

# Radiographic Anticipation of Trochlear Valgus Impaction in AO/OTA 13.C Distal Humerus Fractures

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**Disclosures:** The authors have no disclosures to report.

**Introduction:** Up to 37.2% of distal humerus fractures represent AO/OTA Type 13.C, or complete articular injuries. In treating these fractures, the authors noted an increasing incidence of valgus-impaction fractures of the medial trochlea, which may be difficult to detect on preoperative evaluation. Disimpaction often requires conversion from a paratricipital to a more invasive olecranon osteotomy. Because of this, the authors sought to determine if increased preoperative radiographic scrutiny could allow for anticipation of such articular impaction and therefore allow for alteration in choice of surgical exposure as well as anticipation of articular reduction and fixation. The purpose of this study was to determine if preoperative radiographic parameters are predictive of medial trochlear valgus impaction in intraarticular distal humerus fractures.

**Methods:** A total of 51 patients who underwent open reduction internal fixation of an AO/OTA 13.C distal humerus fracture at our institution between 2008 and 2018 were surveyed. Radiographic parameters, including measurement of the medial trochlear slope angle (MTSA), an angle represented by a line along the articular surface of the medial trochlea and a line along the medial distal humeral metaphyseal cortex, and parallelism between the medial trochlear articular surface and medial distal humeral metaphyseal cortex were recorded for all subjects.

**Results:** The overall mean MTSA was 13.62° (Range 0-27°). In patients in which valgus impaction was noted intraoperatively, the mean MTSA was 9.65°, compared to 19.8° in patients in which valgus impaction was not noted ( $P<0.0001$ ). The mean MTSA in patients undergoing olecranon osteotomy was 6.85°; the mean medial trochlear slope angle in patients treated with a paratricipital approach was 15.95° ( $P=0.0031$ ). A medial trochlear slope angle of 14° or less was 90.3% sensitive and 85% specific for predicting medial trochlear impaction, with an overall accuracy of 88.2%.

**Discussion:** A pathologic parallel relationship between the medial trochlea and the medial cortex of the distal humeral metaphysis is predictive of valgus impaction of the medial trochlear articular surface in intraarticular fractures of the distal humerus. Impaction of the medial trochlea is accurately predicted with medial trochlear slope angles of  $\leq 14^\circ$ .

**Significance/Clinical Relevance:** The medial trochlear slope angle is a simple, reliable preoperative assessment that can help guide treatment of AO/OTA 13.C distal humerus fractures. This measurement can be readily calculated on preoperative PA radiographs of the elbow and may help guide decision making with regards to exposure and reduction technique.

