

# Total Elbow Replacement in Rheumatoid Arthritis: A Case Report

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## Abstract

Inflammatory arthropathies such as Rheumatoid arthritis represent the classic indication for Total elbow arthroplasty (TEA). Indications have been expanded to include posttraumatic osteoarthritis, acute distal humerus fractures, distal humerus nonunions and reconstruction after tumour resection. Elbow arthroplasty successful in terms of pain relief, motion and function. For elderly patients with deformity and ankylosis of the elbow due to Rheumatoid arthritis, Total Elbow Arthroplasty is one of the valuable options. Here, we present a case of a female patient suffering from rheumatoid elbow with significant pain, deformity and instability. The Semi Constrained hinge type elbow prosthesis was used. Clinico-radiological follow up was done at 1 month, 3 months, 6 months, 8 months. In the present case at follow up, supination was 70°, pronation 70°, flexion 135°. The mean Mayo elbow performance score was 95 points. Clinico-radiologically the elbows were stable and no evidence of loosening was seen. Elbow arthroplasty remains a valuable option for deformed and unstable elbows especially in selective patients with crippling deformity of the elbow.

**Keywords:** Rheumatoid Arthritis; Total Elbow Arthroplasty; Semi-constrained prosthesis.

## Introduction

Rheumatoid arthritis (RA) is a chronic inflammatory disease characterized by peripheral polyarthritis and extraarticular manifestations. One or both elbows are involved in 20–65% of rheumatoid patients, although only 5% of the patients develop isolated elbow involvement [1, 2]. Chronic synovitis resulting in joint destruction is a prominent feature. Patients with severe joint destruction occasionally develop severe contractures or ankylosis (Larsen grade- 6) which impair the Activities of Daily Living (ADL) (Table -1). The indications for arthroplasty are rheumatoid arthritis, comminuted fractures of the distal humerus with intraarticular extension, and posttraumatic bony ankylosis of the elbow. In general, elbow arthroplasty is less frequently performed as compared to hip or knee arthroplasty [3]. It may be due to the higher incidence of complications like implant loosening due to cyclic loading in flexion and extension causing compressive and distractive loads [4]. The MAYO Elbow performance Score (100 Points), which takes into account pain, motion, stability, and daily function, is most commonly used to compare various operative procedures of the elbow.

Total elbow arthroplasty has continued to evolve over time. Modern Total elbow implants fall into two design categories: Linked and unlinked. These terms are, generally, interchangeable with the descriptors semi-constrained and unconstrained, respectively. Linked implants are coupled together with pins or snap-fit bushings

that produce a semi-constrained hinged construction, allowing for a degree of laxity in the medial, lateral, and rotational planes that closely simulates the loose hinge of normal elbow kinematics [15]. Unlinked or unconstrained implants are not mechanically linked but rely on matching shapes of the bearing surfaces, adequate bone stock, and most importantly, the integrity of the capsular and ligamentous structures. Both linked and unlinked implants have a similar functional outcome and patient satisfaction scores. Semi-constrained-linked implants (Figure 1) utilize a loosely hinged mechanism allowing about 7-10 degrees of varus-valgus laxity and degrees of axial rotation.

The inherent stability of the design allows for less dependence on surrounding capsule-ligamentous structures and the laxity of the hinge system is thought to decrease the incidence of aseptic loosening [16]. Contraindications are infection, neuropathic joint, ipsilateral shoulder ankylosis and excessive use of the shoulder. The complication rate remains higher than arthroplasty of other joints. The most common complications of elbow arthroplasty include infection, loosening, wear, triceps weakness and ulnar neuropathy.

## Operative Procedure and Results

Surgery was performed in the lateral decubitus position. Under general anaesthesia and tourniquet, parts prepared and draped. A Posterior mid-line incision made curving slightly over the tip of the olecranon on the medial side extending from distal arm to proximal ulna. The triceps-reflecting Bryan-Morrey approach [17, 18, 19] was done where the triceps is detached off the olecranon reflecting it from medial to lateral maintaining its continuity with the anconeus and the forearm fascia.

