ORIGINAL RESEARCH PAPER

Orthopaedics

IDIOPATHIC AVASCULAR NECROSIS OF CAPITATE; A CASE REPORT AND REVIEW OF LITERATURE

KEY WORDS: Avascular, capitate, necrosis, osteonecrosis, treatment

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ABSTRACT

Idiopathic avascular necrosis (AVN) of the capitate bone is an important, although rare, cause of wrist pain. Most cases involve direct or indirect trauma. Only a few reports of idiopathic avascular necrosis have been published in literature. Jonsson(1942) first reported AVN of capitate.

We present a case report of a 32-year-old woman who presented with complaints of right wrist pain, intermittent swelling, loss of movements for approximately 3 years. She had no history of prior trauma or drug abuse. Laboratory testing for systemic disease or infection were negative. Diagnosis of avascular necrosis of the capitate has been made via plain film radiology & Magnetic Resonance Imaging. No etiologic factor could be identified. Surgical treatment was recommended and Excision of Avascular body of capitate and autogenous bone grafting was performed. The physical therapy was implemented to restore function.

INTRODUCTION

AVN of the capitate is very rare bone necrosis caused by blockage of blood supply. It has variable etiologies including trauma (fracture, dislocation), surgery, decompression sickness, diabetes mellitus, hemostatic disorder, tumor, irradiation, alcoholism, steroids[1].

The blood supply to the hand has two pathways. One is extrinsic blood supply from the ulnar artery and radial artery that contribute to branches of the palmar carpal branch. The other is intrinsic (intraosseous) blood supply that is associated with the anterior interosseous artery[2]. Both blood supplies to the capitate bone are derived from the palmar aspect[3]. Therefore, the palmar aspect, if affected by any kind of stress condition, could have an influence on blood supply to capitate.

The extrinsic blood supply is associated with the palmar wrist capsular and ligamentous structures (flexor retinaculum and flexor pollicis longus tendon). Injury to these structures, especially on the palmar side, could damage accompanying vessels interfering with the blood supply to the capitate[4]. Repetitive-motion trauma and consistent pressure disturbs the blood supply to the capitate bone

Case Report

A 32 year old women, dominant right hand, housewife, presented in our OPD on 13th March 2020 with complaints of pain at right wrist since 3 years. She Consulted various hospitals since 18th May 2019, and was treated conservatively without any relief in pain. Pain was initially localised at wrist and gradually extends distally upto fingers after few months. Pain was relieved by taking Analgesics, sometimes upto four in number per day, on regular basis. She was not able to hold spoon, unable to lift her baby, unable to wash clothes. She was not able to carry out even day to day activities without taking analgesics. She had severe pain on just little impact of any object. She had to do her household work after taking analgesics. She had no major history of trauma, steroid use or any systemic illness.

Clinical Examination revealed Tenderness on palpation of dorsal aspect of wrist. There was global restriction and painful movements at wrist joint, mainly Dorsiflexion. No instability or hypermobility was noted. Movements at Metacarpophalangeal, Interphalangeal, Proximal and Distal Interphalangeal joints were normal. All Laboratory Investigations were within normal limit.

Radiograph of the left wrist showed an increased density at distal part of the capitate (Fig 1)

FIG.1 ANTERIO-POSTERIOR (AP) RADIOGRAPH OF LEFT & RIGHT WRIST SHOWING INCREASED DENSITY OF CAPITATE OF WRIGHT SIDE.

We didn't perform histological examinations and we diagnosed AVN with physical examination and radiologic findings.

In our case, AVN was diagnosed by a low signal intensity in T1-weighted and a slightly low signal intensity in STIR images.

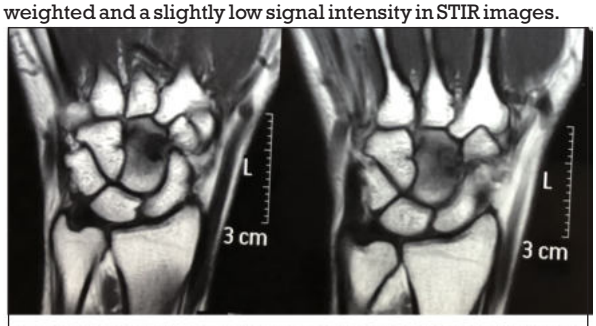

FIG.2 PRE-OPERATIVE T1 WEIGHTED CORONAL MRI SLICE OF THE RIGHT WRIST OF CASE AT TIME OF DIAGNOSIS. THE DISTAL PART OF THE CAPITATE HAS A LOW INTENSITY SIGNAL.

FIG.3 PRE-OPERATIVE STIR CORONAL MRI SLICE OF THE RIGHT WRIST OF CASE

Miliez *et al*.[5] system based on the location of involvement in the capitate. In type I, the most frequent, the involvement is limited to the proximal pole of the capitate, type II involves the body, and the type III, the entire capitate.

