



## 2022 TOA Annual Conference Abstract Submission

**PRESENTATION TITLE:**

Using the Greater Tuberosity as a Reference for Open Reduction and Internal Fixation of Proximal Humerus Fractures Leads to a High Rate of Calcar Screw Malposition

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**DEGREE:**

MD

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**IF NOT ACCEPTED FOR PODIUM PRESENTATION, IS POSTER PRESENTATION ACCEPTABLE?**

Yes

**LIST ANY DEVICES NOT CURRENTLY APPROVED FOR USE BY THE FDA:**

n/a

**STRUCTURED ABSTRACT (PURPOSE, METHODS, RESULTS, AND CONCLUSIONS) IN LESS THAN 400 WORDS:**

**PURPOSE:**

Open reduction and internal fixation with pre-contoured proximal humerus locking plates (PHLP) is a commonly used treatment strategy for proximal humerus fracture. A well-placed screw in the calcar is critical for obtaining a good outcome. Previously described techniques and manufacturers' recommendations utilize the greater tuberosity (GT) as a reference for plate placement. The authors hypothesized that application of plates as per the manufacturer's recommendations would result in inappropriate position of the calcar screw.

**METHODS:**

20 cadaveric specimens were acquired representing a height distribution across the United States population. Fourteen different commercially available PHLPs were applied according to the manufacturer's recommendations. A drill bit or K-wire was placed through the designated calcar screw hole per the manufacturer's recommendations. Calcar screw position was measured on radiographs as described previously in the literature, with the inferior 25% of the head representing ideal placement.

**RESULTS:**

A total of 350 plate/cadaver combinations were studied. In 27% (96/350) of the specimens, the calcar screw was not located within the calcar. In 20% (69/350) specimens the calcar screw was too low, whereas in 8% (27/350) the calcar screw was too high. Median specimen height was 5 feet, 5.5 inches (5'5.5"). The calcar screw missed low in 30% of shorter patients versus 8% of taller patients ( $p = 0.007$ ). The calcar screw missed high in 13% of taller patients versus 2% of shorter patients ( $p = 0.056$ ). The rate of a misplaced calcar screw varied dramatically between plates, ranging from 0-80%. In plates with variable angle guides,



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it was possible to place a screw in the calcar in all specimens; however, in plates with no variable-angle locking or fixed angle guides the calcar screw missed 36% of the time ( $p = 0.003$ ).

### **CONCLUSION:**

Placement of PHLPs based on distance from the GT as described in technique guides and manufacturer recommendations results in unacceptable position of the calcar screw 27% of the time. Care should be taken to optimize calcar screw position when placing PHLPs in order to maximize fixation.