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Kienbock's Disease in A 23yr Old Male: A Case Report and Review of the Literature.

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ABSTRACT

To present the diagnostic, clinical features, and management of Kienbock's disease and create awareness of the differential diagnosis of this condition in patients presenting with insidious, progressive dorsal wrist pain. A 23-year old male presented with insidious progressive dorsal sided wrist pain. A diagnosis of Kienbock's disease was made based on magnetic resonance imaging. A 3mm ulnar-minus variance was found and a joint leveling procedure to shorten the radius was performed. Conservative therapy was provided pre and post surgical management. This case report demonstrates the importance of findings on MRI and clinical examination in the accurate diagnosis and management of a patient with wrist pain.

Keywords: Kienbock, Kienbock's disease, lunatomalacia, avascular necrosis, osteonecrosis, lunate

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INTRODUCTION

Robert keinbock in 1910 described the keinbock disease as those occurring due to disruption of blood supply to the lunate. It is the osteonecrosis of the lunate bone belonging to the carpus bone. Plain radiographsusually show sclerosis,fragmentation,cysts and articular involvements. Theetiologic is unknown. Due to its unknown aetiology the treatment options for this disease still remains controversial. The differential diagnosis can be lunate fracture and dislocation or schapholunate strain.Our case report is about a 23 year old students with Keinbock's disease.

CASE REPORT

Our patient a 23 year old male, a college student presented with intermittent pain more on moving the wrist. The pain started 2 years ago but has aggravated since 5 months. There was no diurnal or postural variation of the pain.

The pain was mainly in the dorsal and palmar side of the wrist. There was history of slip and fall from bus 2 years ago. There was no pain at the time. The pain was waxing and waning in type. Patient felt more pain while driving his two wheeler. An outside physician had diagnosed him as a case of contusion and was treated for the same. On examination patient had no swelling, signs of inflammation or bruising. The pain was concentrated mainly in the scapholunate and triangular fibro cartilaginous regions. There was no pain present over the lunate, or other carpal bones. The active range of movements was full with mild pain. There was pain present on axial loading alone. Resisted range of movements however produced pain which was dull aching type and it was confined to the lunate bone. There was no distal neurological deficits. Bilateral x rays of bothwrist. The ulnar variance was 3mm. There was mild sclerosis of the lunate present. The proximal carpal arc was maintained. The magnetic resonance imaging showed abnormal signals in the right lunate. With 2mm loss of height.

There was no fluid collection.

Figure 1:right AP wrist Radiograph appears normal

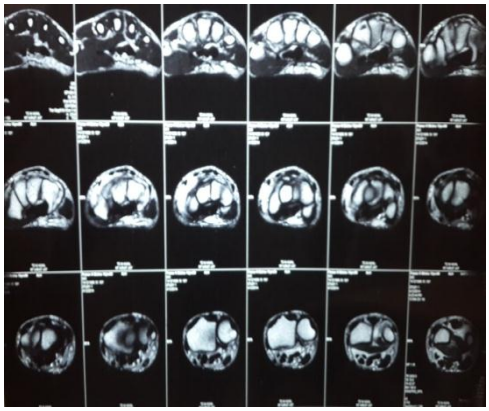

figure 2:right coronal T1 MRI shows abnormal signals at lunate

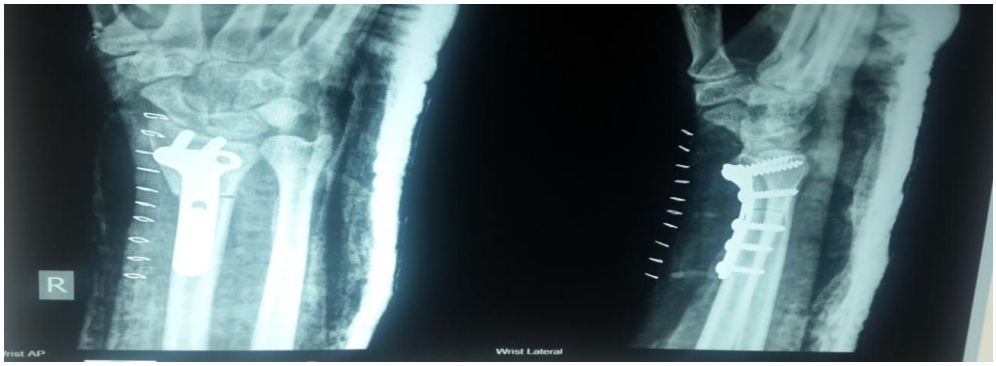

Figure 3: right AP and lateral view showing post op 3mm radial shortening

Patient is diagnosed as stage 1 keinbock's disease. Initially planned for conservative management through fibre cast and immobilization for 6 weeks. Patient had pain even after immobilization. Hence planned for surgical management.

Patient was given ECST by our physiotherapist for 3 weeks and patient symptoms have not reduced. Hence 3mm radial shortening, core decompression lunate and bone grafting done.Patient was immobilised in cast for 6 weeks. After 6 weeks cast was removed and mobilization of wrist started. Wax bath was given as an adjuvant therapy. The patient was asked to do active and passive movements of wrist. After 10 weeks of surgery patient was started on range of motion exercise for wrist. Serial of x rays were taken and there was no progression of disease. After 1 year of surgery patient had painless movements of wrist.

