

## Key Publications

### Three-Dimensional Morphometry of the Proximal Ulna: A Comparison to Currently Used Anatomically Preshaped Ulna Plates

#### Publication Excerpt

“Summarizing all provided features of the 4 plates, we found that plate D [the Acumed Olecranon Plate] was the most suitable plate for our elbows.”

#### Journal Abstract

##### Background

Anatomically preshaped plates are increasingly used for stabilization of comminuted olecranon and Monteggia fractures. The purposes of this study were to investigate the morphology of the proximal ulna and to compare morphologic findings with geometry of 4 preshaped ulna plates.

##### Materials and Methods

40 human elbows (mean age, 68 years; range, 21-98 years) were measured by 2 independent observers using 64-slice computed tomography scans and 3-dimensional measuring software.

##### Results

Measurements showed a mean dorsal hook angle of  $95.3^\circ \pm 9.0^\circ$  (range,  $74.7^\circ$ - $110.8^\circ$ ) with gender-specific differences (mean,  $92.2^\circ \pm 8.1^\circ$  in men and  $98.3^\circ \pm 8.9^\circ$  in women;  $P = .029$ ); a mean distance from the tip of the olecranon to the proximal edge of the ulna of  $24.7 \pm 2.7$  mm (range, 20-30.5 mm) with gender-specific differences ( $P = .00068$ ); a mean varus angulation of  $14.3^\circ \pm 3.6^\circ$  (range,  $5.8^\circ$ - $21.2^\circ$ ); and a mean anterior angulation (proximal ulna dorsal angulation) of  $6.2^\circ \pm 2.7^\circ$  (range,  $1.0^\circ$ - $11.2^\circ$ ). The investigated plates offered a tolerable ( $\pm$  standard deviation) hook angle in 25% to 68%, an appropriate varus angulation in 0% to 20%, and an adequate anterior angulation in 23% to 88%. The intraclass correlation coefficient was between 0.74 and 0.91.

##### Conclusion

The proximal ulna has a gender-specific and variable morphology. Some currently used anatomically preshaped proximal ulna plates differ significantly from these morphologic findings. In cases where reduction is not exactly possible, application of an “anatomically preshaped” plate may result in poor reduction. Especially in case of Monteggia fractures with instability of the radiocapitellar joint, surgeons could be misguided by plates that do not incorporate anterior angulation, resulting in subluxation of the radial head on the capitellum.

#### Reference

Puchwein P, Schildhauer T, Schoffmann S, et al. Three-dimensional morphometry of the proximal ulna: a comparison to currently used anatomically preshaped ulna plates. *J Shoulder Elbow Surg.* 2011;21(8):1018–1023.

# Biomechanical Evaluation of Standard vs Extended Proximal Fixation Olecranon Plates for Fixation of Olecranon Fractures

## Publication Excerpt

“The goal of this study was to determine if extended olecranon fixation plates provided increased biomechanical stability compared to standard plates in olecranon fractures that were 25% or 50% from the proximal most portion of the articular surface of the olecranon...there was no statistically significant difference found. However, this recommendation must be tempered with clinical judgment, particularly with comminuted and non-transverse fractures, where there may be continued utility for the extended plate or suture augmentation to increase the stability of the construct.”

## Journal Abstract

### Background

Small olecranon fractures present a significant challenge for fixation, which has resulted in development of plates with proximal extension. Olecranon-specific plates with proximal extensions are widely thought to offer superior fixation of small proximal fragments but have distinct disadvantages: larger dissection, increased hardware prominence, and the increased possibility of impingement. Previous biomechanical studies of olecranon fracture fixation have compared methods of fracture fixation, but to date there have been no studies defining olecranon plate fixation strength for standard versus extended olecranon plates. The purpose of this study is to evaluate the biomechanical utility of the extended plate for treatment of olecranon fractures.

### Methods

Sixteen matched pairs of fresh-frozen human cadaveric elbows were used. Of the 16, 8 matched pairs received a transverse osteotomy including 25% and 8 including 50% of the articular surface on the proximal fragment. One elbow from each pair was randomly assigned to a standard-length plate, and the other elbow in the pair received the extended-length plate, for fixation of the fracture. The ulnae were cyclically loaded and subsequently loaded to failure, with ultimate load, number of cycles, and gap formation recorded.

### Results

There was no statistically significant difference between the standard and extended fixation plates in simple transverse fractures at either 25% or 50% from the proximal most portion of the articular surface of the olecranon.

### Conclusions

Standard fixation plates are sufficient for the fixation of small transverse fractures, but caution should be utilized particularly with comminution and nontransverse fracture patterns.

## Reference

Boden A, Daly C, Dalwadi P, et al. Biomechanical evaluation of standard versus extended proximal fixation olecranon plates for fixation of olecranon fractures. *HAND*. 2018. DOI: 10.1177/1558944717753206



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