INTRODUCTION:
Shoulder internal impingement, which is described as an impingement of the undersurface of the rotator cuff on the posterior superior labrum and the glenoid during late cocking phase of throwing motion, is thought to be one of the etiologies of Posterior rotator cuff injury and Type II SLAP lesion. We hypothesized that hyper horizontal abduction in late cocking phase may result in pathologic shoulder internal impingement. The first objective was to assess the effect of shoulder horizontal abduction on shoulder internal impingement.

Most of throwers have a stretched anterior shoulder capsule. Jobe¹ has suggested that stretched anterior shoulder capsule in throwers allows increased posterior superior glenoid contact. Liu and Boyton² reported internal impingement associated with increased anterior laxity on examination under anesthesia. Levitz et al³ showed that monopolar RF-induced electrothermal capsulorrhaphy from rotator interval to IGHL complex improved the results of arthroscopic treatment of internal impingement. On the other hand, Walsh et al³ and Halbrecht et al⁴ did not find the correlation between anterior instability and evidence of internal impingement by arthroscopy and MRI. The role of anterior instability in internal impingement is still controversial. The second objective was to investigate the effect of the anterior capsular laxity on shoulder internal impingement.

METHODS:
Eight cadaveric shoulders were tested using a custom shoulder testing system. Rotator cuff insertion points (supraspinatus anterior edge: SA, infraspinatus posterior edge: IP, middle point from SA to IP: MP) on humeral head were recorded using Microscribe digitizer at maximum external rotation position (Figure 1). Glenohumeral contact pressure at maximum external rotation position was measured using Fuji Prescale Film. Rotational range of motion was measured by goniometer. Data were compared between scapular plane (SP), 15 degrees horizontal abduction from scapular plane (15HA), 30 degrees horizontal abduction from scapular plane (30HA, simulated coronal plane), and 45 degrees horizontal abduction from scapular plane (45HA) (Figure 2). The comparisons were also made between intact, after 20% stretching anterior capsule, and after anterior capsular plication. Data were analyzed using Tukey’s post hoc test (p < 0.05).

RESULTS:
SA and MP at 30º and 45º of horizontal abduction were significantly anteriorly located compared with SA and MP at scapular plane and 15º of horizontal abduction (Figure 3). IP at 45º of horizontal abduction was significantly anteriorly located compared with IP at scapular plane and 15º of horizontal abduction (Figure 3). SA at scapular plane after stretching was significantly posteriorly located compared with intact SA at scapular plane. Total pressure, peak pressure, and total area in posterior glenohumeral joint at 30º and 45º of horizontal abduction were significantly greater than those at scapular plane and 15º of horizontal abduction (Figure 4). External rotation at 30º and 45º of horizontal abduction was significantly less than that at scapular plane and 15º of horizontal abduction.

DISCUSSION:
Cuff insertion points at maximum external rotation moved anteriorly with horizontal abduction. Cuff insertion points at more than 30 degrees of horizontal abduction were anterior to the posterior edge of glenoid, suggesting that hyper horizontal abduction, which is greater than coronal plane, may result in pathologic shoulder internal impingement. Glenohumeral contact pressure increased with increasing horizontal abduction.

REFERENCES:

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