DISCUSSION

Kienbock's in 1910 has found out that lunatomalacia is due to rupture of the ligaments surrounding the lunate with disruption in its blood supply [1,4,5,6]. Which results in aseptic necrosis, bonecollapse, and disturbance in nutrition of bone [1,4,5,6]. The aetiology of disease is still a controversy even after years [3]. Diagnosis of keinbock's disease is a challenge due to its rareness and coincidence with symptoms of wrist sprain. Most common in males between 20 to 40 years of age [2,3,6,7]. Common in athletes and manual workers. Mostly unilateral sometimes can be bilateral [2,3,7]. Previous history of trauma to wrist is usually present.The etiology of keinbock is still considered to be unknown till date. Various etiological theories and research activities on the keinbocks disease are still underway. Avascular necrosis of the lunate bone as a consequence of lunate bone collapse due to excessive bony stress and loading is on the basis of mechanical theory [14,15]. Micro fractures of lunate trabaculae leading to bony collapse is caused by excessive load .ulnar minus variant is one of the common most mechanical etiological factor. Axial load cannot be shared to radius by ulna due to ulnar shortening, which compels the force to be transmitted to lunate, further causing nut cracker phenomenon. Mechanical loading is increased by the radio ulnar joint due to the trapezoid shape of the lunate, thus causing compressive loading which causes fragmentation and lunate collapse.[6, 8,9].

Other theories like vascular theory suggest etiology of keinbocks is due to limited arterial supply to the lunate. Due to limited anastomosis of arterial supply, the lunate bone undergoes osteonecrosis. Interosseous pressure increases due to impairment of venous outflow of lunate thus again causing osteonecrosis.

Most widely presumed theory is the traumatic theory, which states that keinbocks is due to rupture of ligaments of the lunate bone , thus causing disruption to blood supply of lunate , further causing sclerosis with micro fracture [3,10,11,12] .

Blood supply of lunate is mainly from the wrist sources of palmar and dorsal arteries including radial and ulnar artery[14,15]. Lunate is the most vulnerable carpal bone to undergo osteonecrosis due to its limited bloody at its proximal pole [16]. Cerebral Palsy, hypercoagulability, systemic corticosteroid use, sickle cell anemia also contribute to osteonecrosis of lunate [2,3,6,7,13].

Degree of osseous changes in lunate and its chronicity are the key factors in easy diagnosis of osteonecrosis. cystic changes , collapse of articular surface , sclerosis , fragmentation and perilunate arthritis can be visualized radiologically .early diagnosis through a radiographic image is difficult , so a magnetic resonance imaging could be considered in cases with persistent pain even after conservative management .[17,18,19].

Lichtman classification [3,6,20,21] is important as it dictates the management options. Stage 1, radiograph shows normal articular surface and density of lunate, MRI shows decreased signal intensity of lunate at its distal portion. Stage 2 fracture lines are seen with normal articular surface of lunateP[3,6,20,21,22]. Stage 3 which is subdivided into stage 3a and 3b.stage 3a is common stage of pioneer presentation due to collapse of articular surface of lunate. Stage 3b is fixed rotation of scaphoid proximal migration and collapse of carpel height [3,6,20,21,22]. Stage 4 is collapse of lunate with peri-lunate arthritis [3,6,20,21,22].

Management of keinbocks disease is depended mostly on its stages based on litchman

classification.[3,6].keinbocks can be treated conservative to surgery the most common conservative treatment are immobilization with cast or splinting and activity modification[3,6,23,24].

Table 1: Management of Kienbock's disease according to Lichtman classification [3,6]

Stage	Radiographical Findings
Stage I	Cast immobilization for 3 months with use of analgesics and NSAIDS
Stage II and IIIA with ulnar negative variance	3 month trial therapy of immobilization with use of analgesics and NSAIDS Joint leveling technique (radial shortening, ulnar lengthening, capitate shortening)
Stage II and IIIA with ulnar positive variance	3 month trial therapy of immobilization with use of analgesics and NSAIDS Vascularized bone graft and external fixation; radial wedge or dome osteotomy; capitate shortening
Stage IIIB	Internal carpal artheodesis; lunate excision with or without replacement; proximal row carpectomy; joint leveling
Stage IV	Proximal row carpectomy; carpal arthrodesis; wrist denervation

There are multiple surgical methods for management of keinbock's disease. For stage 1 conservative management is ideal choice with cast, immobilization is given with analgesics and NSAIDS. STAGE 2 and stage 3A with ulna variance is initially treated with trail of conservative management for 3 months, if conservative therapy fails then joint leveling technique is considered. A positive ulnar variant indicates surgical management with vascularized bone grafts and external fixation is done, however this procedure does not revascularise the lunate but slows down its process of degeneration in the affected wrist, intercarpal arthrodesis, excision of lunate, carpectomies are considered primary option of management.[26]

Extracorporeal shockwave therapy is conservative treatment for osteonecrosis as it may increase the vascular endothelial growth factor in osteogenesis, and angiogenesis which allows the affected bone to revascularise .[29,30,31,32]

Keinbocks disease prognosis is highly dependent on stage of the disease.

SUMMARY

Keinbocks disease is a condition which is rare and its etiology is unknown. The case shows the importance of the diagnosis of the disease by the primary healthcare practitioner and responsible for management of keinbock's disease

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