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Case Report

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Lunate Excision and Interposition Arthroplasty Using Ipsilateral Palmaris Longus Tendon in Stage III b Kienböck's Disease: A Case Report

Aman Tomar[1], Vatsal Gupta[1], Yogesh Sharad Salphale[2*], Hrishikesh Saodekar[1], Shivani A. Tomar[1]

[1]Department of Orthopaedic, Sumandeep Vidyapeeth Deemed to be University, Waghodia, Vadodara, Gujrat.

[2]Consultant Trauma and Orthopaedic Surgeon, Shushrusha Hospital, Lane Opp. Z.P, Chandrapur, Maharashtra, India.

Correspondence to: Yogesh Sharad Salphale, Consultant Trauma and Orthopaedic Surgeon, Shushrusha Hospital, Lane Opp. Z.P, Chandrapur, Maharashtra, India. E-mail: yogeshsalphale@outlook.com

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ABSTRACT

Introduction: Kienböck's disease is a rare, progressive condition characterized by avascular necrosis of the lunate bone, presenting clinically with wrist pain, reduced grip strength, and restricted motion. Early stages are amenable to conservative treatment, while advanced stages require surgical intervention.

Case Presentation: We report the case of a 25-year-old female with Stage IIIb Kienböck's disease of the left wrist. The patient underwent lunate excision and interposition arthroplasty using the ipsilateral palmaris longus tendon,which is redundant.

Outcome: At nine-month follow-up, the patient exhibited significant improvement in pain and functional wrist motion, with the Visual Analog Scale (VAS) score improving from 8 to 2. Radiographs demonstrated maintained carpal alignment without evidence of collapse.

Conclusion: Lunate excision and interposition arthroplasty using an autologous palmaris longus tendon can provide pain relief and preserve motion in selected patients with advanced Kienböck's disease. However, this report is limited by the short follow-up period, and long-term studies are needed to confirm the durability of outcomes compared with other motion-preserving or salvage procedures.

Keywords:

Kienböck's disease, Lunate avascular necrosis, Tendon interposition, Palmaris longus, Lunate excision, Wrist arthroplasty.

Introduction

Kienböck's disease, or lunatomalacia, involves Avascular Necrosis (AVN) of the lunate bone, a central structure in carpal biomechanics. Though rare, with an estimated prevalence of 0.0066%, its global documentation has increased due to heightened clinical suspicion and improved imaging modalities such as MRI [1,2]. Etiological factors include ulnar variance, compromised vascularity, and biomechanical stresses [3–6].

Patients typically present with dorsal wrist pain, reduced grip strength, and motion restriction. Diagnosis involves clinical evaluation and imaging, with Lichtman's classification guiding treatment. While early stages may respond to immobilization, Stage IIIb and beyond often necessitate surgical approaches [7]. We present a case of Stage IIIb disease managed by lunate excision and autologous tendon interposition arthroplasty.

Case Report

A 25-year-old female presented with chronic pain over the dorsal aspect of left wrist since three years. The pain had progressively worsened over the past six months. It was insidious in onset and dull and persistent in nature and got exacerbated by wrist movement and daily activities. The patient also complained of restricted wrist movement and weakening of grip strength. There was no history of trauma and any exacerbating occupational factors. No history of comorbidities or systemic symptoms such as fever, weight loss or night sweats was noted.

On general examination, the patient was well oriented to time, place and person. Vitals of the patient were recorded continuously and were stable on all occasions. The body temperature was 98.6 °F, pulse rate was 88 beats per minute, blood pressure was 110/78 mm of Hg, respiratory rate was 17 breaths per minute and the oxygen saturation (SpO2) was observed to be 98%. On Systemic examination no abnormality was detected in the central nervous system cardiovascular system and respiratory system. No adventitious or added sounds were present on auscultation.

