Isolated Lunocapitate Osteoarthritis—An Alternative Pattern of Osteoarthritis

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Abstract

Introduction Osteoarthritis (OA) in the wrist usually develops in a pattern described as scapholunate advanced collapse (SLAC). We observed an alternative pattern of OA that involves the lunocapitate joint in isolation with minimal involvement of the radio-scaphoid articulation.

Case Series The series was observed from a series of 100 wrist radiographs that were retrospectively reviewed. In order to characterize the alternative pattern of OA, we compared demographic data, presentation, and physical and radiographic examination characteristics between the patients with lunocapitate OA and SLAC wrists. Fifteen radiographs showed OA, nine had a SLAC pattern, and six had lunocapitate OA. The demographics were similar, but the clinical presentation was different. The patients with lunocapitate OA had less tenderness over the snuffbox ($P < 0.03$), and a lower percentage of a positive scaphoid shift test ($P < 0.005$). Isolated lunocapitate OA had a higher association with scaphotrapeziotrapezoidal (STT) arthritis ($P < 0.004$). The SLAC group had an increased scapholunate gap ($P = 0.0003$).

Discussion The presentation of lunocapitate OA differs from SLAC wrist in a number of ways. Further study is necessary to understand the clinical implications of this pattern.

Level IV evidence Case series

Keywords

- lunocapitate
- osteoarthritis
- pattern
- SLAC
- wrist

Osteoarthritis (OA) in the wrist that is secondary to chronic scapholunate instability usually develops in a predictable pattern, starting at the radial styloid–scaphoid joint and progressing to include the scaphocapitate joint and, finally, the lunocapitate joint.¹ This has been described as the scapholunate advanced collapse (SLAC) pattern of wrist osteoarthritis. The process in this pattern centers around the scaphoid, with periscaphoid osteoarthritis developing in the first stages of the degenerative process.

Recently, there have been some studies describing alternative patterns of osteoarthritic degeneration in the wrist. Lane et al

described a pattern of degeneration that included scapholunate dissociation with radiolunate arthritis and sparing of the radio-scaphoid joint space.² They found a total of 21 wrists in 17 patients with radiographic radiolunate arthritis without evidence of radial scaphoid narrowing despite some degree of scapholunate instability in most of these cases.² We observed a similar “alternative” pattern of OA that involves the lunocapitate joint but did not include the radioscapoid joint. The purpose of this study is to report the findings of patients with isolated lunocapitate OA and to emphasize the different clinical and radiographic presentation from patients with SLAC wrist.

Patients and Methods

The case series was observed during the performance of a separate study on a cohort of 100 standard wrist radiographic exams obtained consecutively in our hand clinic from January to March 2011. This cohort was retrospectively reviewed. To attempt to characterize the series, we will describe the cohort of radiographs from which it was observed.

Posteroanterior (PA), lateral, and oblique views of the wrist were included. Radiographic exams were excluded if they were of insufficient quality for evaluation or if the examination did not include all of these views. Also excluded were radiographs with radiographic evidence of an inflammatory process such as gout or rheumatoid arthritis, as well as acute fractures/dislocations that involved the wrist joints. We included all adult patients presenting to the hand clinic and sent for a wrist radiograph for any reason. The mean age of the patients was 61.3 ($\pm$ 14.5) years, with a normal distribution and a range of 24–89 years. Sixty-four patients were heavy laborers, 35 worked in office jobs, 1 was not working, and five did light manual work. Sixty-two percent of the radiographs were taken because of wrist pain; 21% had isolated ulnar-sided wrist pain, 29% isolated radial-sided wrist pain, and 12% had both radial and ulnar pain. Twelve percent of the patients had pain in the base of the thumb, 8% presented with wrist ganglia, 13% with trauma (distal radius fractures, crush injury, metacarpal fractures), and 9% had soft tissue injuries including tendon lacerations, insect bites and infection. Institutional review board (IRB) approval was obtained prior to the study commencement.

The radiographs were reviewed by an experienced hand surgeon who was masked to all clinical information. As stated, these radiographs were initially collected as part of another study. They were now further analyzed for radioscapoid, radioulnar, lunocapitate, and thumb carpometacarpal (CMC) joint OA. The definition of OA was narrowing of the joint space (less than 1 mm or smaller than the other spaces in the same radiograph) with or without subchondral sclerosis, osteophytes, and cystlike defects.³

The classification system used for the evaluation of STT joint OA is based on regular wrist radiographs.³ This classification system does not include an evaluation of the trapezio-

trapezoidal joint. It defines the stage by the highest stage regardless of joint (scaphotrapezial/scaphotrapezoidal) and regardless of the view (PA, lateral, or oblique) of the wrist joint. Stage 1 is defined as narrowing of the joint space compared with those of other intercarpal joints in the same radiograph (such as the lunotriquetral or lunocapitate joints), with or without periarticular sclerosis. Stage 2 is narrowing of the joint space compared with other intercarpal joints in the same radiograph with one or more of the following: periarticular sclerosis, cystlike lucencies, and osteophytes. Stage 3 is obliteration of the joint.

Radiocarpal OA was defined according to the SLAC classification by Watson and Ballet, which was subsequently modified to include a stage 4.⁴ Stage 1 includes OA between the scaphoid and the radial styloid. Stage 2 includes OA between the scaphoid and the scaphoid fossa, and stage 3 includes OA between the lunate and capitate bones. Stage 4 includes radiographs with radiolunate arthritis or “panarthritis.” Thumb carpometacarpal (CMC) joint OA was defined by the method of Eaton et al.⁵ The scapholunate gap was considered enlarged if it was greater than 2 mm. The distance between the scaphoid and lunate was measured at the level of the midjoint of the scapholunate joint from the ulnar cortex of the scaphoid to the radial cortex of the lunate. These measurements were performed directly on the films.⁶

Statistical Analysis

Comparisons were made between the patients with SLAC wrist and those with lunocapitate OA. Wilcoxon–Kruskal–Wallis and chi-square tests were used to compare ordinate variables between the groups. The Mann–Whitney U test was used for the comparison of continuous variables.

