Computed Tomography Effectively Detects Traumatic Elbow Arthrotomies

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INTRODUCTION:

Failure to identify a traumatic arthrotomy of the elbow (TAE) can lead to septic arthritis with devastating complications. The gold standard for TAE detection remains controversial, and evidence is limited. While multiple clinical and cadaveric studies have validated the use of computed tomography (CT) to detect traumatic arthrotomies about the knee, other studies have called into question whether the use of CT to detect traumatic arthrotomy is applicable to the elbow. A prior cadaveric study utilizing a direct posterior (transtendon) traumatic arthrotomy model failed to detect traumatic arthrotomy via CT in 100% of cases. The aim of this study was to determine the sensitivity and specificity for detecting TAE with CT, utilizing a lateral traumatic arthrotomy model.

METHODS:

Ten fresh-frozen upper extremity transhumeral cadaveric specimens were utilized. Only specimens with an intact elbow joint and no known elbow surgery or injury were included. CT scans were performed to screen for intra-articular air prior to arthrotomy. A full thickness 10 mm incision was performed over the soft spot, just distal to the lateral epicondyle. The elbow was taken through full range of motion in flexion and extension, as well as forearm pronation and supination 10 times. CT scans were then repeated and screened for the presence of intra-articular air. Lastly, a saline load test was performed on all specimens, and the volume of saline required to detect the arthrotomy was recorded.

RESULTS:

Of the 10 specimens, 0% (n=0) demonstrated intra-articular air of the elbow joint on CT scan prior to arthrotomy, and 100% (n=10) demonstrated intra-articular air on CT scan following arthrotomy. CT scan demonstrated 100% sensitivity and 100% specificity for TAE. For the saline load test, 90% (n=9) were positive for TAE at an average of 12.1mL providing 90% sensitivity.

DISCUSSION AND CONCLUSION:

In this cadaveric study utilizing a more commonly observed posterolateral traumatic laceration, CT scans were able to detect 100% (n=10) of TEAs providing 100% sensitivity and specificity. These results show that CT scans can effectively diagnose TAE and provide another modality for diagnosis of other anatomic locations at risk for traumatic arthrotomy.

Image 1: Lateral Elbow Depression Landmarks

This image showcases the landmarks including lateral epicondyle, olecranon process, and radial head. The 1cm lateral incision is marked between the anatomic structures listed above in the lateral depression.
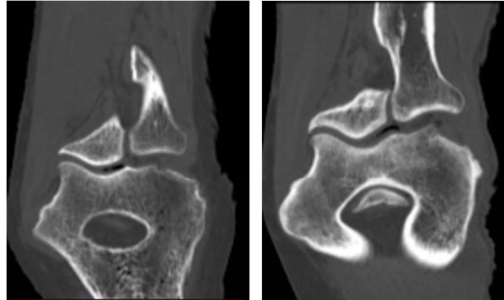

Image 2: Positive Intra-Articular Free Air on Elbow CT

Coronal CT images of two specimens showcasing intra-articular free air after lateral traumatic elbow arthrotomy through the lateral depression. Free air was localized in the elbow joint in all 10 specimens utilized for this study.