The ulnar nerve was identified, mobilized, transposed anteriorly and submuscularly to avoid stretching and irritation by the prosthesis.

The humeral side is prepared first after exposing the joint and



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**Figure 1a:** semi constrained Total elbow prosthesis



**Figure 1b:** Semi constrained System



**Figure 2a:** Radiographs of elbow antero-posterior view



**Figure 2b:** Radiographs of Elbow Lateral view



**Figure 3:** Intra operative photographs



**Figure 4:** Post operative radiographs



**Figure 5:** Post operative clinical photos



**Figure 6:** Post operative radiographs at 8 months

releasing the lateral and medial collateral ligaments. The humeral canal is identified and used as a reference to cut a yoke-shaped segment of the distal humerus to accommodate the distal part of the humeral component. The ulnar canal is opened at the mid-portion of the trochlear notch and the canal prepared with right-sided broaches. Reaming of the distal humerus was done with triangular humeral reamer and upper part of the ulna with a rasp and wound lavage done with pulse lavage. Trial reduction was done and then final ulnar and humeral components were fixed to the bone with bone cementing. The components are then linked together (Figure 3). The operative time was 90 minutes. The range of motion was checked pre-

operatively, hemostasis maintained, repair of triceps done, and wound closed in layers. Above elbow slab with the elbow in 90-degree of flexion and forearm in supination was given. Intermittently active and passive movements of the elbow started were started. A removable splint was given after stitches removal. The patient was advised not to lift heavy weights and do hard works. She followed the rehabilitation protocol under the supervision of a Physiotherapist. Postoperatively, the passive range of motion of the patient's elbow ranged from 20 to 130 degrees and she did not experience any pain or numbness. Her Mayo elbow score improved to 95 at 3 months. The patient was assessed clinico-radiologically at each follow-up. No

infection, ulnar neuropathy or triceps weakness was noted. Supination was 70°, pronation 70°, flexion 135° at 6 months (Figure 5). The elbow was stable clinically at all aspects of movements. The final X-ray at 8 months follow up was taken to see the placement of humeral and ulnar stem, bone cement interface and any radiolucency (Figure 6). Functional outcome was assessed in form of lifting a glass of water, taking food, combing hair, buttoning dress and writing

## Discussion

The primary indication for TEA (Total Elbow Arthroplasty) is a painful arthritic elbow with Larsen Grade-IV or grade-V Rheumatoid destruction. There are only limited published data to guide a surgeon in implant selection. A recent systematic review by Little et al. [19] found that a high proportion of the published studies on TEA had originated from the establishments of the designers of the implants. In addition, no recognized form of survival analysis such as the Kaplan-Meier technique had usually been used in these studies. In their attempt to re-calculate the revision rates for different TEA designs in patients with RA, Little et al. found an overall revision rate of 13% at 5 years. Severe elbow arthritis secondary to trauma or inflammatory disease is a difficult problem in young or active individual.

