A Case Report of Kienbock's Disease with Distal Radioulnar Joint Dislocation

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Kienbock's disease is known as osteonecrosis of the lunate. The cause is unknown, but several theories endeavor to explain such as mechanical and vascular theories. Kienbock's disease can lead to collapse and fracture of the lunate and eventually collapse of proximal carpal row and progress to arthritis of the adjacent joints. This report presents the case of a 62-year-old female patient with Kienbock's disease combined with distal radioulnar joint dislocation, nowadays not yet reported as the cause of Kienbock's disease.

Keywords: *Kienbock's disease, distal radioulnar joint dislocation, case report*

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Introduction

Kienbock's disease is known as osteonecrosis of the lunate, considering as rare disease. Kienbock's disease can progress into 4 stages according to Stahl and modified by Lichtman[1,2], in the late stage there is collapsed, fractured of the lunate and arthritis of the adjacent joint. The exact cause is unknown, but there are several theories endeavor to explain, the most frequently mentioned is ulnar variance. It is believed that negative ulnar variance is associated with Kienbock's disease[3-5], but, on the other hand, several studies not support this correlation[6-8]. Besides ulnar variance theories, there were lunate morphology and vascular patterns that may play a role in lunate osteonecrosis[9-13]. However, there is no correlation between distal radioulnar joint (DRUJ) injury and Kienbock's disease has been reported.

Case report

A 62-year-old right-handed female presented with a 2-month history of right wrist pain after falling. Initially, she didn't seek immediate medical treatment, because there was mild wrist pain and swelling at that time. She didn't have any previous wrist injury. Physical examination demonstrated the point of tenderness and mild swelling at the dorsal of the affected wrist that was worse when rotating the forearm and dorsal subluxation of the ulnar head. The special tests showed a positive piano key sign and press test. The flexion/extension and pronation/supination of the affected wrist were 30º/20º and 80º/55º, The grip strength was 60.52 percent compares to the normal contralateral wrist.

The radiographic images of the right wrist in PA and lateral views showed collapse, sclerosis and fracture palmar pole of the lunate, resulting from osteonecrosis of the lunate. The scaphoid was forced into flexion. The surrounding joints had not degenerative yet. The scapholunate angle was 63.83º and the carpal height ratio was 0.40, considering stage 3B according to Lichtman classification. The distal radioulnar joint gap was 5.4 mm. (Figure 1)

The treatment options in this stage can be classified into two categories: (1) proximal row carpectomy, (2) partial wrist fusion (scaphotrapezialtrapezoid or scaphocapitate fusion) ± lunate excision. This patient was elected for proximal row carpectomy because of normal cartilage of capitate head and lunate fossa were found, intraoperatively. After the excision of proximal carpal bones, the ulnar variance was found greater positive, so the subsequent procedure was done to correct by ulnar shortening osteotomy. (Figure 2)

The patient was assessed before the operation, after 4, 6 months and 1 year using the Mayo wrist score. The pain keeps getting better and she can return to work. The flexion-extension motion and grip strength of the right wrist were 76.19 and 77.67 compared to the left wrist at the final follow-up. The Mayo wrist score after 1 year showed good results (80 points). (Table 1 and Figure 3)

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Table 1 The Mayo wrist score at initial, 4, 6 months and 1 year.

	Initial	4 months	6 months	1 year
Pain	15 points	15	25	25
Return to work	15 points	20	20	25
Range of motion%	47.61% (5 points)	47.61% (5 points)	61.9% (10 points)	76.19% (15 points)
Grip strength%	60.52 (10 points)	45% (5 points)	74.1% (10 points)	77.67% (15 points)
Mayo wrist score	45 points	45 points	65 points	80 points

Fig.1 The radiographic images of the right wrist in PA, lateral views (A, B) and computed tomography in Coronal and Sagittal planes (C, D).