Clinical examination of the left wrist showed intact skin with no signs of infection, sinus formation or dilated veins. Swelling was absent, though tenderness was present over the dorsal aspect of right lunate bone. No abnormality was detected in the radial pulse and full range of motion was preserved in the fingers along with intact sensation throughout the hand. Flexion/extension of the right wrist was 15°/ 10° and the Ulnar deviation/Radial deviation was 5°/5°. Grip strength was reduced on the left right side as compared to the dominant right side.

On the standard AP lateral and oblique radiographs, collapse of the lunate carpal bone was noted (Figure 1 A,B,C). An MRI was performed to confirm the diagnosis [(Figure 2) . It showed poorly defined abnormal marrow signal on T1 and T2. Mild heterogeneity was seen in STIR image. Irregular loss of articular cartilage of proximal lunate was seen (Figure 2). The diagnosis of Stage III b Kienböck's disease according to Lichtman's

classification was made.

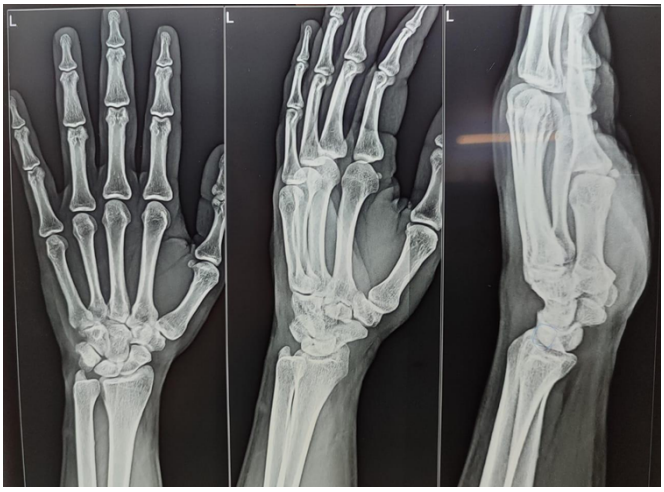

Figure 1: A): Postero-Anterior (PA) view of the left wrist; B): Oblique view of the left wrist; C): Lateral view of the left wrist showing Lunate collapse with fixed scaphoid rotation, suggestive of Keinbock's disease without Disrupted Normal Vascular Dynamics.

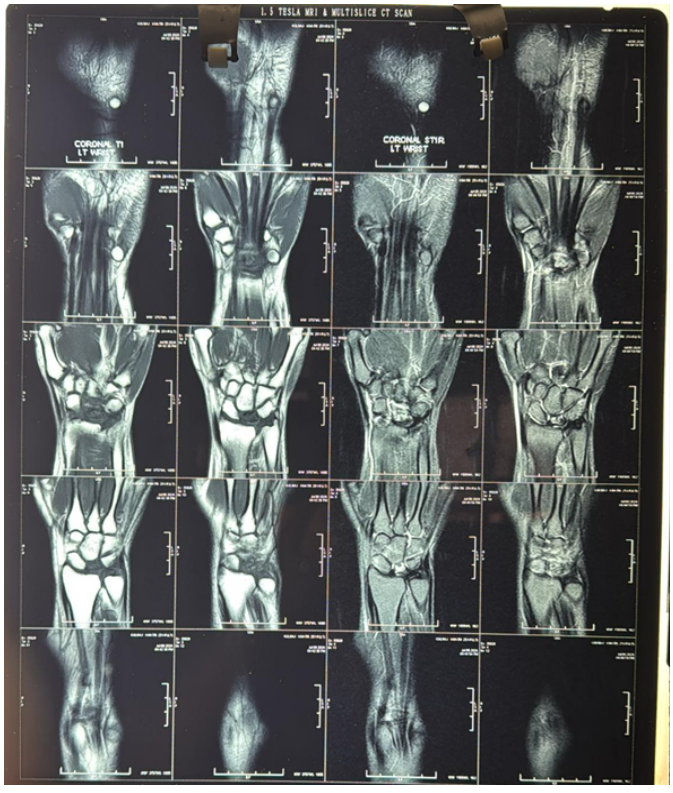

Figure 2: MRI showing stage III b of Kienbock's disease. Irregular loss of articular cartilage of proximal lunate.

