

# Total Elbow Arthroplasty with Condylar Preservation for Post-Traumatic Non-union with secondary Arthropathy: A Case Report

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## Learning Point of the Article:

Traditionally, total elbow arthroplasty involves resection of the humeral condyles; however, in this case report, the condyles were preserved and sutured to the prosthesis to achieve improved anatomical replication.

## Abstract

**Introduction:** Total elbow arthroplasty (TEA) is a valuable salvage procedure, traditionally reserved for elderly or rheumatoid patients. However, expanding indications have allowed selective application in younger patients with debilitating post-traumatic elbow pathology.

**Case Report:** A 74-year-old female presented with persistent instability and ulnar neuropathy following non-union of a distal humerus fracture and chronically dislocated elbow, complicated by progressive arthropathy. On evaluation, she exhibited valgus-varus laxity, restricted range of motion (ROM), and crepitus. A semi-constrained TEA was performed using a posterior triceps-splitting approach. The humeral condyles, though destabilised from prior instrumentation, were preserved and secured using No. 5 Ethibond sutures. These sutures were tied to the humeral prosthesis. Postoperatively, by 3 months the patient achieved a functional, pain-free elbow with improved ROM and resolution of neurological symptoms.

**Conclusion:** This case highlights the potential of condylar-preserving TEA as a reliable management option with advanced post-traumatic elbow dysfunction. Even in the presence of instability, non-union and prior instrumentation, preserving the native condyles and securing them to the prosthesis can yield a stable, pain-free, functional result.

**Keywords:** Total elbow arthroplasty, Ethibond sutures, Anatomical reconstruction, condylar preservation

## Introduction

Distal humerus fractures, particularly those involving articular surfaces, can result in chronic elbow dysfunction if not treated effectively. In younger patients, internal fixation is generally favoured to maintain native anatomy and permit functional recovery. However, complications such as non-union, post-traumatic arthropathy, chronic elbow instability may necessitate salvage options. TEA, once primarily indicated for rheumatoid or osteoarthritic pathology, has emerged as a valuable solution in such cases [1,3].

Despite improvements in implant design and surgical technique, the application of TEA in younger patients (<50 years) remains controversial due to the risk of implant failure and limitations in postoperative loading [1,5]. Nevertheless, literature increasingly supports its use in select post-traumatic cases where reconstruction is unfeasible, especially when pain and loss of motion severely impact quality of life [2,4].

## Case Report

A 74-year-old female presented with complaints of persistent

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## Author's Photo Gallery



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**Figure 1:** Preoperative radiograph

pain, restricted motion, and paraesthesia in the left elbow. She had sustained a closed distal humerus fracture one year prior, managed with open reduction and internal fixation using cancellous compression screws at an outside institution.

The fixation failed, leading to non-union of the elbow joint. Following implant removal three months prior, the patient reported worsening symptoms including instability, deformity, and neurological symptoms in the ulnar distribution.

Clinical Examination shows that medial side of elbow prominence with loss of 3-point bony alignment

Tenderness over medial and lateral joint lines

Painful crepitus on motion

ROM limited to 20°–90° with terminal pain

Valgus and varus laxity confirmed

Ulnar nerve: paraesthesia over little finger, motor function preserved

### Investigations

Radiographs: Non-union of distal humerus, joint space narrowing, articular irregularity, subluxation (Fig. 1).

CT scan: Misaligned fragments, condylar attenuation, cartilage loss

### Surgical Management

#### Rationale for TEA:

Given the chronic nature of the instability, non-union, and degenerative changes, reconstructive fixation was not viable. The patient was counselled on the benefits and limitations of TEA, including permanent lifting restrictions and prosthesis

longevity.

#### Surgical tips and tricks:

Under general and regional anaesthesia, a posterior midline incision was used. A triceps-sparing approach provided access to the joint [6]. Dense fibrous tissue and synovitis were debrided. The ulnar nerve was isolated and protected. Intraoperatively, the condyles were found intact but with compromised cortical support.

Instead of resection, both condyles were preserved and secured with multiple tensioned loops of No. 5 Ethibond suture, restoring the supracondylar architecture and facilitating prosthesis fit. The medullary canals were broached, and

uncemented, hinged prosthesis was implanted. Trialling confirmed joint stability and good arc of motion (0°–110°). Triceps was repaired with heavy non-absorbable sutures. (Fig. 2 & 3).

