

Vascular Pedicle Pisiform Bone Grafting for Kienbocks Disease :A Case Report

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ABSTRACT

25 years old female patient presented with pain in the right wrist of 3 years duration, with mild restriction of movements, the case is diagnosed as Kienbock's disease, the case treated with vascular pedicle pisiform bone grafting.

Keywords: Kienbock's disease, pisiform bone, vascular pedicle bone grafting.

INTRODUCTION

Kienböck disease is a painful disorder of the wrist of unknown cause in which radiographs eventually show osteonecrosis of the carpal lunate. It occurs more frequently between the ages of 15 and 40 years. ^[1] Untreated, the disease usually results in fragmentation of the lunate, collapse with shortening of the carpus, and secondary arthritic changes throughout the proximal carpal area. Symptoms can develop 18 months before radiographs show evidence of the disease. ^[2]

CASE REPORT

25 years female patient presented with right wrist pain

for the past 3 year. It is Insidious in onset and pricking in nature, gradually progressing and increased since 6 months, no constitutional symptoms aggravated by twisting, relieved by rest, no radiation.

On examination, there is tenderness over the volar aspect of the wrist, in the centre of the proximal row of carpal. Movements are painful in the terminal range of movements, flexion and radial deviation are minimally decreased. Patient is investigated routine blood investigations are normal, X-ray of the wrist showed collapsed lunate, the carpal height is decreased, CT scan, showed the collapsed lunate.



