Effect of Radial Head Prostheses Design on Radiocapitellar Joint Stability - Monopolar vs Bipolar -

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Introduction

Both bipolar and monopolar designs area available for replacement of the radial head. Few data exist comparing the biomechanical characteristics of these two quite different prostheses. The purpose of this study was to evaluate radiocapitellar stability as related to these two types of radial head prostheses.

Methods

Twelve fresh frozen elbow cadavers were utilized. The capitellum of the distal humerus and three different conditions of radial head (native, monopolar and bipolar) were tested for radiocapitellar joint stability. The greatest resistant force in the direction of travel between the components prior to subluxation was defined as the peak subluxation force. For each of 3 joint positions (30°, 60° and 90° flexion; neutral rotation) and three different amount of compression load (25, 50 and 75 N) were tested. Peak subluxation forces were compared among all radial head conditions.

Results

The monopolar metallic head and the native radial head behaved similarly regarding resistance to subluxation. The bipolar head behaved in an entirely opposite manner than the native and monopolar head and actually acted to facilitate subluxation. The mean peak subluxation force with the native radial head was significant greater than those with the monopolar metallic head in all testing conditions. Compression load had a significant effect on subluxation force, whereas joint flexion angle did not.

Conclusion

Mobility of radial head components such as in the bipolar radial head has a compromising effect on the stability of the radiocapitellar joint. A monopolar implant is more effective in stabilizing the radiocapitellar joint than a bipolar radial head prosthesis.