#### Postoperative Protocol:

Immobilization with posterior slab was done for 14 days. Passive ROM initiated at day 14 under physiotherapy supervision. Active-assisted ROM at 4 weeks. Muscle strengthening was continued thereafter. Lifelong precautions on lifting weight and fall prevention was followed. Clinical Examination at 6 weeks shows that surgical scar was well-healed. There was loss of 3-point bony alignment as compared to opposite side. There was tenderness over medial and lateral

Condylar preservation helps in complete supination and extension
Condyles are sutured back by Ethibond using the intraosseous suturing technique
Anterior transposition of the ulnar nerve should be done
Pre-operative planning using templating aids in better outcomes
Pre-assembled prosthesis should be implanted
In post-operative rehabilitation, protected weight bearing of the elbow, which is <2.5 kg, should be started for the initial 6 weeks, and early passive range of motion should be encouraged

**Table 1: Key pointers for surgical management.**





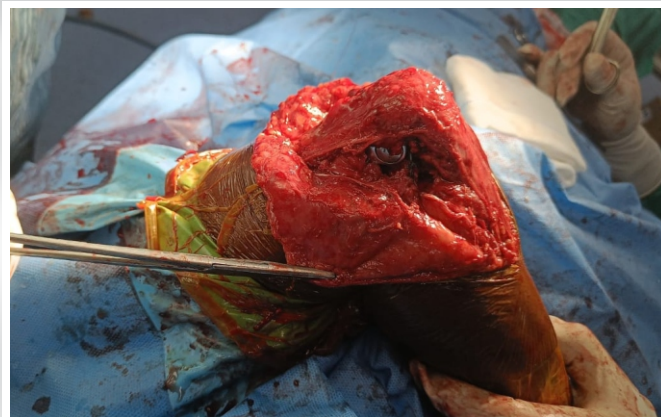
**Figure 2:** Implantation of prosthesis

joint lines. Rom was 200 to 900, DASH score of 40 and there was no valgus and varus laxity. Ulnar nerve paraesthesia over little finger was present for which NCV was done which revealed Ulnar neuropathy, motor functions were preserved. At 6 months follow-up, ulnar neuropathy was resolved and she has 10 to 110 degrees of ROM with full supination and pronation with DASH score of 20. There was no tenderness over the scar and joint line. Power was 4/5 in both wrist flexion and extension at the end of 6 months. Whereas Follow-Up and Outcome at 1 year was ROM 10° to 120°. (Fig. 4 & 5).

Pain-free with complete resolution of paraesthesia with DASH score which improved from 65 (preoperative) to 15.3 (at end of 1 year). Radiographs at 6 weeks, 6 months and 1 year revealed no aseptic loosening of the elbow prosthesis along with non-displacement of both the condyles. (Fig. 6, 7, 8).

### Discussion

The management of complex elbow injuries, remains a surgical challenge when primary internal fixation fails. The risk of long-term disability due to chronic pain, stiffness, deformity, and instability is significant. In the present case, the presence of non-union and chronic elbow malalignment led to progressive arthropathy, which rendered the



**Figure 3:** Reconstruction and anatomical replication

joint irreparable by conventional means. In such scenarios, total elbow arthroplasty (TEA) provides an alternative pathway to restore function and reduce pain [7]

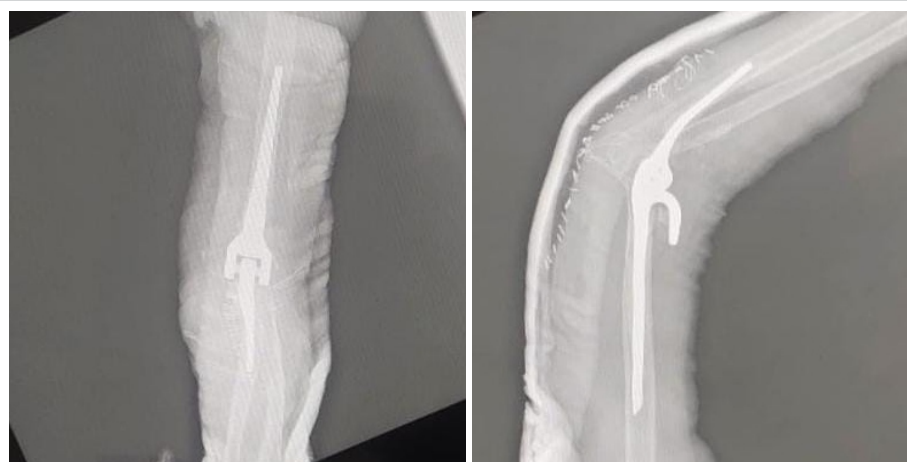
TEA was historically limited to elderly patients with inflammatory arthropathies due to concerns about mechanical wear and activity restrictions. However, advancements in prosthetic design, cementing techniques, and soft tissue handling have broadened its use. Coonrad-Morrey-type semi-constrained implants, like the one used in this case, offer a balance between joint mobility and stability, particularly valuable in elbows with ligamentous incompetence [5].