Figure 1: Right wrist dorsiflexion decreased

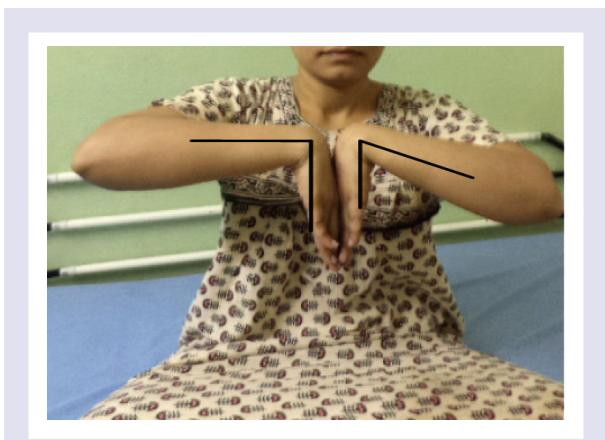


Figure 2: Right wrist palmar flexion decreased



Figure 3: Right wrist radial deviation decreased

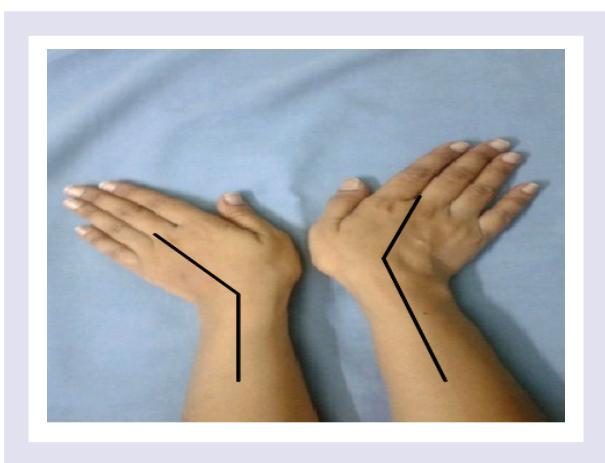


Figure 4: Wrist ulnar deviation equal

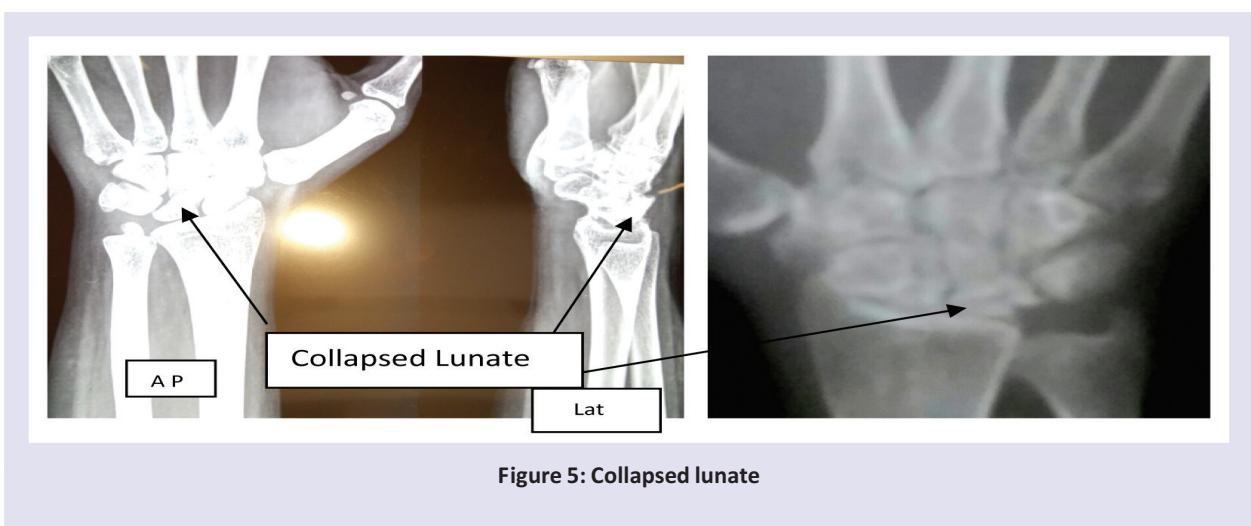


Figure 5: Collapsed lunate

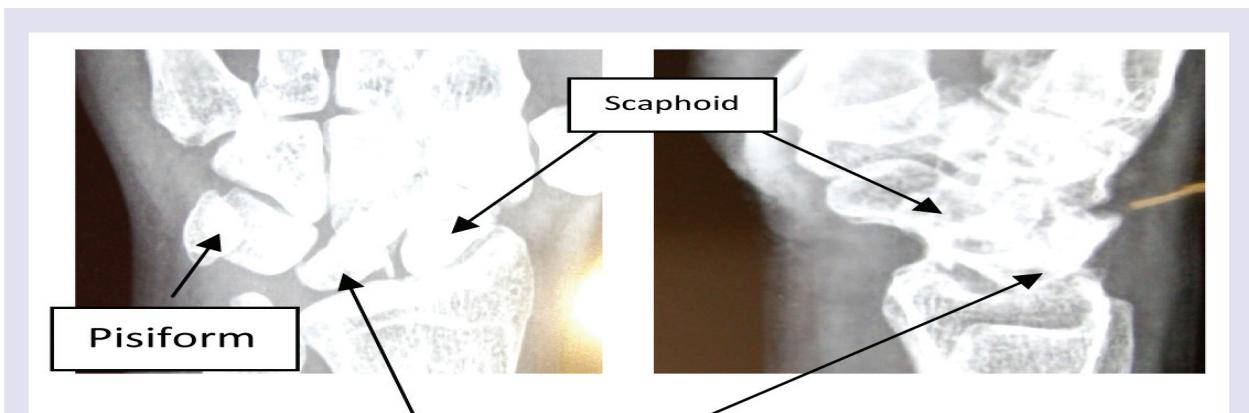


Figure 6: Collapsed and deformed lunate

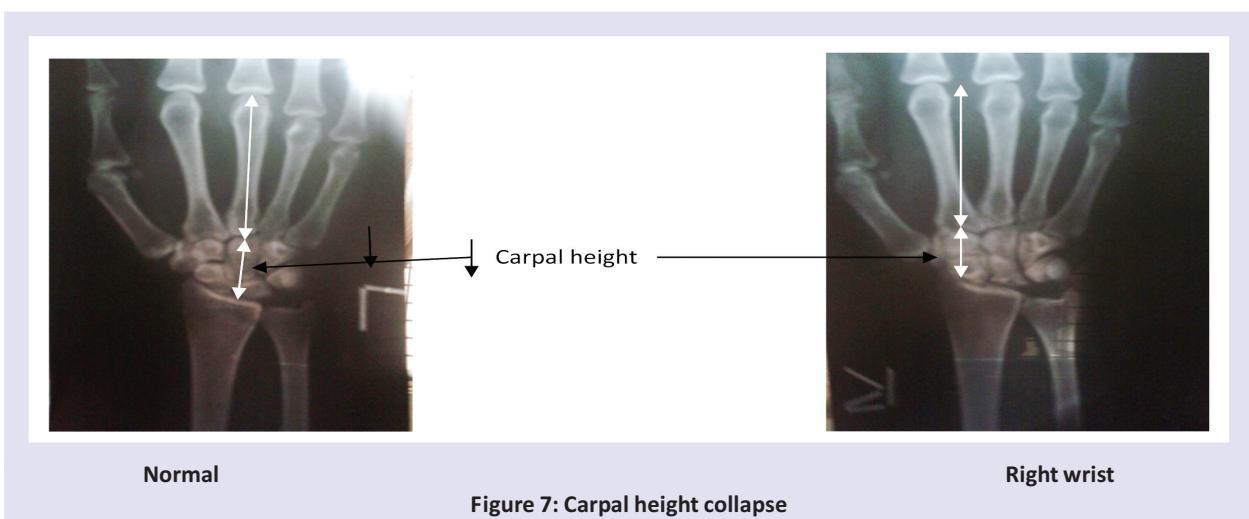


Figure 7: Carpal height collapse

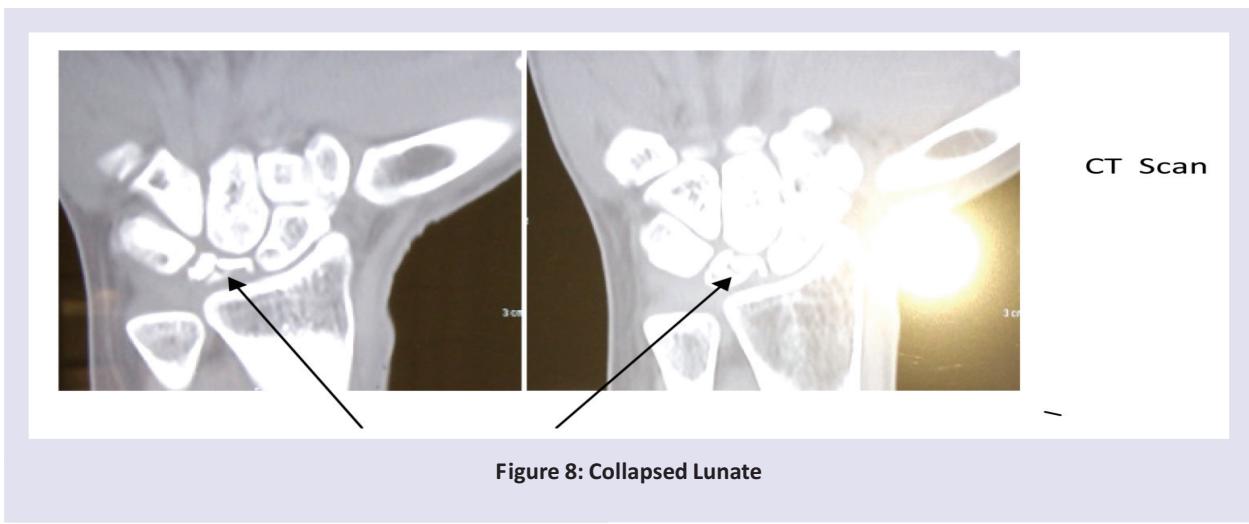


Figure 8: Collapsed Lunate

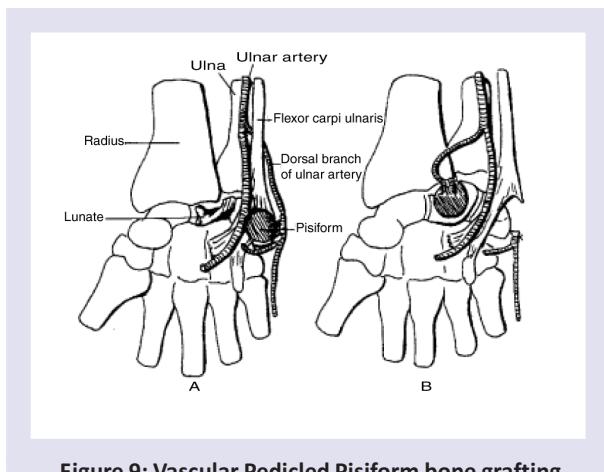


Figure 9: Vascular Pedicled Pisiform bone grafting

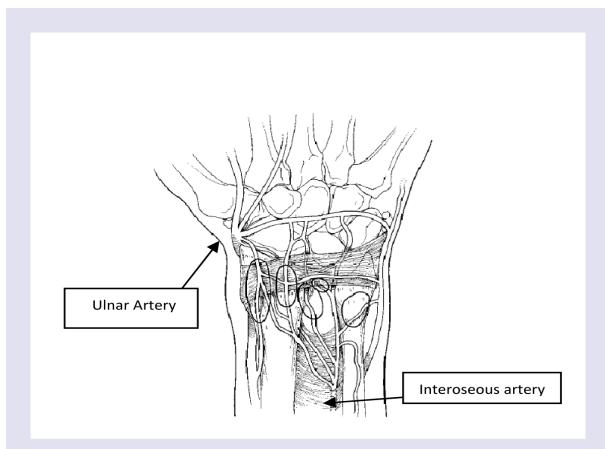


Figure 10: Other vascularized bone graft donor sites

MANAGEMENT

The patient is operated under general anaesthesia, under tourniquet control without exsanguinating the limb, to facilitate vessel identification. Haemostasis was done progressively. An 8-cm antero-medial zigzag incision was made extending from the forearm to the palm, just lateral to the flexor carpi ulnaris tendon and directed towards the fourth ray in order to avoid the palmar cutaneous nerves. The vessels on the lateral border of the pisiform were cut and electrocauterised.