Surgical treatment was recommended because of the degree of pain, inability to carry out any type of work and weakness. She was operated on 13th Mar 2020. It included excision of the necrotic part of capitate. The surrounding joint surfaces was denuded of articular cartilage by burr and the space was filled with cortico-cancellous bone graft from iliac crest, which was stabilized with k-wire. The graft was held in place with the help of K-wire, which was removed after 1 month.

Patient was kept in below elbow slab(cock-up) for around 1 month. After which physiotherapy was started. After 5th post-operative day, patient doesn't need analgesic.

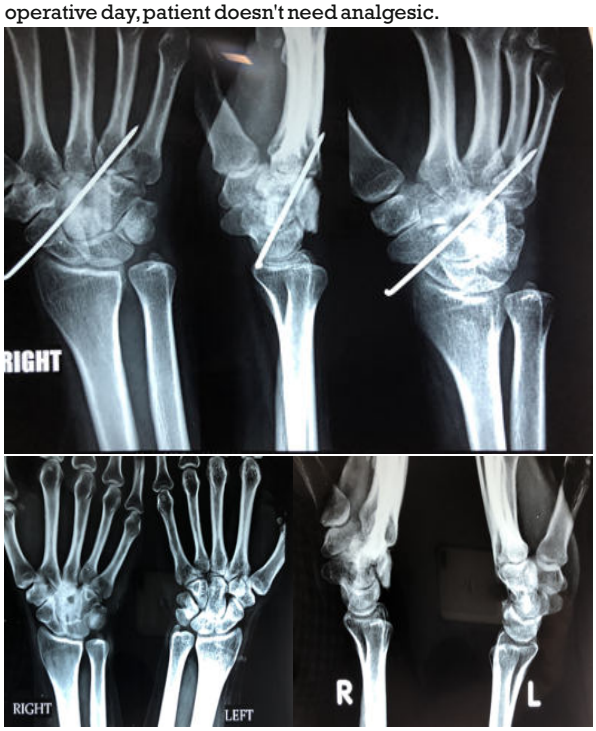

Fig. 5 AP and Lateral Radiograph at 4.5 month post operative

Presently, patient is experiencing no pain, no need of Analgesic, She is able to do all household work without any difficulty.

There was no restriction on Supination & Pronation.

DISCUSSION

In conclusion, in our case, no cause of AVN of capitate was established as per history.

However, cases of AVN capitate without history of trauma are much less common. Nearly all cases reported in literature have occurred in adults & only one case of occurance in skeletally immature patient has been reported.

AVN of the carpal bones has been well documented in adults[6]. The lunate, scaphoid, and capitate are the most commonly affected bones in the wrist, with AVN occurring most frequently after a traumatic event. However, cases of capitate avascular necrosis without a history of trauma are much less common[6,7].

The capitate plays an important role in movement of the wrist, including flexion, extension, and ulnar and radial deviation[8,9]. The repetitive wrist motions necessary for these physical activities may cause micro fractures leading to osteonecrosis[6].

The diagnosis of avascular necrosis of the capitate is now being made frequently, as a result of an increased awareness of this condition and the ability of more sophisticated techniques to investigate causes of unresolved wrist pain[7].

The reported common symptoms of this condition involve chronic wrist pain, swelling, stiffness, crepitus, and loss of wrist motion[7,10].

Diagnosis of AVN has been typically made via plain film radiology, isotope bone scanning, and, above all, magnetic resonance imaging, which have been recommended as the preferred imaging modality for all chronic unexplained wrist pain[7,10].

A conventional radiography revealed an area of subtle increased density in the capitate and collapse. Isotope bone scanning might be helpful in localizing the pathology in the carpus and revealed a focus of increased uptake. Advanced diagnostic studies should be performed including computed tomography as it was the case of our patient. MR imaging of avascular necrosis showed a low signal intensity on T1-weighted and high signal intensity in T2-weighted[10].

Treatment of AVN of the capitate consists of conservative splinting and surgical intervention. Several different surgical treatments have been also attempted; these include excision of the proximal pole of the capitate with tendon interposition, mid carpal arthrodesis, curettage and bone grafting, partial resection and drilling, and arthroplasty with silicone prosthesis.

The surgical intervention helps our patient to control her overall pain and provide some stability in the bone. The rehabilitative process increased the overall function of the wrist[11].

CONCLUSION

Avascular necrosis of the capitate is a rare condition that should be considered in patients who presented with wrist pain. Advance diagnostic studies should be performed including plain radiograph and Magnetic Resonance Imaging. A multidisciplinary approach was taken in treatment including the surgical intervention and the rehabilitation process.

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