Treatment option includes resection arthroplasty, (TEA), arthrodesis, and interposition arthroplasty. There is concern that younger patients with posttraumatic arthritis will require additional surgery following semi-constrained total arthroplasty because of infection, fracture, or bushing wear [14]. Gill and Morrey [17] published the results obtained in 78 consecutive rheumatoid elbows using the Coonrad-Morrey design. At the most recent follow-up, 97 per cent of the patients had no or mild pain and the mean arc of motion was from 28 degrees of extension to 131 degrees of flexion. The main complications of this series included deep infection (2 cases), aseptic loosening (2 cases), triceps avulsion (3 cases), periprosthetic fractures (2 cases), and ulnar component fracture (1 case). Survivorship free of revision was 92.4% at ten years. Prasad et al. [8] reported on 99 elbow arthroplasties performed for rheumatoid arthritis by a single surgeon. The Souter prosthesis was used in 44 elbows and the Coonrad-Morrey design in 55 elbows. The follow-up time was longer for Souter implants (9 and 5 years, respectively). Both designs provided similar rates of clinical improvement. However, Coonrad-Morrey implants had better 5-year survival (100 vs 93%). At 10 years, the survival of Souter implants was 76%, with reoperations due to loosening (18%) and instability (9%). Gill et al. reported on 78 total elbow arthroplasties performed using the Coonrad-Morrey design; 46 elbows had at least 10 years of follow-up. Arthroplasty led to substantial improvements in pain and motion. Mansat et al [12] reported 14 cases, 4 of which were rated as excellent, 4 were good, 1 was fair, and 5 were poor. He that reported that the

mean increase in the arc of flexion was 60 degrees (range, 5 to 115 degrees), with a mean increase of 33 degrees in flexion and 27 degrees in extension. Peden et al [11] reported 13 cases: 5 were rated as excellent, 3 were good, 4 were fair, and 1 was poor. According to these reports, functional ability restored in most patients postoperatively and was sufficient enough that they could perform ADL normally. The improvement in range of motion at the elbow measured 1 year after the operation was maintained for all patients after a 12-year follow-up. In our study, the average arc of motion was 85 degrees (range, 65 to 110 degrees) at the most recent examination. Improvement in the range of motion of the elbow improves the ADL for patients with RA. Common complications following TEA are aseptic loosening, infections, ulnar nerve problems, elbow instability, dislocation, subluxation, intraoperative fracture, fracture of the prosthesis, and ectopic bone formation [13]. When performing TEA for an ankylosed elbow, special care should be taken to prevent infection, ulnar nerve problems, instability, and an intraoperative fracture. Infection is not typically frequent, but severe complications can arise if it does occur. Mansat et al [12] reported that a deep infection developed in one elbow of two patients with posttraumatic stiffness. One patient had two previous operations prior to the arthroplasty, and the other patient had been operated on four times before. Both of these patients required revision surgery. Neurogenic symptoms, especially those pertaining to ulnar nerve disorders, were a relatively common complication after TEA. It was reported that some patients with moderate neurogenic symptoms preoperatively had complete relief after ulnar nerve decompression and transposition, while other previously asymptomatic patients developed ulnar nerve symptoms; however, no pain was attributed to the ulnar nerve [12]. Among our case, the patient had ulnar nerve symptoms in form of paresthesia and tingling along little finger which subsequently improved at 2 months follow up, however perioperative procedures to manage the ulnar nerve should be employed. Intraoperative fracture is one of the most severe complications to try and avoid during this type of operation. Peden et al [11] reported that two cases had a fracture of the lateral humeral epicondyle which resolved uneventfully and the ulnar component was malpositioned causing a perforation of the posterior cortex in another case. Mansat et al [12] reported that two patients sustained a fracture associated with a loose component.

## Conclusion

Total Elbow arthroplasty is very predictable in terms of pain relief and functional improvement. This has been used extensively in rheumatoid arthritis, posttraumatic arthritis, and comminuted fracture distal humerus with intraarticular extension in elderly patients. To conclude TEA is usually done in selected cases considering all deciding factors. Further larger scale studies are required in order to evaluate long term outcomes.

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  19. Little CP, Graham AJ, Carr AJ. Total elbow arthroplasty. A systematic review of the literature in the English language until the end of 2003. *J Bone Joint Surg (Br)* 2005a; 87: 437-44. Figure 1a – semi constrained Total elbow prosthesis

Conflict of Interest: NIL  
Source of Support: NIL

#### How to Cite this Article

Das A, Parida SK | Total Elbow Replacement in Rheumatoid Arthritis: A Case Report | Odisha Journal of Orthopaedics and Trauma | January 2021; 02: 24-27.