SUPRASCAPULAR NERVE ENTRAPMENT AND GLENOHUMERAL JOINT FUNCTION

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Introduction: Suprascapular nerve entrapment (SNE) is an acquired neuropathy, secondary to compression of the nerve in the bony suprascapular notch and spinoglenoid notch. Although SNE commonly causes palsies of the suprascapular nerve, it remains unclear whether SNE has any effects on glenohumeral joint functions [1]. The purpose of this study was to examine the alteration of the glenohumeral joint function after SNE using a simulated in vitro model.

Methods: Six cadaveric shoulders were tested on a specially designed loading device. Skin and subcutaneous soft tissues and muscles were removed except the deltoid, rotator cuff and the long head of biceps. The scapula was mounted on the loading frame. A fiberglass rod was inserted into the medullary canal and cemented in the proximal humerus. A rotational control device was used for guidance of this intramedullary rod to control the shoulder motion. The joint stability was tested at 3 clinically relevant positions: (1) inferior drawer by sulcus test, (2) posterior drawer with 90° flexion and maximal internal rotation, and (3) anterior drawer with 90° abduction and maximal external rotation. Three translation loads (15, 30, and 45N) were applied at each of the positions. The displacement of the humerus relative to the glenoid was monitored by a magnetic tracking system. The displacement ratio (DR) was calculated as the displacement divided by either the length (for inferior motion) or the width (for anterior and posterior motion) of the glenoid.

SNE was simulated as either incomplete palsy with both supraspinatus (SS) and infraspinatus (IS) 50% unloaded, or complete palsy with both SS and IS 100% unloaded. The selection of the incomplete palsy was based on the report that the average loss of torque generated at the shoulder in SNE patients was 50% for abduction and flexion [2]. Repeated measures analysis of variance was used to detect any difference within each group, followed by Tukey HSD test if a difference was found.

Essential Results: The inferior DR of sulcus test increased at 45 N translation load for incomplete palsy (p<0.05) (Fig.1). The posterior DR with 90° flexion and maximal internal rotation increased up to 0.21 in incomplete palsy and 0.24 in complete palsy (p<0.05) (Fig.2). However, the most dramatic changes occurred in the anterior DR with 90° abduction and maximal external rotation (Fig.3). For example, for incomplete palsy, the DR increased to 0.26 at 30 N and 0.40 at 45 N translation load, respectively.

Discussion: Clinically, the SNE has been speculated to affect glenohumeral joint functions. This study provided a support to this speculation. Specifically, the results showed that the increment of DR was most significant in anterior direction when the arm is at 90° abduction and maximal external rotation. This position is critically involved in several sports activities, such as throwing, serving, smashing and backhand stroke. Because the IS provides 90% of the external rotation power of the shoulder and the SS stabilizes the humeral head within the glenoid during elevation, suprascapular nerve entrapment would potentially create weakness during shoulder motion.

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References: