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Soft Tissue Interposition Arthroplasty and Hinged Bar External Fixation in Young Male with Ankylosed Elbow Joint: A Case Report

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ABSTRACT

Ankylosis of the elbow, especially in young individuals, severely impairs upper limb function and quality of life. This study aims to present the use of soft tissue interposition arthroplasty combined with hinged bar external fixation in managing left elbow joint ankylosis in a young adult male. A 19-year-old male presented with a diagnosis of left elbow joint ankylosis. The surgical procedure included osteotomy, soft tissue interposition arthroplasty using contralateral fascia lata, and stabilization with a hinged bar external fixator. Intraoperative findings included fibrotic tissue, significant trochlear erosion (>50%), and synostosis of the radial head and ulna. The ulnar nerve was preserved. The operation resulted in successful graft placement and stable fixation at 90° elbow flexion. After surgery, the patient was conscious with well-controlled pain and intact neurovascular status. Wound condition was clean with no discharge, and the external fixator was functioning well. Distal active range of motion was preserved. The wound care was performed every 2 days and external fixation was maintained for 4 weeks. The successful management of elbow ankylosis in this young male using soft tissue interposition arthroplasty combined with hinged bar external fixation demonstrates the potential of this technique as a motion-preserving alternative to total elbow arthroplasty. This case illustrates the technical feasibility and early favorable outcome of soft tissue interposition arthroplasty combined with external fixation for elbow ankylosis in a young patient, offering hope for functional restoration without prosthetic replacement.

Keywords: elbow ankylosis, fascia lata graft, hinged external fixator, interposition arthroplasty, motion-preserving surgery

INTRODUCTION

Elbow ankylosis is a debilitating condition that leads to the complete loss of motion in the joint, resulting in significant functional impairment and a marked reduction in quality of life. The condition can arise secondary to trauma, infection, inflammatory arthritis, burns, or previous surgical procedures that lead to excessive fibrosis, heterotopic ossification, or bony fusion across the joint surfaces.[1] The functional consequences are especially profound in young and active individuals, as the elbow plays a crucial role in positioning the hand for daily activities and occupational tasks. Therefore, the restoration of joint motion and functional range becomes a primary therapeutic goal,

and the selection of an appropriate surgical intervention is of critical importance.[2]

Traditional surgical options, such as total elbow arthroplasty, have proven effective in older or low-demand patients but remain suboptimal for younger individuals due to concerns about implant longevity, activity restrictions, wear-related complications, and the potential need for future revision surgery.[3] As a result, motion-preserving procedures, particularly soft tissue interposition arthroplasty, have gained renewed interest. This biological reconstruction technique involves excision of the ankylosed bone or fibrotic tissue followed by interposition of a biological material—such as fascia lata, skin, or muscle—to prevent re-ankylosis and facilitate joint mobility.[4]

To enhance postoperative stability and allow for early mobilization, the use of a hinged external fixator has been advocated. This device not only maintains proper joint alignment but also provides a controlled range of motion during the healing process, minimizing the risk of instability or recurrent stiffness. The combination of soft tissue interposition arthroplasty and hinged external fixation represents a promising strategy for restoring motion while preserving the native anatomy of the elbow joint.[5]

Here, we present the case of a 19-year-old male with ankylosed left elbow joint successfully treated with soft tissue interposition arthroplasty using contralateral fascia lata graft and hinged bar external fixation. This report aims to describe the surgical technique, intraoperative findings, and early postoperative outcomes.

CASE PRESENTATION

A 19-year-old male (NRA) was admitted to the Orthopedic and Traumatology Department of Ngoerah Hospital on March 16, 2025, with a diagnosis of ankylosing left elbow joint. The patient reported a history of progressive stiffness and complete loss of motion in the left elbow over several years, following a previous traumatic injury. He denied any history of infection, inflammatory arthritis, tuberculosis, or systemic disease. The immobility of the elbow significantly affected his ability to perform daily activities, including eating, grooming, and lifting objects, thereby reducing his quality of life. The patient expressed a desire to regain elbow motion and functional independence.

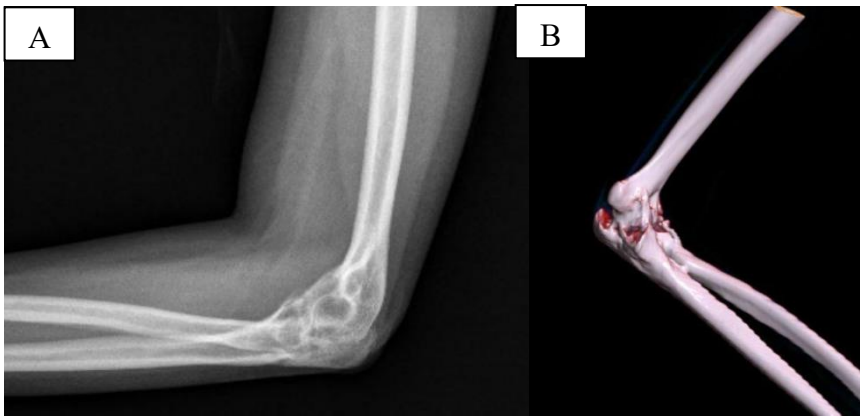

Figure 1. The radiological examination of X-ray (A) and 3D CT-scan (B) reconstruction of left elbow. (Source: internal documentation)

Clinical Examination

Upon physical examination, the left elbow was fixed in a flexed position of approximately 80°, with no active or passive range of motion (ROM). The overlying skin appeared normal, with no erythema, swelling, or sinus tract formation. There was no tenderness on palpation, and the ulnar nerve was palpable along its anatomical course without evidence of entrapment or irritation. Neurovascular examination revealed intact radial and ulnar pulses, as

well as preserved motor and sensory function in the distal limb in Figure 1. Radiological examination showing X-ray and 3D CT-scan reconstruction of the left elbow demonstrating fracture dislocation associated with malunion of the radial head, ulna, and humeral condyles.

Systemic examination was unremarkable. Laboratory investigations showed normal hematological and biochemical parameters, including a hemoglobin level of 14.10 g/dL. The patient was classified as ASA Physical Status I, indicating a healthy individual without systemic disease. Radiographic evaluation of the left elbow demonstrated complete bony ankylosis involving both the humeroulnar and proximal radioulnar joints, with obliteration of the joint space and irregular bone margins. There were no signs of active infection or osteolysis.

Durantee Operation

The patient underwent soft tissue interposition elbow arthroplasty combined with hinged bar external fixation on March 18, 2025. Under general anesthesia, the patient was positioned supine on the operating table with the affected limb supported on a sterile arm board. A posterior tongue-shaped incision was made along the midline of the elbow, extending proximally and distally to ensure optimal exposure of the joint.

Dissection revealed dense fibrotic tissue and extensive scar formation surrounding the joint capsule. The ulnar nerve was carefully identified, mobilized, and protected throughout the procedure. A circumferential soft tissue release was performed to eliminate fibrotic adhesions and gain access to the ankylosed joint surfaces. An osteotomy was carried out to separate the fused articulations of the humerus, ulna, and radial head. Intraoperative inspection demonstrated more than 50% erosion of the trochlear surface of the humerus, consistent with advanced degenerative changes. A fascia lata graft was harvested from the contralateral (right) thigh, utilizing a 10 × 4 cm segment of the tensor fascia lata. This graft served as an interposition material, inserted into the resected joint space to prevent re-ankylosis.

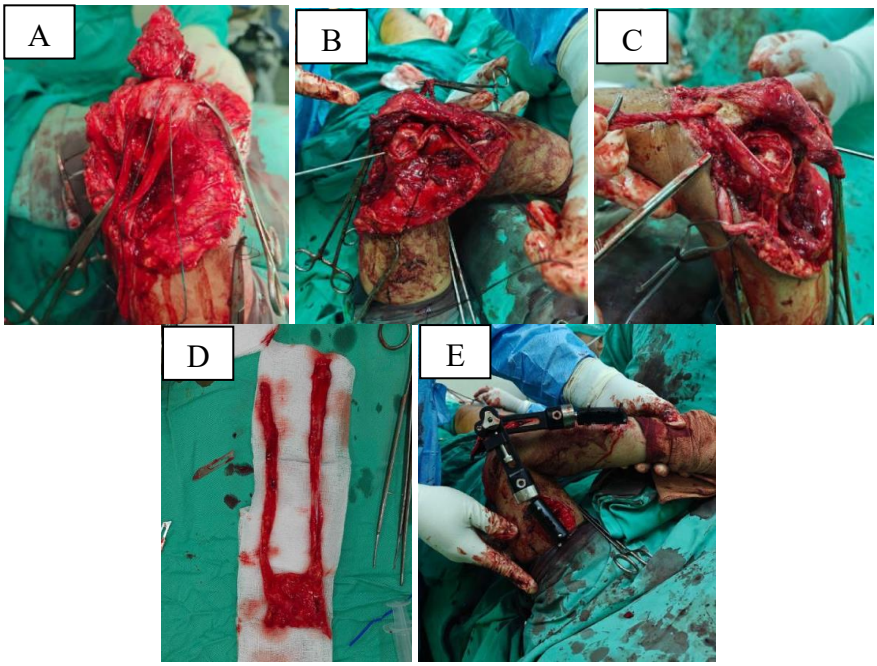

Figure 2. The intraoperative demonstrated the surgical exposure and debridement of the ankylosed elbow joint (A–C), preparation of the fascia lata graft (D), and interposition arthroplasty with fixation (E). (Source: internal documentation)

Additionally, bony tunnels were created through the ulna to facilitate reconstruction of the medial collateral ligament (MCL) and lateral collateral ligament (LCL) using fascia lata strips, thereby restoring joint stability and proper alignment. Two Schanz screws were placed in the ulna and two in the humerus, followed by application of a hinged bar external fixator. The device was adjusted to maintain the elbow at 90° flexion, allowing for controlled postoperative motion. Stability testing confirmed a secure construct with satisfactory alignment through passive flexion–extension. The wound was irrigated thoroughly with normal saline, hemostasis was achieved, and the incision was closed in multiple layers. The total estimated intraoperative blood loss was approximately 400 mL (Figure 2. A-E).

Postoperative

Following surgery, the patient was transferred to the recovery room in a fully conscious and hemodynamically stable condition. Postoperative analgesia was maintained via a continuous intravenous infusion of fentanyl (300 mcg) and ketamine (20 mg) diluted in 50 mL of normal saline, administered at a rate of 2.1 mL/hour. Additional pain control was achieved with paracetamol 500 mg orally every 6 hours and ibuprofen 400 mg orally every 8 hours. Ceftriaxone 1 g intravenously twice daily was administered for 24 hours postoperatively as antibiotic prophylaxis.

On postoperative day 0 (H-0), the patient remained alert, comfortable, and afebrile, reporting a Visual Analog Scale (VAS) pain score of 2–3. The surgical dressing was dry and intact, with no evidence of bleeding, discharge, or wound dehiscence. The hinged bar external fixator was functioning well, maintaining elbow alignment and fixation stability. Distal neurovascular examination revealed intact capillary refill, palpable radial and ulnar pulses, and normal motor and sensory function of the hand and fingers. The patient was able to perform active wrist and thumb extension, with negative Froment's and peace sign tests, confirming preservation of ulnar and radial nerve integrity.

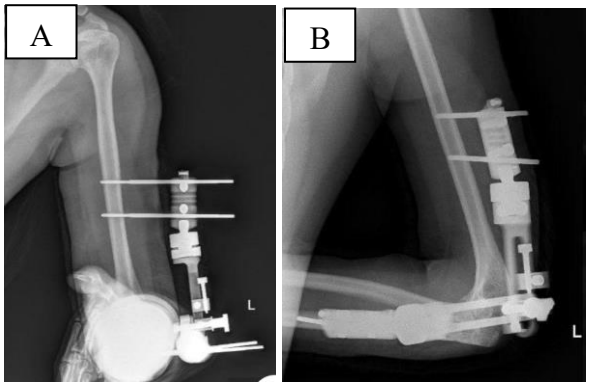

Figure 3. Postoperative anteroposterior (A) and lateral (B) radiographs of the left elbow showing the hinged external fixator in place following soft tissue interposition arthroplasty (Source: internal documentation)

The postoperative care plan included wound dressing changes every 2 days, continued immobilization with the hinged external fixator for four weeks, and early active range of motion (ROM) exercises of the distal joints (wrist and fingers) to prevent stiffness. After the initial immobilization period, supervised physiotherapy was scheduled to initiate gradual and controlled elbow mobilization. The postoperative course was uneventful, with no signs of infection, neurovascular deficit, or fixator-related complications. The patient demonstrated satisfactory wound healing, stable fixation, and preserved distal limb function during early follow-up, indicating a

favorable early recovery following soft tissue interposition arthroplasty with hinged bar external fixation for elbow ankylosis (Figure 3.).