Results

Fifteen radiographs showed evidence of lunocapitate OA (15%), with nine of these patients having radiographic signs of a SLAC stage 3 pattern of wrist degenerative OA (60%). Six patients had radiographic evidence of degenerative changes involving the lunocapitate joint with minimal or no evidence of involvement of the periscaphoid area that we designated as the alternative group.

Table 1 Characteristics of the SLAC group and the lunocapitate group

	Lunocapitate OA+ n = 7	SLAC n = 29	p Values
Age (SD)	67.6 (13.2)	67.1 (13.2)	N/S
Gender (% males)	85.7	93.1	N/S
Occupation (% heavy labor)	71.4	72.4	N/S
Reason for radiograph (% wrist pain)	85.7	79.3	N/S
Dominance = side affected	85.7	55.2	N/S
Significant wrist trauma (%)	0	31	N/S
Smoking (%)	42.9	24.1	N/S

Comparison between the SLAC and lunocapitate OA group. There are no significant differences in presentation between the groups.

Table 2 Signs and symptoms in the studied groups

	Lunocapitate OA	SLAC	<i>p</i>
Radial-sided wrist pain/tenderness (%)	85.7	100	N/S
Ulnar-sided wrist pain/tenderness (%)	0	7	< 0.001 ^a
STT tenderness (SD)	0.3 (0.7)	0.9 (2.0)	N/S
Snuffbox tenderness (SD)	2.4 (3.5)	5.9 (3.4)	0.002 ^b
Scaphoid shift test positive (%)	14.3	72.4	< 0.001 ^a
Ganglion (%)	0	13.8	N/S

Abbreviations: SD, standard deviation; STT, scaphotrapeziotrapezoidal.

Tenderness was measured on a scale of 0–10, 0 being no pain/tenderness and 10 being maximal pain and tenderness.

^aChi-square test.

^bMann–Whitney U test.

Table 3 Radiographic characteristics of scapholunate advanced collapse (SLAC) pattern, and lunocapitate OA group

	Lunocapitate OA	SLAC	<i>p</i> <
STT joint arthritis (%)	100	31	0.004
Thumb CMC joint arthritis (%)	100	48.2	0.013
S-L gap (mm)(SD)	2.4(1.9)	4.2(3.6)	0.0003
R-L joint (%)	17	0	N/A

Abbreviations: CMC, carpometacarpal; N/A, not applicable; R-L, radiolunate; S-L, scapholunate; STT, scaphotrapeziotrapezoidal; Total, the population without arthritis (*n* = 64).

The characteristics of these patients, compared to the characteristics of the SLAC group, are seen in ►Table 1.

The two groups were similar in age, gender, occupation (percent heavy labor), and presentation: the patients in both groups presented to the clinic with radial-sided wrist pain, and both groups tended to have no clear-cut history of wrist trauma.

The findings of the physical exam of the patients with the alternative pattern of OA were compared to the examination of the patients with SLAC wrist. The alternative pattern group differed from the SLAC group in that there was a lower incidence of tenderness over the snuffbox ($P = 0.002$), a lower incidence of a positive scaphoid shift test ($P = 0.001$), and an absence of ulnar-sided wrist symptoms ($P = 0.001$). The numbers were too small to detect any significant differences in STT joint tenderness and associated ganglia. ►Table 2 summarizes these comparisons.

The radiographic characteristics of the three groups are described in ►Table 3. The patients with lunocapitate OA had a higher incidence of STT arthritis ($P < 0.004$) and thumb CMC joint arthritis ($P = 0.013$). There was a higher incidence of an increased scapholunate gap in the SLAC group ($p = 0.0003$).

Discussion

Lunocapitate OA is characterized by minimal or no involvement of the radioscapoid joint. All the cases had a certain degree of STT joint osteoarthritis, with no clinical or radiographic evidence of scapholunate instability or wrist pain.

The pattern of OA in any joint is dependent on the anatomic configuration of the joint and its ligamentous support as well as on the characteristics of the forces that are applied to the joint. None of our cases (both the SLAC and the alternative pattern group) had clinical evidence of mid-carpal instability. The significance of the variation in capitate or lunate morphology could not be addressed because of the small size of this series, but when there was a lunate type 2, the OA involved the hamate as well^{7–10} (►Figure 1a, b).

Fig. 1 (a) A PA view of a wrist following an old blast injury with lunocapitate OA and a lunate type 2. (b) A lateral view of the same wrist.

Radiographically, the patients with lunocapitate OA had a greater incidence of STT joint osteoarthritis. This may imply a relationship between the two, but our numbers are too small to say this with certainty. We did not find a significant relationship in this series between the type of occupation and the pattern of OA, most likely because of the small sample size.

This is a small series, which limits our ability to characterize this pattern fully both clinically and radiographically. The causation and natural history of lunocapitate OA is unknown. Recognition of this pattern, however, is important, since it is an alternative pattern of wrist OA that is not related to scapholunate instability. Further study is needed to understand the implications of this pattern of wear and to identify the ideal type of treatment.

Notes

This is a Level 4 study. This study received IRB approval.

Conflict of Interest

None

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