The pisiform was freed from its muscular attachments (flexor carpi ulnaris) and from the pisohamate ligament, preserving the lateral distal insertions of flexor carpi ulnaris. When the capsule was incised, the pisiform was only attached to the blood vessels on its medial border.

The latter, in addition to the dorsal carpal branch of the ulnar artery and accompanying veins were contained in a cellulo-adipose bundle easily identifiable by traction on the pisiform. The dorsal carpal branch was divided and ligated at the level of the triquetrum near the origin of the deep palmar branch. This bundle was dissected from distal to proximal. Dissection is easier in relation to the flexor carpi ulnaris than to the dorsal branch of the ulnar nerve situated just behind the artery.

The tourniquet could be deflated temporarily to differentiate vascular and nervous structures. The vessels were passed behind the flexor carpi ulnaris and were freed up to the ulnar artery. The pedicle obtained was at least 4 cm long. The pisiform and its pedicle were slipped behind the flexor carpi ulnaris and placed lateral to the ulnar neurovascular bundle. The flexor carpi ulnaris tendon remaining in continuity with the pisohamate ligament and the abductor digiti minimi forms a

fibromuscular septum protecting the ulnar neurovascular pedicle. The flexor retinaculum was incised longitudinally on its medial side to open the carpal tunnel. The flexor tendons and the median nerve were retracted laterally and volarly. The pisiform was completely detached from the pisotriquetral capsule and its articular cartilage was abraded.

The radiolunotriquetal ligament was incised to expose the lunate. Necrotic bone fragments were removed from the lunate to allow graft placement. Traction is applied to the wrist and a percutaneous scaphotrapezial K-wire is inserted. The pisiform is inserted into the lunate with care to orient the pedicle as anteriorly and distally as possible to prevent it from being crushed during forced palmar flexion of the wrist. The transplant is fixed with a lunotriquetal K-wire.

