SCIENTIFIC ARTICLE

Lateral Para-Olecranon Approach for the Treatment of Distal Humeral Fracture

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Purpose To assess the outcomes of the lateral para-olecranon triceps-splitting approach for the treatment of distal humeral fracture.

Methods Ten patients (3 males, 7 females) with a mean age of 59 years were retrospectively reviewed. There were 2 A2, 3 C1, and 5 C2 fractures according to the AO/ASIF classification. Types B3 and C3 fractures were excluded from this study because the olecranon osteotomy approach was indicated to visualize the anterior fragment. The triceps was split at the midline, and the anconeus muscle was incised from the proximal ulna. The lateral half of the triceps along with anconeus was retracted laterally as a single unit. The distal part of the humerus could be visualized from medial and lateral windows by retracting the medial half of the triceps. The articular fragment was anatomically reduced and fixed temporarily with a Kirschner wire, and the reconstructed distal articular block was then fixed to the humeral shaft with double locking plates.

Results After surgery, average elbow flexion was 127° (range, 110°−145°), and extension was −10° (range, −20°−0°) at the average follow-up time of 12.4 months (range, 8–20 months). Seven patients had normal muscle strength against full resistance (manual muscle testing grade 5), and the other 3 patients had slightly reduced muscle strength (grade 4). No articular stepoffs of more than 1 mm were seen on postoperative radiographs. There were no cases of triceps insufficiency and nonunion. The average (± SD) Mayo Elbow Score was 93.5 ± 5.8 points at the final follow-up.

Conclusions The lateral para-olecranon approach is useful for the management of selected fractures of the distal humerus, preserving extension strength and providing satisfactory clinical outcomes, with no risk of olecranon osteotomy-related complications. *(J Hand Surg Am. 2017;■(■):■−■. Copyright © 2017 by the American Society for Surgery of the Hand. All rights reserved.)*

Type of study/level of evidence Therapeutic V.

Key words Distal humeral fracture, surgical approach, triceps-splitting, olecranon osteotomy.

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TREATMENT OF DISTAL HUMERAL FRACTURES is one of the most technically demanding challenges in orthopedic trauma surgery.[1] To gain good functional results, various authors recommend open reduction and double column plating.

An olecranon osteotomy approach is the most common method recommended for intra-articular distal humeral fractures. This approach provides good exposure of the articular surface, enabling accurate articular reduction.[2,3] However, this approach is associated with several complications, including symptomatic hardware prominence, loss of

osteotomy reduction, nonunion, or delayed union of the olecranon.[4–6]

To avoid these complications, various posterior approaches without olecranon osteotomy have been described.[7–9] The triceps-reflecting technique described by O'Driscoll[8] can preserve the continuation of the triceps tendon, but the triceps disruption from the olecranon causes weakness of extension power.[10]

Alonso-Llames[11] described a bilaterotricipital approach, in which the distal articular surface could be approached on both sides of the triceps tendon while not disrupting the triceps insertion to the olecranon. However, preservation of the triceps tendon insertion reduces exposure of the joint surface, which makes reduction of the articular fragment difficult. Studer et al[12] reported a modified triceps-splitting approach for total elbow arthroplasty, which they called the lateral para-olecranon approach. This approach preserves most of the insertion of the triceps tendon to the olecranon while providing improved visualization of the articular surface relative to the bilaterotricipital approach.

The purpose of this study was to describe and evaluate the lateral para-olecranon approach for the treatment of distal humeral fractures. The functional outcome, extensor strength, and complications of this approach were evaluated.

METHODS

This retrospective study included 10 patients (3 males, 7 females) with distal humeral fractures who were treated surgically with double locking plate fixation using LCP distal humerus plates (DHPs) (DePuy Synthes, Zuchwil, Switzerland) in our institution from January 2012 to April 2015. The average age at the time of surgery was 59 years (range, 23–85 years). The average follow-up time was 12.4 months (range, 8–20 months). The dominant extremity was involved in 6 patients. At presentation, there was a Gustilo type I open fracture[13] with radial nerve injury in 1 patient. No patients had vascular injuries or compartment syndrome. Fracture types were classified according to the AO/ASIF classification.[14] There were 2 A2, 3 C1, and 5 C2 fractures. During this period, 1 B3 and 4 C3 fractures were excluded from this study because the olecranon osteotomy approach was required to visualize the anterior fragment.

The operative procedures were performed or supervised by the 2 senior authors (T.I. and T.S.). Institutional review board approval was obtained, and all patients gave their informed consent.

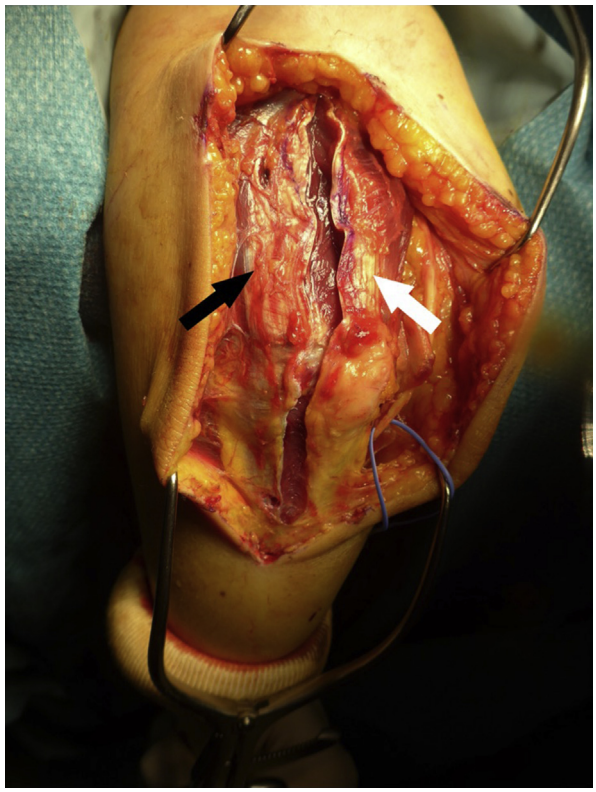

FIGURE 1: The triceps is split next to the central triceps tendon. The anconeus muscle is also detached from the proximal ulna. Black arrow, lateral half of triceps; white arrow, medial half of triceps.

Surgical technique

The patient is placed in a lateral position and the arm placed on an arm support. A midline posterior incision is performed, and fasciocutaneous flaps are elevated on the deep fascia.

After the ulnar nerve is identified and protected, the anconeus muscle is incised from the proximal ulna. This incision is extended proximally by splitting the triceps between the lateral triceps expansion and the central triceps tendon (Fig. 1). The insertion of the central triceps tendon to the olecranon tip is maintained. The lateral half of the triceps, along with the anconeus, is retracted laterally as a single unit, and the lateral half of the distal humerus is visualized. In this situation, we always take care not to incise the annular ligament and lateral collateral ligament, which differs from the original description of the lateral para-olecranon approach by Studer et al.[12]

Next, the medial half of the triceps muscle is released from the medial intermuscular septum and dorsal aspect of the distal humerus. In cases with intra-articular fracture, the joint capsule and fat pad are excised from the olecranon fossa. During capsulotomy, care is taken to preserve the anterior oblique