

## Influence of Coronoid Fracture on Elbow Stability: A Kinematic Study Based on New Clinical Relevant Fracture Classification

Department of Kyungpook National University, Daegu, Korea.,  
Department of Orthopaedic Surgery, Mayo Clinic, Rochester, MN

In-Ho Jeon, M.D.<sup>1</sup> · Sanchez-Sotelo Joaquin, M.D. Scott Steinmann, M.D.  
Kristin Zhao, Kai-Nan An, Ph.D., Bernard F Morrey, M.D.

### Purpose

The focus of this study is specifically to determine the effect of pure coronoid articular deficiency, with or without the radial head, on the kinematics of an elbow with intact ligamentous integrity. The goal is to define and reveal the critical amount of coronoid articulation required for maintaining ulnohumeral stability.

### Methods

In nine fresh cadaveric upper extremities, an electromagnetic tracking system (3Space Fastrak; Polhemus, Colchester, Vermont) was used to record the kinematics of elbow motion and track the three dimensional relationship of the ulna relative to the humerus. We created six injury types designated: Type IV-lateral-oblique (LO), Type IV-Medial-oblique (MO), Type II, Type II with radial head resection, Type III, Type III with radial head resection. We measured the articular surface area of both coronoid and radial head using digitized image measuring software Image J.

### Results

This kinematic study showed a type II isolated coronoid articular loss does not cause any significant change in the kinematic curve. When the total articular surface defined is less than 25 percent as in type III and radial head resection, significant kinematic changes occurred between 30 and 60 degrees of elbow flexion. Minimal changes were demonstrated by isolated medial-oblique (Type IV-MO) and lateral-oblique (Type IV-LO) coronoid fracture in this non-loading flexion-extension condition.

### Conclusion

There is an alteration in elbow kinematics when over 50% loss of the coronoid or 50% loss of total articular surface (including radial head) is present.

## Summary

This study suggests isolated Type IV-MO or Type IV-LO fractures could be treated with non-surgical treatment because they do not interfere with normal elbow kinematics, Valgus and external rotation instability were influenced by total articular surface, however, posterior and proximal translation were influenced by isolated articular surface involvement of coronoid. Further clinical studies are warranted to validate these in vitro findings

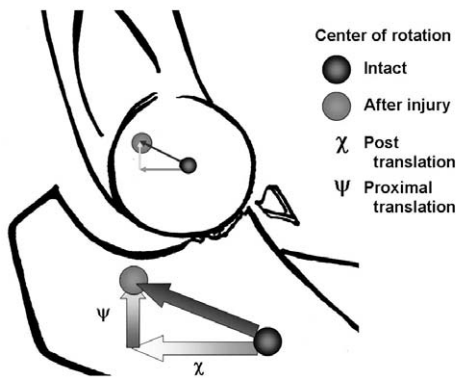


Fig. 1.

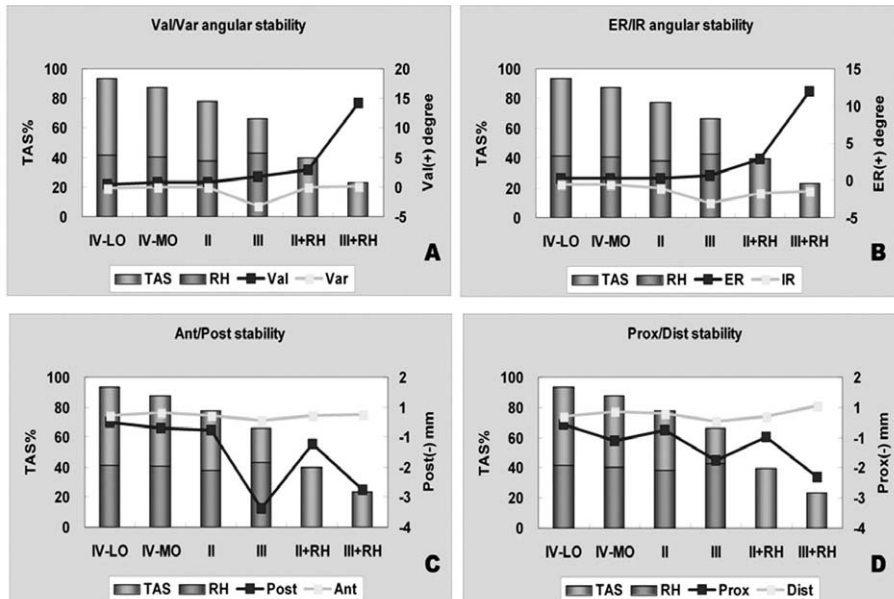


Fig. 2.