Treatment Plan

In accordance with the grade of the disease, we treated the patient surgically by excision of the lunate carpal bone, by dorsal approach as seen in Figure 3A. Interposition arthroplasty with ipsilateral palmaris longus tendon was performed.

The palmaris longus muscle was identified on the volar aspect of the forearm and isolated making a small longitudinal incision (Figure 4A). It was then traced up to its muscle belly and stabilised using stab skin incisions. The tendon was detached from the muscle belly and harvested to a length of 25 mm (Figure 4B). It was then coiled and inserted into the void which was created by the excision of the lunate bone as an interposition material (Figure 3B). A K-wire was used to maintain proper alignment. The surgical site was irrigated with saline and haemostasis was achieved. The joint capsule, subcutaneous tissue and skin were closed in layers. Vicryl suture was used for subcutaneous tissue and stapler was used for skin closure.

Postoperatively, the wrist was immobilized in a cast for four weeks. The patient subsequently underwent a structured physical therapy program aimed at restoring wrist strength and range of motion. Seven months post-operatively VAS score was 2 as compared to the previous score of 8. The patient was able to conduct almost all of the daily activities pain free.

Radiographic evaluation at final follow-up demonstrated no signs of carpal collapse (Figure 4 A-D). The wrist exhibited a palmar flexion and dorsiflexion range of 25° each.

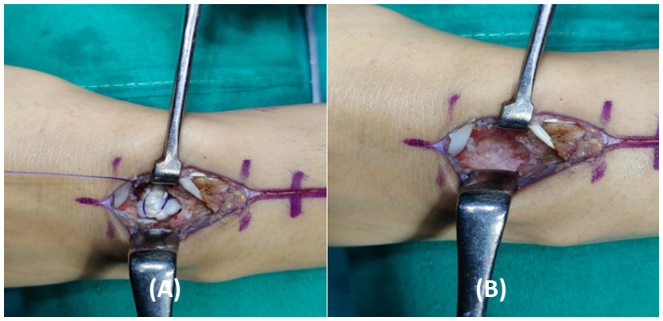

Figure 3: A): Clinical picture showing exposure of lunate bone; **B):** Clinical picture showing space created for interposition by removal of lunate bone.

Figure 4A: Identification and isolation of the ipsilateral palmaris longus tendon on the volar forearm.

Discussion

The success of lunate excision with tendon interposition depends on careful patient selection. Ideal candidates are younger patients with Stage IIIa or IIIb disease who have persistent pain and functional limitation but no advanced radiocarpal arthritis. Preserved cartilage in adjacent carpal

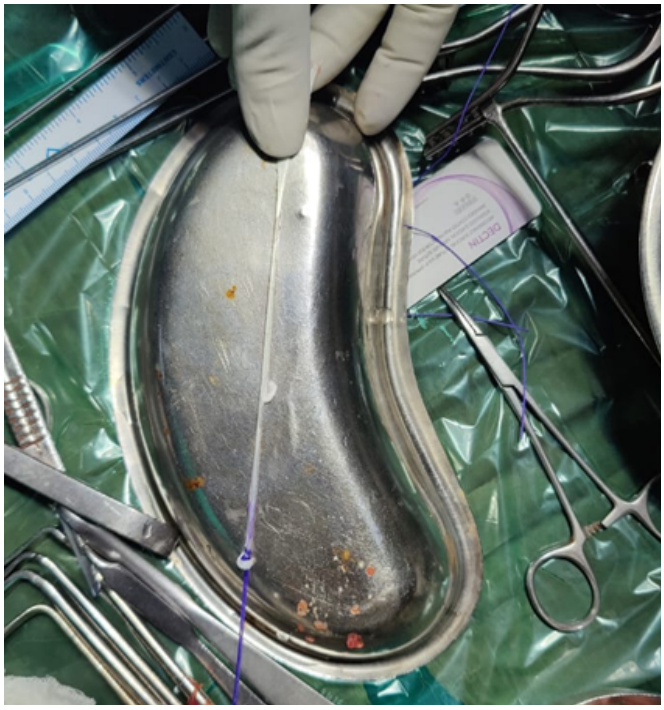

Figure 4B: Harvested palmaris longus tendon.

Figure 4C: Intra-op radiograph showing the graft placed at the radio-carpal joint

bones is crucial, as interposition aims to maintain carpal height and motion rather than replace a destroyed joint [10,13,18–20]. Patients with low to moderate physical demands are more suitable, as heavy manual laborers may experience earlier failure. Contraindications include Stage IV disease with established degenerative changes, significant carpal collapse, or cases where alternative motion-preserving procedures (e.g., revascularization, PRC, or fusion) are more appropriate.

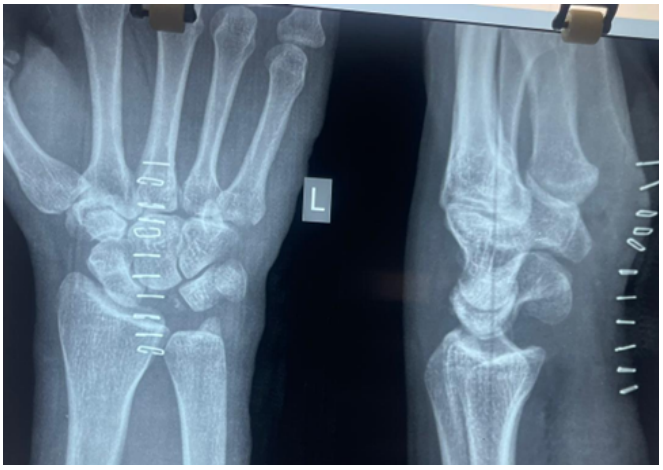

Figure 4D: Post operative radiograph of the left wrist in AP and Lateral view showing absence of carpal bone.

This case met these criteria: a young adult with Stage IIIb disease, intact surrounding cartilage, and no arthritic progression, making her a suitable candidate for tendon interposition.

Although Kienböck's disease predominantly affects young males and the dominant hand [8,9], our case involved a young female with non-dominant wrist involvement. Surgical treatment for Stage IIIb includes options such as lunate excision, vascularized bone grafts, proximal row carpectomy, or limited intercarpal fusion.

In this patient, lunate excision combined with biological interposition using the palmaris longus tendon was selected. This tendon is functionally redundant in many individuals and harvesting is associated with minimal morbidity [11]. Autologous tendon interposition provides the advantages of biocompatibility and preservation of carpal height without introducing foreign material [12-14]. Several previous reports demonstrated favorable pain relief and motion preservation with this technique [10,13-15].

More recent comparative studies have added to the understanding of long-term outcomes. Luegmair et al. (2015) showed that palmaris longus tendon interposition provided satisfactory short- to mid-term pain relief and function, although some loss of grip strength was noted over time [10]. Döring et al. (2011) highlighted that long-term follow-up beyond 10 years could reveal progression to radiocarpal arthritis in some patients [14]. Recent studies show tendon interposition preserves motion early, while PRC or fusion may give more durable results in advanced disease [18–20].

These recent reports suggest that patient selection is critical: tendon interposition arthroplasty appears to be most beneficial in young patients without extensive degenerative changes, whereas salvage procedures may be more reliable in late-stage disease or in heavy manual workers. Our case supports the short-term efficacy of tendon interposition in terms of pain relief and restoration of daily function.

Limitations

The main limitation is the short 9-month follow-up. While outcomes were good, literature shows that deterioration may occur with time [14,17]. Ongoing review is needed to confirm durability.

Conclusion

Lunate excision with palmaris longus tendon interposition is a useful short-term option for advanced Kienböck's disease. It provides pain relief and preserves motion in selected patients, but longer follow-up and comparative trials are required to establish long-term value.

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