Several authors have demonstrated the successful application of TEA in young, low-demand individuals when reconstruction is not feasible. Savio et al. [1] described a similar case of TEA in a 38-year-old patient with schizophrenia and a neglected terrible triad, resulting in significant post-traumatic changes. Their study emphasized the role of TEA in providing pain relief and restoring functional range of motion when traditional methods were contraindicated.

Similarly, Prasetya et al. [2] highlighted the importance of soft



**Figure 4 and 5:** Range of motion clinical postoperative



**Figure 6 and 7:** Postoperative Radiograph

and preoperative counselling about lifelong restrictions is vital to ensure implant longevity.

This case exemplifies the integration of anatomical preservation, stable prosthetic implantation, and soft tissue balance, leading to excellent early outcomes in a challenging post-traumatic elbow. Continued follow-up will be essential to monitor long-term performance, but early indicators suggest that condylar-preserving TEA can be a robust solution in appropriately selected young patients. [10].

### Conclusion

Total elbow arthroplasty with condylar preservation and soft-tissue reconstruction offers a promising solution for managing severe post-traumatic elbow dysfunction—including non-union and arthropathy—in select patients. With appropriate surgical planning and patient compliance, TEA can restore function, alleviate pain, and improve quality of life despite age-based constraints.

### Clinical Message

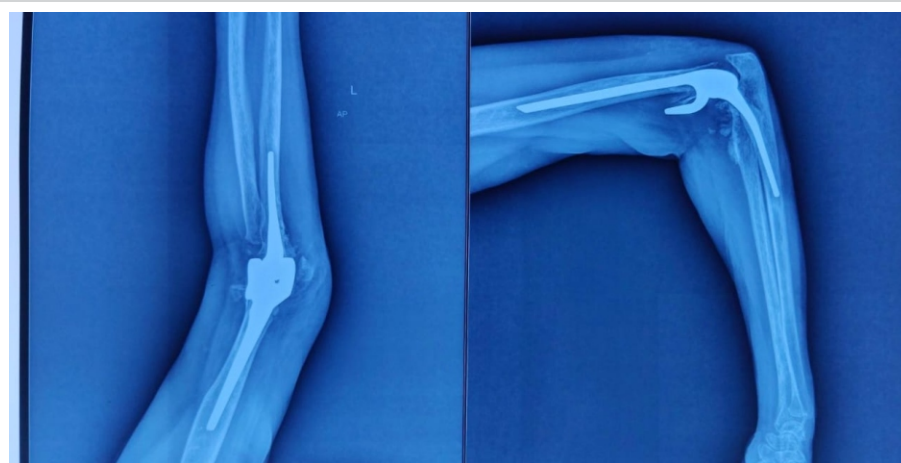
Condylar preservation and soft-tissue reconstruction in total elbow arthroplasty present a viable approach for managing complex post-traumatic elbow conditions such as non-union and arthropathy in appropriately selected patients. This case highlights the successful combination of anatomical preservation, secure prosthetic fixation, and restoration of soft-tissue balance, resulting in excellent short-term outcomes. Ongoing follow-up will be crucial to evaluate long-term success.

tissue management during TEA in neglected non union and arthropathy. They used a triceps turn-down flap for adequate lengthening and tissue coverage, allowing for improved postoperative outcomes. While our case did not require such augmentation, the meticulous handling of triceps and preservation of humeral condyles helped avoid soft tissue compromise.

The concept of condylar preservation in TEA has been less frequently reported but offers several potential benefits. It aids in maintaining the natural shape of the distal humerus, improves implant seating, and provides additional cortical support. In our case, cerclage with No. 5 Ethibond sutures allowed secure stabilization of the condylar fragments, recreating an anatomic scaffold for the prosthesis. This strategy avoids the need for extensive distal bone resection, a critical consideration in younger patients who may outlive their initial implant.

D'Ambrosi et al. [4] reported similar success with TEA in a patient with complete post-traumatic elbow ankylosis. Their outcomes mirrored our findings: significant improvement in range of motion, pain scores, and daily activity performance. Furthermore, Cutler et al. [5] demonstrated the feasibility of converting elbow arthrodesis to TEA, which underscores the procedure's value as a motion-restoring solution in severely compromised elbows.

It is essential, however, to recognize the limitations and potential complications of TEA. These include implant loosening, infection, bushing wear, and periprosthetic fractures, particularly with increased mechanical demands [8,9]. Hence, patient selection remains crucial,



**Figure 8:** Follow up radiograph



**Declaration of patient consent:** The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

**Conflict of interest:** Nil    **Source of support:** None

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