

## **Clinical Application of “Expanded Paratricipital Approach” for Fixation of Complex Articular Fractures in Distal Humerus: Revisited with Cadaveric Study and Case Series**

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**Purpose:** Although extensor mechanism-sparing paratricipital approach (expanded paratricipital approach) has been introduced and clinically used for managing complex articular fracture of the distal humerus, there had been no clinical guideline in which type of fracture is indicated best for this approach. Aims of this study are to verify the superiority of articular assessment of extensor mechanism-sparing paratricipital approach compared with conventional approach and to find out certain reference line of articular assessment for suggesting clinical guidance of this approach.

**Methods:** We designed 2 studies which included cadaveric study and retrospective comparison study of clinical cases. Cadaveric study was designed to compare expanded and conventional paratricipital approach using 40 matched paired elbows from 20 fresh-frozen cadavers. Accessible articular length and distances of osteotomy marking from capitellotrochlear sulcus and medial epicondyle were calculated based on osteotomy markings of articular surface from lateral and medial side, respectively. 36 OTA/AO 13C fracture cases treated by expanded paratricipital approach at a single Level-I trauma center from 2015 to 2017 were divided into 2 groups based on the location of main fracture line, which was measured by preoperative CT scan. Demographics, Intraoperative details (operation time and quality of reduction), clinical outcome (union rate, postoperative complications, and presence of unscheduled surgery), and functional outcome (Mayo Elbow Performance Score and DASH [Disabilities of the Arm, Shoulder and Hand score] were retrospectively analyzed and compared between the 2 groups.

**Results:** Cadaveric study shows that expanded paratricipital approach can allow more articular exposure than conventional approach (69.4% vs 52.7% of transepicondylar width). Location of lateral osteotomy marking was significantly medially located in expanded paratricipital approach (6.9 mm vs 1.7 mm medial to capitellotrochlear sulcus). Based on the result of cadaveric study, a fracture line that lies 7 mm medial to capitellotrochlear sulcus was selected as a reference line for ideal indication of approach. Comparison between Group 1 (15 cases, main fracture line lies lateral to reference line) and Group 2 (21 cases, main fracture line lies medial to reference line) shows significant difference in operation time (138 min vs 165 min), quality of reduction (malreduction rate 20% vs 33%), and complication rate. Union rate and functional outcome were not significantly different between the 2 groups.

**Conclusion:** Expanded paratricipital approach makes wider exposure in articular surface of distal humerus than that of conventional approach. However, this study can support that expanded paratricipital approach can be more successfully applied to a fracture that has main articular fracture line that does not exceed 7 mm medial to capitellotrochlear sulcus.