

# A Case Report of Kienböck Disease Treated by Radial Shortening Osteotomy with Vascular Bone Graft

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## ABSTRACT

Kienböck disease is a condition characterized by avascular necrosis of the lunate bone. It is a progressive disease process that can lead to wrist pain and dysfunction. Initial treatment is nonsurgical, and it remains unclear whether surgical intervention results in improved outcomes over non-operative treatment. Traditional surgical procedures such as radial shortening osteotomy and proximal row carpectomy have been shown to be reliable treatment options for relieving pain and improving function. This was a case of 33-year-old male with left wrist Kienböck disease treated by radial shortening osteotomy with vascular bone graft. Patient showed good radiological and functional recovery.

**Key words:** Kienböck, radial shortening osteotomy, vascular bone graft

## INTRODUCTION

Kienböck disease is a condition marked by avascular necrosis of the lunate bone.<sup>[1]</sup> Kienböck disease was described by the Austrian radiologist Robert Kienböck in 1910 as a condition characterized by avascular necrosis of the lunate bone. It is also known as osteonecrosis, lunatomalacia, and aseptic or ischemic necrosis of the lunate.<sup>[2]</sup> It has multifactorial pathophysiological mechanism.<sup>[2]</sup> A complex interplay of vascular and anatomic variations combined with varying degree of microtrauma and insults, results into development of Kienböck disease.<sup>[3]</sup> It is a rare disease

which mostly involves dominant wrist of male manual workers between the ages of 20 and 40.<sup>[4]</sup> It is mainly characterized by wrist pain which get worsens with activity, a reduced range of movement, and decreased grip strength.<sup>[4]</sup> Pain is mainly insidious in onset, often related to activity, and can be present for extended periods before presentation.<sup>[3]</sup> Radiography is the initial imaging technique for assessing Kienböck disease. It allows disease to be classified into four stages according to Lichtman and associates.<sup>[5]</sup> This classification has most clinical relevance as it helps in determining the most appropriate treatment. The aim of treatment is mainly to relieve pain, preserve motion, and improve function.<sup>[3]</sup> Treatment is based on its classification, with Stage I usually treated conservatively with immobilization and Stage II-IV treated surgically. Surgical options include temporary scaphotrapeziotrapezoidal pinning, joint leveling procedures, and radial wedge procedures for those with Stage II-III of the disease, and proximal row carpectomy, arthrodesis, and arthroplasty for those with Stage IV of the disease.<sup>[6]</sup> Following is the description of a case of 33 years old male with the left wrist Grade III Kienböck disease managed surgically.

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## CASE REPORT

A 33-year-old male presented to the outpatient department of a tertiary care center in rural India. He complains of pain in the left wrist since 2 years. He had a history of fall on outstretched hand 2 years ago. He complained of persistent pain in the left wrist joint which got worsened with activity which got exacerbated since 1 month. Patient had taken over the counter analgesics for symptomatic relief during this period. On examination, there was mild tenderness on palpation around the distal end radius. No tenderness over ulnar aspect of wrist joint. Flexion/extension of the left wrist was 85°/85° compared with 90°/90° on the right side. Pronation and supination were mild painful. Grip strength was 10 kg on the left side compared with 20 kg on the right. Range of movement at left wrist joint mild painful but fully present. Third metacarpal prominence was reduced compared to the opposite hand. There was no neurosensory deficit. Radial pulsation was palpable.

### Investigations

A plain X-ray of the left wrist joint in anteroposterior and lateral view was taken [Figure 1]. It showed the presence of sclerotic changes and irregular appearance of the lunate bone with signs of osteoarthritis. For further clarification, computed tomography (CT) left wrist with screening magnetic resonance imaging wrist joint was planned. It showed minimal elongation and collapse mainly at radial aspect of lunate suggestive of Stage III Kienböck disease [Figure 2].



**Figure 1:** X-Ray on Presentation showing a sclerotic changes and irregular appearance of the lunate bone

### Treatment

Radial shortening osteotomy with vascular bone graft was planned after duly explaining patient relatives about pros and cons of the surgery, written informed consent was taken. Supra-clavicular and axillary block were given, dorsal approach to the left wrist was taken, and incision was taken in S-shaped fashion. Extensor Compartment identified Extensor pollicis longus tendon identified, Extensor retinaculum identified, and distal dissection was done to expose lunate. Fracture was seen over chondral surface of lunate [Figure 3], fissure created on dorsal aspect of lunate for graft interposition. Graft is taken with feeding vessel from listers tubercle over dorsal aspect of radius. Radial shortening osteotomy was done. Fixed with two K-wires from radial styloid and one from ulnar aspect of distal radius. Graft vascularity was checked. Graft interposition in fissure in lunate, sutured in place with 4-0 vicryl, extensor retinaculum repaired, and skin sutured with 3-0 ethilon. Dressing is done. Patient was given above elbow slab in mid-prone position with wrist in 20° dorsiflexion.

