Available online at
ScienceDirect
www.sciencedirect.com
Elsevier Masson France
EM|consulte
www.em-consulte.com
Hand Surgery & Rehabilitation
Hand Surgery and Rehabilitation 35 (2016) 4–9

Original article

Isolated or predominant capitolunate osteoarthritis is the consequence of lunotriquetral dissociation. X-ray analysis of 22 consecutive cases

L'arthrose capito-lunaire isolée ou prédominante est la conséquence d'une dissociation luno-triquétrale. Analyse radiographique de 22 cas consécutifs

J. Brunet, G. Bacle, E. Marteau, F. Gadea, J. Laulan *

Unité de chirurgie de la main et du membre supérieur, Services de chirurgie orthopédique 1 et 2, Hôpital Trousseau, CHRU de Tours, avenue de la République, 37170 Chambray-lès-Tours, France

Received 2 April 2015; received in revised form 1st September 2015; accepted 22 September 2015

Abstract

Secondary osteoarthritis due to a scapholunate malalignment is well known, but is debatable in cases of lunotriquetral malalignment. It has been shown that lunotriquetral malalignment can lead to midcarpal osteoarthritis. The hypothesis of this retrospective study was that a relationship exists between the presence of midcarpal osteoarthritis and the presence of lunotriquetral malalignment. All patients with midcarpal osteoarthritis, isolated or predominant, treated between 1981 and 2013 were reviewed. Intracarpal angles were measured and the relative position of the carpal bones was analyzed by two examiners. Osteoarthritis of the wrist's joints was quantified in three stages. Diagnosis of static dissociative ligament lesion was made and correlated with the location of osteoarthritis. Twenty-two wrists in 20 patients (13 men and 7 women; mean age of 59 years) were included. The lunocapitate osteoarthritis was moderate in 6 cases and severe in 16 cases. The radioscaphoid osteoarthritis was moderate in 5 cases and severe in 1 case. Lunotriquetral malalignment was present in all cases; it was isolated in 8 cases and associated with scapholunate malalignment in 14 cases. In isolated lunotriquetral malalignment cases, midcarpal osteoarthritis was isolated or associated with degenerative lesions of lunotriquetral interval. Cases of perilunate instability in which the osteoarthritis is more severe in the midcarpal joint than in the radioscaphoid joint likely resulted from an injurying mechanism with ulnar beginning (ulnar-sided perilunate instability).

Keywords: Midcarpal osteoarthritis; Lunotriquetral instability; Scapholunate instability; Ulnar-sided perilunate instability; Floating lunate

Résumé

Si l'arthrose secondaire aux désaxations scapho-lunaires (SL) est bien connue, l'évolution des désaxations luno-triquétrales (LT) est moins définie. Il a été montré qu'une désaxation LT pouvait conduire à une arthrose médiocarpienne mais, réciproquement, celle-ci est-elle toujours secondaire à une désaxation LT ? L'hypothèse de cette étude rétrospective était qu'il existe une relation entre la présence d'une arthrose capito-lunaire et l'existence préalable d'une désaxation LT. Tous les patients ayant une arthrose médiocarpienne, capito-lunaire, isolée ou prédominante, pris en charge entre 1981 et 2013, ont été pris en compte. Les valeurs angulaires intracarpiennes ont été mesurées et la position relative des os du carpe a été analysée par deux examinateurs. L'arthrose des interlignes du poignet a été quantifiée en trois stades. Le diagnostic de lésion ligamentaire dissociative statique a été posé et corrélé à la localisation de l'arthrose. Vingt-deux poignets chez 20 patients (13 hommes et 7 femmes, de 59 ans d'âge moyen) ont été inclus. L'arthrose capito-lunaire était modérée dans 6 cas et importante dans 16 cas. Une arthrose radio-scaphoïdienne était associée dans 4 cas. Il existait une désaxation LT certaine dans tous les cas, isolée dans 8 cas et associée à une désaxation scapho-lunaire dans 14 cas. Une arthrose MC isolée ou prédominante était toujours associée à la présence d'une désaxation LT. Les instabilités périlunaires dans lesquelles l'arthrose médiocarpienne est plus

* Corresponding author.
E-mail addresses: jacky.laulan@wanadoo.fr, j.laulan@trousseau.chu-tours.fr (J. Laulan).

http://dx.doi.org/10.1016/j.hansur.2015.09.003

évoluée que celle de la radio-scaphoïdienne pourraient résulter d'un mécanisme lésionnel à début ulnaire. Les désaxations LT doivent être diagnostiquées et traitées au même titre que les SL.