After tourniquet release, the incision in the radiolunotriquetal ligament is closed taking care not to compress the vascular pedicle. Skin is closed and plaster immobilization is applied.

DISCUSSION

The natural course of Kienböck disease is unpredictable, the treatment of established Kienböck disease cannot be rigidly prescribed, but an attempt is made to stage the disease and suggest the treatment procedures by Lichtman et al. The following staging classification of Kienböck disease:

Stage-I there is a linear or compression fracture but otherwise normal architecture and density.

Stage-II density is abnormal, without lunate or carpal collapse.

Surgery Steps



Figure 11: Incision

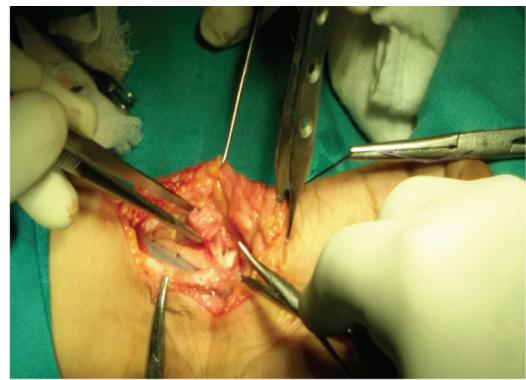


Figure 12: Pisiform bone isolated from Flexor carpi ulnaris



Figure 13: Pisiform vascularized graft



Figure 14: Pisiform graft in situ in the collapsed lunate



Figure 15: Fixation of the graft in the lunate by traquetro-lunate pinning.



Figure 16: The Final X-ray.

Stage-III Lunate collapse is present

Stage-IIIA without carpal collapse (i.e., carpal height is normal, radioscapoid angle is less than 60°)

Stage IIIB, with carpal collapse (diminished carpal height, radioscapoid angle greater than 60°).

Stage IV, extensive osteoarthritic changes are present as, proposed, is useful when planning treatment.

Numerous surgical procedures have been described for Kienböck disease. Joint "Leveling" procedures, include ulnar lengthening and radial shortening usually are indicated for Lichtman Stage I through IIa Kienböck disease, with an ulnar-minus variation and without degenerative changes in the radiolunate or capitolunate joints. Wedge osteotomies have been used to decrease the load on the lunate by decreasing the radioulnar inclination of the distal radius.^[2]

Lunate revascularization using a variety of pedicled bone grafts has been effective in preserving the lunate architecture. These revascularization procedures usually require protection of the lunate with pinning of the scaphocapitate or scapho-trapeziotrapezoid joint or with an external fixator. Excision of the lunate can give short-term relief.

Prosthetic lunate replacement also may provide relief. Limited intercarpal fusions can prevent proximal carpal migration after lunate excision and can help decrease pressure on lunate prostheses. When secondary arthritic changes have developed throughout the wrist (Stage IV), treatment usually is proximal carpal row resection or wrist arthrodesis. In the present case there is no fixed ration of scaphoid, There is no ulna minus, So the revascularization is done with vascularized pisiform bone, the size of the bone is nearly matching the size of lunate.

The scapho trapezoid pinning with K wire prevents the proximal collapse of the carpus and prevents the loading on the lunate, So first the scapho-trapezoid pinning is

done after applying longitudinal traction, then, the pisiform is isolated with pedicle. The cartilage over the pisiform is removed placed into the lunate, fixed with lunate- traquital pinning. This case needs follow up for the outcome.

CONCLUSION

1. Kienbock's disease the condition of lunate due to loss of blood supply of unknown aetiology, resulting In avascular necrosis and collapse with consequential carpal collapse and secondary arthrosis with compromised function of the wrist.
2. The natural history how the disease progress is unpredictable
3. Lichtman's classification is the presently available staging of Kienbock's disease
4. Many procedures are advocated for the management of the Kienbock's disease of which revascularization with vascularized bone grafting of which the vascularized pisiform grafting is described.
5. This condition requires careful planning and choice of treatment.
6. It needs long term follow up for the outcome.

CONFLICT OF INTEREST

The authors have no conflicts of interest to disclose.

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