

Δ Evaluating the Utility of the Lateral Elbow Radiograph in Central Articular Olecranon Reduction: An Anatomic and Radiographic Study

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Purpose: The surgical reduction of intra-articular olecranon fractures is judged primarily on the lateral elbow radiograph, as orthogonal articular imaging is not obtainable. Our interpretation of the olecranon articular surface on a single radiograph may be inadequate given its complex anatomy. As such, surgeons may fail to recognize olecranon articular malreduction intraoperatively, resulting in poor postoperative outcome. We sought to determine surgeon accuracy in identifying intra-articular olecranon malreductions on the lateral elbow radiograph.

Methods: Six human fresh-frozen cadaveric elbow specimens were sagittally sectioned in 5-mm increments after olecranon dissection, preservation of soft-tissue envelope, and rigid fixation of the elbow in an external fixator. Three distinct patterns of central intra-articular olecranon malreduction were created in each elbow using a ruler and a standard bone saw. Perfect lateral elbow radiographs were taken of each malreduction, and these images were randomized along with radiographs of normal cadaveric olecranons. The image series was presented to 4 blinded trauma-trained surgeons to determine if the olecranon was malreduced or anatomic. Surgeons interpreted the same image series on 2 separate occasions separated by 6 weeks. Percent correct was recorded and inter- and intra-observer reliability was calculated.

Results: Orthopaedic trauma surgeons correctly identified olecranon malreductions only 73% of the time on the lateral elbow radiograph. Inter-observer agreement was moderate for the first review of images and fair for the second review, with respective Fleiss kappa values of 0.43 and 0.28. Intra-rater reliability revealed moderate agreement with Cohen's kappa value ranging from 0.56 to 0.66.

Conclusion: Intra-articular olecranon malreductions are inconsistently recognized by trauma surgeons on the lateral elbow radiograph. The complex anatomy of the olecranon articular surface likely contributes to this discrepancy. Therefore, articular incongruity may still be present post-surgical fixation of comminuted olecranon fractures. We must further define the radiographic anatomic representation of the articular olecranon in order to improve surgical reduction and clinical outcomes.

Δ OTA Grant

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.