

A New Radiographic Measurement To Predict Late Displacement Of Minimally Displaced Lateral Humerus Condyle Fracture

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Objective: Late displacement (>2mm) occurs in 12% of minimally displaced lateral humerus condyle fracture (LHCF) despite initial immobilization. Severe functional deficit may ensue. We are introducing a novel radiographic measurement to predict late displacement of LHCF: the lateral elbow soft tissue swelling to humerus shaft diameter (LES-H) ratio.

Materials and Method: Eighty-eight minimally displaced LHCF patients with late displacement (LD) were compared to 88 minimally displaced LHCF patients with no late displacement (NLD). LES-H ratio was retrospectively obtained from antero-posterior plain radiographs of the elbow. Receiver operating characteristic (ROC) curve analysis was performed to obtain a threshold value with appropriate sensitivity and specificity. Logistic regression was performed to assess odds ratio (OR). Positive (PPV) and negative predictive values (NPV) were calculated based on local prevalence.

Results: The average age of patients were 5.1 ± 2.3 years and 5.7 ± 3.2 in LD and NLD groups ($p=0.36$) respectively. The LES-H ratio was significantly greater in LD (1.79 ± 0.45 vs. 1.43 ± 0.43 , $p < 0.01$). The area under curve for the ROC curve is 0.731 ($p < 0.01$, 95% CI=0.656-0.806). At LES-H ratio of 1.90, the sensitivity, specificity, PPV and NPV for predicting LD are 42.0%, 90.9%, 36.6%, and 92.6% respectively. Patients with LES-H ratio of ≥ 1.90 are more likely to have LD (OR: 6.37 (95% CI=2.84-14.30, $p < 0.01$))

Conclusion: A LES-H ratio may be used to predict late displacement in minimally displaced LHCF. This measurement should be validated in a fresh population pool. There may be a role for this ratio to be used to decide early surgical fixation of minimally displaced LHCF.