DISCUSSION

Elbow ankylosis represents one of the most challenging conditions in orthopedic practice, often resulting from post-traumatic complications, infection, burns, or prolonged immobilization leading to fibrous or bony fusion across the articular surfaces.[1] In this case, the patient presented with post-traumatic bony ankylosis of the left elbow, manifesting as a complete loss of motion and fixed flexion deformity. The chronic immobility not only limited his ability to perform essential activities of daily living but also significantly impaired his quality of life, emphasizing the importance of surgical intervention aimed at restoring motion and functional use of the limb.

In cases of established bony ankylosis, nonoperative management is rarely effective, and surgical reconstruction becomes the treatment of choice. The selection of an appropriate technique depends on patient factors, such as age, activity level, bone quality, and soft tissue status. Total elbow arthroplasty (TEA) provides reliable pain relief and motion restoration in elderly, low-demand patients; however, in young and active individuals, its use is limited due to implant longevity issues, wear-related complications, and revision challenges.[6] Therefore, motion-preserving procedures such as soft tissue interposition arthroplasty have gained renewed attention for younger patients with preserved bone stock and no active infection.[4]

Soft tissue interposition arthroplasty involves the excision of ankylosed bone or fibrous tissue, recontouring of articular surfaces, and interposition of a biological graft—commonly fascia lata—to act as a pseudo-articular interface preventing re-ankylosis. The fascia lata graft provides excellent tensile strength, low immunogenicity, and biocompatibility, making it suitable for reconstructing the articular surface.[4,7] In the present case, the use of a contralateral fascia lata autograft provided both an interpositional cushion and ligamentous support for medial and lateral collateral reconstruction, restoring joint congruity and stability.

To further ensure mechanical stability and promote early mobilization, a hinged external fixator was applied. This device allows controlled flexion and extension around the anatomic axis of rotation while maintaining joint reduction. Studies have shown that early mobilization under stable fixation minimizes periarticular fibrosis and enhances functional recovery.[5,8] Jupiter and Ring also demonstrated favorable outcomes using hinged external fixation following elbow arthroplasty, with patients achieving an average motion arc of 30°–130° and significant pain reduction. However, accurate alignment of the fixator hinge with the elbow's flexion-extension axis is crucial to prevent restricted motion and uneven stress on the reconstructed joint.[9]

Intraoperative findings in this patient revealed dense fibrotic tissue, obliterated joint space, and more than 50% trochlear erosion, consistent with advanced post-traumatic arthropathy. Extensive soft tissue release and osteotomy were essential to restore mobility and access the ankylosed joint. Following graft placement and fixation, stability testing demonstrated satisfactory alignment and secure construct integrity. Early postoperative evaluation showed stable vital signs, well-controlled pain, intact neurovascular status, and proper functioning of the hinged fixator. The absence of wound complications or pin tract infections further supported the success of the surgical intervention. The combination of soft tissue interposition and hinged fixation provided the dual benefits of biological resurfacing and mechanical stability, allowing for early rehabilitation. This approach aligns with modern principles of functional joint reconstruction—

preserving native anatomy while promoting motion. Nonetheless, complications such as graft failure, infection, or residual stiffness remain possible and require vigilant follow-up.[10]

This case reinforces that interposition arthroplasty with fascia lata graft and hinged external fixation is a viable joint-preserving alternative for young, active patients with post-traumatic elbow ankylosis who are unsuitable for total elbow replacement. However, this report is limited by its single-patient nature, short-term follow-up, and lack of quantitative postoperative functional assessment. Future studies with larger cohorts and long-term outcomes are warranted to validate the durability and functional success of this combined technique.

CONCLUSION

This case demonstrates the successful management of post-traumatic elbow ankylosis in a 19-year-old male using soft tissue interposition arthroplasty with a contralateral fascia lata graft and hinged bar external fixation. The combination of biological reconstruction and mechanical stabilization provided a functional range of motion, maintained joint alignment, and allowed early rehabilitation without complications such as infection or graft failure. This approach offers a motion-preserving alternative to total elbow arthroplasty, particularly suitable for young, active patients, emphasizing the importance of individualized, joint-sparing surgical strategies in restoring upper limb function and quality of life.

Declaration by Authors

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