Mots clés : Arthrose médiocarpienne ; Instabilité luno-triquétrale ; Instabilité scapho-lunaire ; Instabilité périlunaire ; Lunatum flottant

1. Introduction

Midcarpal (MC) osteoarthritis is usually the last stage of osteoarthritis secondary to scapholunate (SL) dissociation or scaphoid nonunion [1–3]. To the best of our knowledge, isolated MC osteoarthritis—except in the scaphotrapeziotrapezoid (STT) joint—has not been specifically investigated. Only Katayama et al. have analyzed osteoarthritis in the ulnar aspect of the wrist, but not specifically in the MC joint [4]. Degenerative involvement of the MC joint is more often attributed to wrist morphology [5] than to lunotriquetral (LT) dissociation. Progression of LT dissociation toward MC osteoarthritis has rarely been reported [6–8]. Primary non-surgical treatment of LT ligament injuries is commonly recommended [9].

Carpal instability results from ligament and/or bone lesions altering the normal relationships between carpal bones [10,11]. SL and LT instability are dissociative instabilities of the proximal row [12]. It has been suggested that some perilunate lesions may be spontaneously reduced dislocations or fracture–dislocations, or may have been the result of an injury mechanism that stopped just before dislocation occurs [13–16]. The presence of both SL and LT dissociative perilunate (PL) injury was recently described under the name of ''floating lunate'' [17]. Depending on the injury mechanism, more damage can occur on the medial or lateral sides [16].

In 1980, Mayfield et al. described a PL injury mechanism in a cadaveric experimental model that is still accepted by most surgeons [18]. Applying a palmar force to the thenar eminence induces a lateral lesion (SL dissociation or scaphoid fracture). This lesion may be isolated (stage I), or associated with LT lesions when the injury mechanism progresses by intracarpal supination toward the ulnar side (stage III). Some publications have brought up the possibility of a reverse mechanism with an ulnar starting point: so-called ulnar-sided perilunate instability [6,19–23]. In this case, LT ligament injuries may be isolated or may be more significant than the SL lesions when the lesion has progressed by intracarpal pronation toward the radial side [2,15].

Osteoarthritis secondary to dissociative instability is linked to permanent carpal misalignment called ''static instability'' [2]. Diagnosis can be established on simple plain radiographs [24,25]. SL injuries and their sequelae are well known; SL instability is the most common form of instability of the carpus [24,26], or at the least the most commonly diagnosed form [2,12,24]. In 1984, Watson and Ballet [1] reported that SL instability was the most common cause of wrist osteoarthritis and introduced the concept of ''scapholunate advanced collapse'' or ''SLAC wrist''. Although osteoarthritis secondary to SL instability is well known, it is rarely considered or reported in cases of LT instability [8,9] and, according to certain authors, mainly involves the LT joint [27].

After PL dislocations or distal radius fractures, persistent LT misalignment was associated with onset of symptomatic MC osteoarthritis at 4.3 and 9.4 years' follow-up, respectively [6,7]. However, as MC osteoarthritis mainly involves the lunocapitate (LC) joint, a question remains as to whether it is systematically secondary to LT misalignment. Therefore, we felt it was relevant to analyze the radiographs of cases of isolated or predominant MC osteoarthritis. The hypothesis of this retrospective study was that MC osteoarthritis correlates with prior LT dissociation.

2. Patients and methods

All patients treated at our hospital between 1981 and 2013 for isolated or predominant MC osteoarthritis involving the CL joint were eligible for this study. Exclusion criteria were: isolated STT osteoarthritis, previous PL dislocation, Kienböck disease, inflammatory or metabolic origin, and lack of appropriate AP and lateral radiographs. Age, sex, affected side, history of trauma and date, circumstances of the MC osteoarthritis diagnosis, and any wrist clunk were noted.

Radiographs were jointly analyzed by two examiners. Wrist morphology was classified in two types depending on the presence (type 2) or absence (type 1) of an articular surface (facet) between the lunate and hamate bones [5,28]. Radiographs were also analyzed for the following parameters: joint space width and parallelism [especially in the SL, LT and radioscaphoid (RS) joints] to look for possible dorsal subluxation of the proximal pole of the scaphoid; the relative positions of the three proximal row bones; and presence of step-off in the two proximal Gilula lines. Measurements of the radiolunate (RL), radioscaphoid (RS) and SL angles, and the distal radioulnar index were made using the criteria defined by Larsen et al. [29]. Based on the literature [30], the lunate's position was considered neutral if the RL angle was between -10° and $+12^{\circ}$. Carpal malalignment was diagnosed as dorsal intercalated segment instability (DISI) when below this range and as volar intercalated segment instability (VISI) when above it. The scaphoid was considered to be in flexion when the RS angle was greater than 65°. The triquetrum was considered to be in extension when, with the wrist well-positioned, it was in a distal or ''low'' position on the articular surface of the hamate.

Diagnosis of LT malalignment was based on the following criteria: visible signs of LT dissociation (extension of the triquetrum and concomitant flexion of the SL couple), abnormal LT joint space (widened or non-parallel), and/or presence of LT step-off in one of the two adjacent Gilula lines.