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Surgical fixation of extra-articular distal humerus fractures with a posterolateral plate through a triceps-reflecting technique

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Background: Surgical management of extra-articular distal humerus fractures results in predictable fracture alignment. Open reduction and internal fixation also decrease the soft tissue complications and frequent follow-up required with functional bracing. A triceps-reflecting posterior approach provides excellent exposure to the humerus and minimizes trauma to the triceps. An anatomically precontoured plate on the posterolateral surface of the humerus provides stable fixation of these injuries and is placed directly through the interval developed by the triceps-reflecting approach.

Methods: We retrospectively reviewed the trauma databases at 2 level I academic trauma institutions during a 5-year period for all patients with an extra-articular distal humerus fracture treated with a triceps-reflecting approach and an anatomically precontoured posterolateral distal humerus plate. Patient and fracture characteristics were recorded, as were QuickDASH functional scores and visual analog scale scores for pain, function, and quality of life.

Results: Forty patients were eligible for our study. Average follow-up was 88 weeks. Thirty-eight (95%) patients went on to union. Seven (20%) patients required a secondary procedure. The average QuickDASH score was 17.5 (range, 2.6-56.8). The average visual analog scale scores were 1.9 (range, 0-7) for pain, 2.3 (range, 0-8) for function, and 1.6 (range, 0-5) for quality of life. Thirty-five (87.5%) patients reported satisfaction with the outcome of their surgery.

Discussion: Surgical fixation of extra-articular distal humerus fractures through a triceps-reflecting approach with an anatomically precontoured posterolateral distal humerus plate results in predictable osseous union and overall excellent functional results for patients with this injury.

Level of evidence: Level IV, Case Series, Treatment Study.

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Keywords: Humeral fracture; distal humerus; extra-articular; triceps reflecting; posterolateral plate

This study was performed with the approval of the Institutional Review Board.

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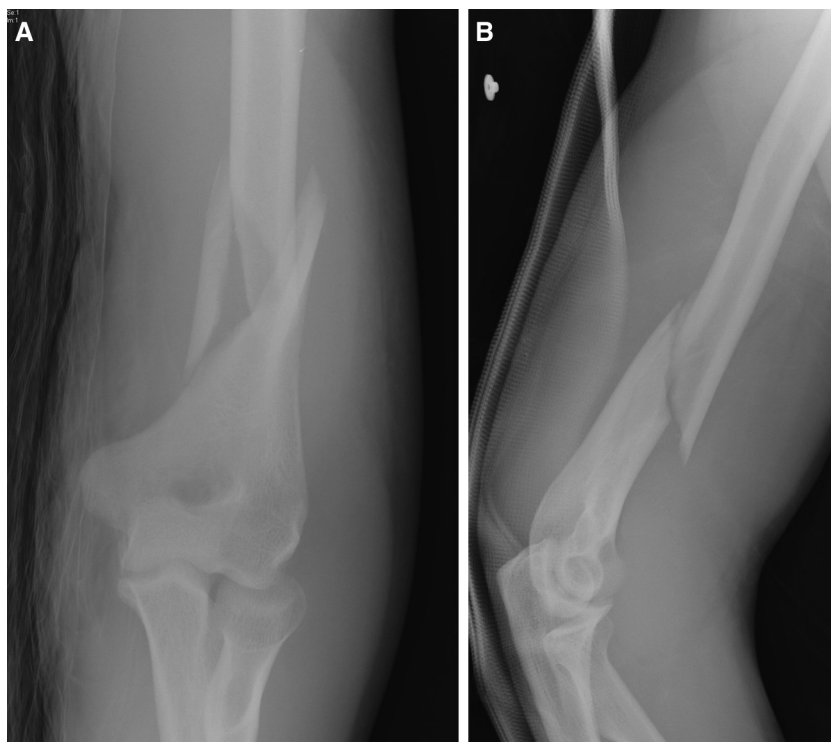


Figure 1 Anteroposterior (A) and lateral (B) radiographs of extra-articular distal humerus fracture.

Open reduction and internal fixation of extra-articular distal humerus fractures provide immediate skeletal stability, allow early rehabilitation, and eliminate the soft tissue complications associated with functional bracing. The benefits of surgical fixation must be considered within the context of an increased risk of infection, iatrogenic nerve injury, and need for secondary procedures.⁵

Fixation of extra-articular distal humerus fractures must provide stability to resist the torsional forces placed on the upper extremity as well as the forces realized with elbow flexion and extension. The location of the humeral fracture dictates the type of implant used. The distal humerus transitions from a cylindrical shape in the diaphyseal region to a wider fish-tail morphology distally with thinner cortices. Mid-diaphyseal fractures may therefore be amenable to a standard 3.5-mm or 4.5-mm plate, whereas more distal fractures may require 2 plates or an anatomically designed plate.^{6,8} The precontoured 3.5-mm posterolateral locking compression plate (LCP) (DePuy Synthes, West Chester, PA, USA) is designed to provide proximal diaphyseal as well as distal fixation for extra-articular middle- and distal-third humerus fractures.

The purpose of this study is to describe functional and radiographic outcomes, complication rates, and reoperations in a cohort of patients who underwent fixation of extra-articular distal-third humerus fracture by a triceps-reflecting technique, as described by Gerwin et al,³ and a single, posterolateral plate.

Materials and methods

A retrospective chart review was performed from the orthopaedic trauma databases of 2 level I academic institutions during a 5-year period (2008-2012). Both databases are maintained by residents trained in coding surgically treated fractures and entering data on the specifics of the operation, including implants used. The institutions' databases were queried for all AO Foundation and Orthopaedic Trauma Association (AO/OTA) 12-A to 12-C and 13-A2 and 13-A3 fractures treated with a 3.5-mm posterolateral humeral LCP. Inclusion criteria were age ≥ 18 years, traumatic fractures of the humerus that were located within or extending into the distal third of the humerus (Fig. 1), use of a posterior triceps-reflecting surgical approach, and use of a 3.5-mm precontoured posterolateral distal humerus LCP. Exclusion criteria were age < 18 years, fractures through a pathologic lesion, subjects with an incomplete or unavailable radiographic record, and subjects with follow-up ≤ 6 months.

Our initial search resulted in 51 patients. After application of inclusion and exclusion criteria, 40 patients were eligible for inclusion in our study. Eleven patients were excluded from the initial group because their humeral fractures were primarily diaphyseal without extension into the distal third of the humerus.

Patient demographics recorded were age, sex, and handedness. Injury details recorded included mechanism of injury, presence of a preoperative nerve palsy, and whether the fracture was open or closed. The pattern of the fracture was recorded as transverse or spiral oblique and noted to be simple or containing comminution. Comminution was defined as a fracture possessing 2 or more fracture fragments that were independent of the intact proximal

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