Three-dimensional computer simulation of shoulder impingement

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Introduction: The term impingement syndrome refers to a complex interaction between the soft tissues and the bones of the shoulder. Etiologies of impingement syndrome include hypovascularity and degeneration, extrinsic bony spurs and varying acromial morphology, rotator cuff muscle weakness and shoulder instability. Typical prognostic physical examination maneuvers, particularly the Neer and Hawkins impingement tests, do not identify the cause of the impingement. As a result, it is still unclear if one or several factors contribute to the etiology of impingement. Most cadaver models developed to study impingement simulate subluxation, capsular venting, or extensive soft tissue dissection, all of which disrupt normal shoulder mechanics. No model to date has evaluated the three-dimensional interaction between the soft tissues and the bones of the shoulder. Etiologies contributing to the etiology of impingement, we can use our model to induce shoulder pathology. This would demonstrate that absolute minimum distances did not occur along the humeral head subluxation within the glenoid which could be exacerbated by functional activities or classic physical exam maneuvers, resulting in pain, tendinosis, and ultimately rotator cuff tears. As a next step, we hope to quantify some of these issues by measuring humeral head subluxation on the glenoid in a shoulder with no known rotator cuff pathology.

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