion of the HIL	1 wrist (20%)	4. wrists (50%)
Associated lesion of the SIL	3 wrists (60%)	4. wrists (50%)
Associated lesion of the TFCC	3 wrists (60%)	1 wrist (12.5%)
Midcarpal synovitis	3 wrists (60%)	5 wrists (62.5%)
Capitate length	27.2mm	25.6mm
Diameter of the head of the capitate	14.2mm	15mm

(HIL: hamate-lunate interosseous ligament. SIL: scapho-lunate interosseous ligament. TFCC: triangular fibrocartilage complex) Source: Arthroscopy laboratory.

Statistical analysis

The mean size of the head of the capitate of the patients with wrist classified as type 1 in dissection is 1.8 units larger than those categorized as type 2 (p=0.038). The relation between arthrosis of the proximal pole of the hamate and Type II lunate was statistically significant (p=0.007).

DISCUSSION

The importance of hamate-lunate impingement syndrome[2] lies in the differential diagnosis of pain at the ulnar edge of the wrist. The possible differential diagnoses include[6]:

- Pyramidal lunate instability
- Lesions of the triangular fibrocartilage complex
- Pathologies of the distal radio-ulnar joint
- Pisiform, hamate or lunate fractures
- Flexor carpi ulnaris and extensor carpi ulnaris tendinitis
- Dislocation of the extensor carpi ulnaris tendon
- Pyramidal-Pisiform arthritis
- Tumors.

Literature reports prevalence varying between 44 to 73% of type II lunate wrists[1-4]. (Figure 1)

In this study, the prevalence of 65% of the medial facet, besides being consistent with data from literature, closely resembles the data obtained exclusively by Viegas, the author who described the anatomical and biomechanical bases of the hamate-lunate impingement syndrome.[1,3,7]

We could not evaluate data on prevalence in race or sex due to the quantity of specimens studied, neither did we notice significant differences between mean weight and height between the groups. Due to the characteristics of this study, carried out on cadavers with high mean age, we should expect a high incidence of degenerative alterations in the wrists studied.

In our casuistry we did not observe any case of arthrosis of the proximal pole of the hamate in wrists with a type I lunate. This

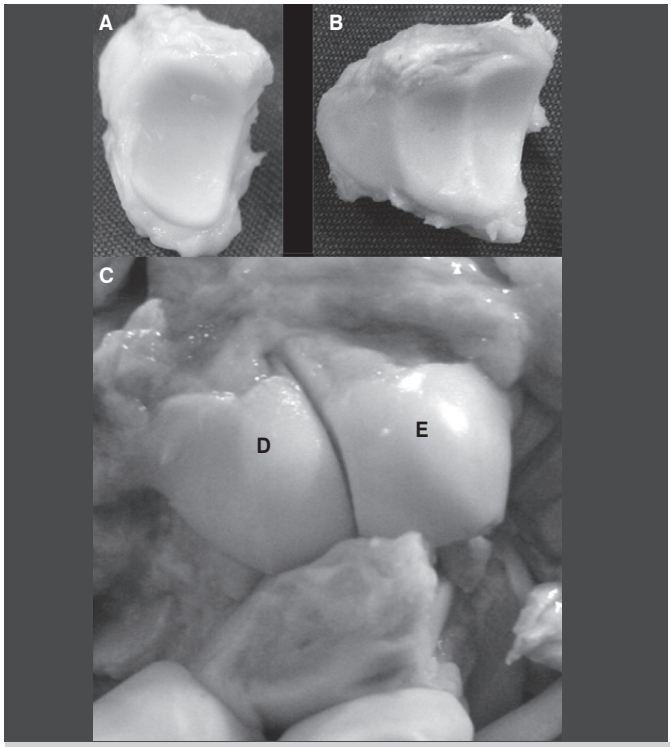

Figure 1. A) *Type I lunate.* B) *Type II lunate, with a view of the two articular facets, one for the capitate (R) and the other for the hamate (L).* C) *Type 2 lunate articulating with the capitate (R) and the hamate (L).*

Source: Arthroscopy laboratory.

data is in line with those obtained by Theumann and Resnik[4] who observe the presence of slight degenerative alterations in the proximal pole of the hamate in 27% of the wrists with a type I lunate. However, the same authors make the proviso that severe degenerative alterations of the proximal pole of the hamate were only observed in wrists with a type II lunate, particularly when the facets were larger than 3mm.

Dautel et al.[8] find representative degenerative lesions on the ulnar edge of the midcarpal joint in 22.8% of the type I lunates, dividing these lesions up among proximal pole of the hamate, helical surface of the hamate, head of the capitate and articular surface of the lunate. In all of these cases the author observed the presence of associated ligamentous lesions. In contrast, the wrists with a type II lunate presented an incidence of 30.2% of arthrosis, predominantly in the proximal pole of the hamate and often isolated, that is, without other associated lesions. It is worth emphasizing that in this study, Dautel et al.[8] retrospectively assess patients submitted to arthroscopies due to various causes such as: fractures of the distal radius, Kiemböck's disease, scaphoid pseudarthrosis and wrist instability. This diversity of pathologies could undoubtedly explain the degenerative processes found in wrists with type I lunates.

Some data from literature are similar to those found in our casuistry, including:

The apparent predominance of ligamentous lesions in wrists with a type I lunate (Table 2);

The percentage of arthrosis in the proximal pole of the hamate in wrists with a type II lunate, 30.2% against 38.5% in our study;

The possibility of non-visualization of the lunate medial facet, regardless of its size, perhaps because of its obliquity or important synovitis. In 3 cases we did not visualize the lunate medial facet arthroscopically, although it was present during the anatomical dissection.

Nakamura et al.[5] observe that the kinematics among these wrists is different, with the center of rotation of the wrist, in the head of the capitate, more proximal in wrists with a type II lunate. The data from our casuistry are fully consistent with this study, since we observed a tendency for the capitate to have a greater length and a smaller head diameter in wrists with a type II lunate, transferring the center of rotation to a more proximal position. (Table 2) This tendency is accentuated when we compare the data between wrists with a type II lunate with and without arthrosis in the proximal pole of the hamate. (Table 3)

CONCLUSION

The presence of the lunate facet articulate with the hamate, in our opinion, should not be called alteration on account of its high prevalence (65%), a fact that is consistent with literature.

Arthroscopy of the midcarpal joint is not able to guarantee the absence of the lunate medial facet, regardless of its size.

Isolated arthrosis of the proximal pole of the hamate is related to the presence of the lunate medial facet.

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