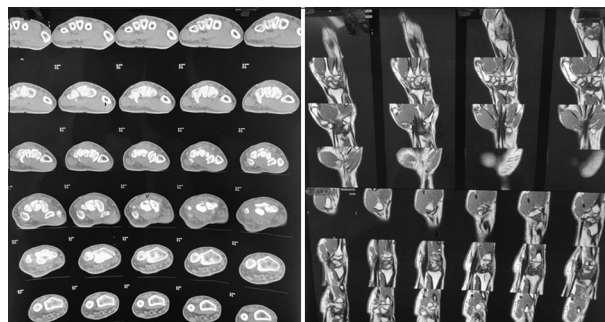
Post-operative X-ray showing radial shortening osteotomy with vascular bone graft and fixed with three cross K-wires [Figure 4].

### Outcome

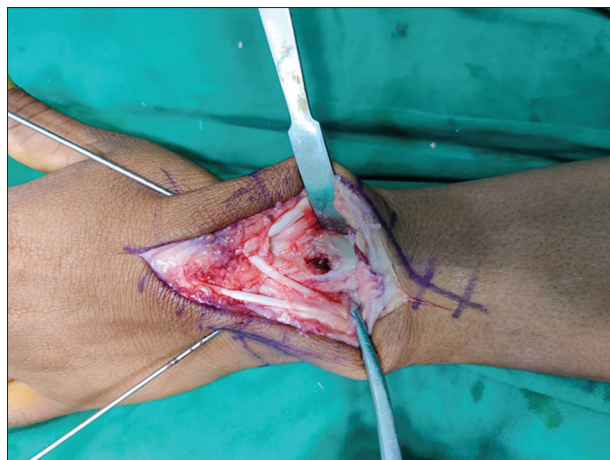
Patient is under observation and follow is done since last 1 month. Patient is completely free from pain postoperatively. He had improved range of movement and grip strength.

## DISCUSSION

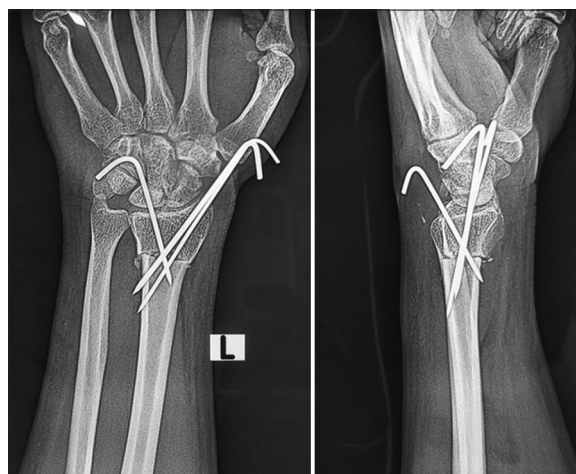
The etiology of Kienböck's disease is poorly understood. Trauma tends to be a preceding factor, there are a number



**Figure 2:** Computed tomography of the left wrist joint with screening magnetic resonance imaging suggestive of Stage III Kienböck disease



**Figure 3:** Soft-tissue dissection during intra-operative period



**Figure 4:** Post-operative X-ray showing radial shortening osteotomy with vascular bone graft

of risk factors that are thought to be contributory.<sup>[4]</sup> Negative ulnar variance of the wrist has shown to be a significant risk factor for the development of the disease<sup>[7]</sup> as have anatomical differences in the blood supply to the lunate leading to reduction in venous outflow.<sup>[8]</sup> Progressive radiograph findings include sclerosis of the lunate, lunate collapse, fixed scaphoid rotation, and degeneration of the adjacent intercarpal joints. CT scanning may also be useful in demonstrating fracture or fragmentation of the lunate that may be difficult to see on plain radiograph. Treatment of the disease is based on Lichtman's radiographic staging. It is recommended that adults with stage I Kienbock's disease are managed

with a period of immobilization. Studies have however shown that adults in the later stages of the disease can have better outcomes when managed operatively. These procedures include joint leveling procedures and radial wedge procedures for those with Stage II-III, and wrist fusion and proximal row carpectomy for those with stage IV. Several studies have suggested improved outcomes in adults treated with radial shortening.

## CONCLUSION

Kienböck disease is characterized by avascular necrosis of lunate bone. The aim of surgical intervention in the early stage of disease is to improve lunate circulation by unloading the bone. Radial shortening osteotomy with vascular bone graft is an efficient technique to induce the revascularization process and prevent further necrosis of lunate bone. In this case patient had relief in level of pain and increased range of motion and grip strength was noticed at the end of 6 weeks.

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