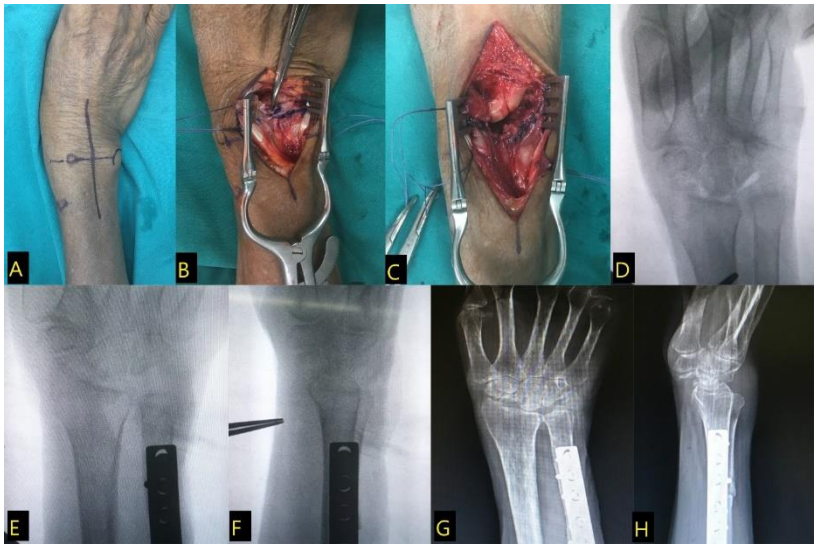

Fig. 2 Preoperative image of the right wrist (A), Collapse of the lunate (B), After proximal row carpectomy (C), Fluoroscopic view after proximal row carpectomy showed ulnar-positive variance (D), Fluoroscopic view after ulnar shortening osteotomy in AP and lateral views (E, F), Radiographic view 1 month after operation (G, H).

Fig. 3 Image of the patient at a one-year follow-up visit showed flexion-extension motion (A, B).

Discussion

Kienbock's disease is a rare disorder of unknown etiology. Several studies supported that it related to ulnar-negative variance, believed to cause the increased load to the lunate and cause ischemia, such as Gelberman and colleagues studied 15 patients with Kienbock's disease and found that ulnar-negative variance was significantly related to Kienbock's disease[3-5]. However, many studies suggested that the ulnar-negative variance has no relationship to Kienbock's disease. For example, D'Hoore and colleagues studied radiographic imaging of 125 normal wrists and 52 patients with Kienbock's disease and found no association between ulnar variance and Kienbock's disease[6-8,14,15]. In a systematic review and prospective case-control studies, no evidence can confirm or subtract negative-ulnar variance as a cause of Kienbock's disease. But a recent study by van Leeuwen and colleagues found that the more negative-ulnar variance causes more advanced lunate collapse (adjusted odds ratio, 1.4), but it is not the main cause of the disease[16-18].

Anatomical studies of the lunate, such as Rhee and colleagues studying 106 patients with Kienbock's disease found that the morphology of the lunate is of type I (71%) more than type II (29%), according to the classification of Viegas,[9,11] and from the studies of Tsuge and Nakamura, studied in 41 patients with Kienbock's disease, found that the lunate is smaller and the radial inclination is decreased. In our study, the patient had a radial inclination of 28.82 degrees, which is considered higher than normal[10,14].

In this study, the patient had associated DRUJ dislocation, without a history of previous wrist injuries, but not conclude whether the DRUJ was injured before or with this fall. Dislocation of the DRUJ may affect the normal force of wrist biomechanics. Normally, the axial force is about 20-30% to the ulna, so it is, therefore, possible that the occurrence of DRUJ dislocation may have more force on the radius and lunate, resulting in the decrease of blood supply of the lunate and subsequent collapse and fractures. There has never been any report of DRUJ dislocation being the cause of Kienbock's disease, but it may be a coincidence[19,20].

In this case, the patient with Kienbock's disease stage 3B, undergoing proximal row carpectomy. After the proximal carpal bones are removed, it was found to be ulnar-positive variance, which can lead to ulnar impaction syndrome. Therefore having to undergo ulnar shortening osteotomy to return ulnar variance to normal. And after 1 year of follow-up, the Mayo wrist score improved with time, finally, a good level.

Conclusion

In this research, support for the cause of Kienbock's disease is due to increased force to the radius through the lunate, such as the ulnar-negative variance, DRUJ dislocation, which causes the lunate to decrease in blood supply and finally has Kienbock's disease.

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Potential conflicts of interest

The author declares no conflicts of interest.

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กรณีศึกษาโรคคีนบอคกับภาวะข้อ distal radioulnar หลุด

ณัฐดนัย จูสิงห์, พบ

โรคคีนบอค (Kienbock's disease) เป็นโรคที่มีการขาดเลือดของกระดูก lunate สาเหตุยังไม่ทราบแน่ชัด แต่มีหลายทฤษฎีที่พยายามอธิบายสาเหตุการเกิดโรค เช่น ทฤษฎีทางกลศาสตร์ และ ลักษณะเส้นเลือดที่มาเลี้ยงกระดูก lunate โรคคีนบอคสามารถทำให้เกิดการยุบตัวและหักของกระดูก lunate ได้ จากนั้นกระดูกข้อมือจะเกิดการยุบตัวลงและเกิดข้ออักเสบรอบๆตามมา การศึกษานี้เป็นกรณีศึกษาผู้ป่วยหญิง อายุ 62 ปี ที่เป็นโรคคีนบอคและมีภาวะข้อ distal radioulnar หลุดร่วมด้วย ซึ่งยังไม่เคยมีรายงานว่าเป็นสาเหตุของการเกิดโรคคีนบอคมาก่อน