

Humeral Head Translation After A Suprascapular Nerve Block

Jun G. San Juan¹, Peter Kosek², and Andy R. Karduna¹

¹University of Oregon, Eugene, OR, USA, ²Pain Consultants of Oregon, Eugene, OR, USA

Email: bsanjuan@uoregon.edu, Web: <http://biomechanics.uoregon.edu/obl/>

INTRODUCTION

Shoulder impingement and rotator cuff tears are among the most common chronic shoulder injuries [1-3]. Although there are clearly underlying biological factors involved, many clinicians feel that abnormal mechanical forces may lead to a progression from impingement syndrome, or tendonitis, to rotator cuff tears. However, it is not known whether abnormal decentralization of the humeral head is causal or compensatory in nature. The suprascapular nerve innervates both the supraspinatus and infraspinatus, which function to centralize the humeral head. Therefore, the specific aim of this study was to examine the effects of a suprascapular nerve block on superior translation of the humeral head during dynamic shoulder elevation.

METHODS

Eight healthy subjects, 5 males and 3 females (age 23 ± 3.3 , weight 65.8 ± 13.8 kg, height 171.5 ± 6.2 cm) participated in this study. Subjects were asked to stand while performing shoulder elevation in the scapular plane prior to and following a suprascapular nerve block. Shoulder elevation trials were recording using fluoroscopy (Figure 1). The suprascapular nerve block was performed by an anesthesiologist (PK) using Lidocaine, 1.5% 1 ml, and a total of 100 mg was used per subject. Ten minutes following initial injection, subjects was asked to stand, and the post block trial was collected.



Fig. 1. Subject set-up during testing protocol.

Humeral head translation was measured using a 2-D registration technique developed by Crisco et al. [4]. The measured superior humeral head translation was calculated at each humeral elevation angle with respect to the resting position (arm at the side). This method of measuring humeral head translation was previously validated in our laboratory with a measured error of less than 0.5 mm. A one-way repeated measures analysis of variance (ANOVA) was used to examine mean differences between the two conditions (pre and post block).

RESULTS AND DISCUSSION

There was no statistical difference between the measured humeral head translation before and after the suprascapular nerve block ($p = 0.5$). The pre-nerve block trials shows that only at 30 degrees of arm elevation is the humeral head superiorly migrated (0.5 ± 3.1 mm) compared to the initial position. However, the post-nerve block trials showed superior migration of the humeral head at 30 (1.4 ± 3.0 mm) and 90 (1.1 ± 3.7 mm) degrees of humeral elevation (Figure 2).

The result of the current study shows that there is no difference in measured humeral head translation prior to and after suprascapular nerve block. The pattern of increased in humeral head superior translation seen with rotator cuff patients was not observed in the present study. This might suggest that decrease in muscle activation of the supraspinatus and infraspinatus has no effect on centralizing the humeral head in the glenoid during arm elevation, possibly due to compensation by other muscles, such as the latissimus dorsi. We plan on testing more subjects to see if this trend is consistent.

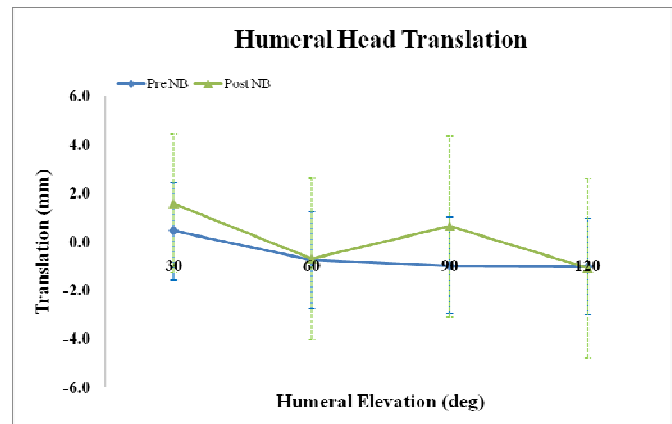


Fig. 2. Pre and post nerve block humeral head translation during shoulder elevation (means \pm sd).

REFERENCES

1. Flatow, E.L., et al., *Am J Sports Med*, 1994. 22(6):779-88.
2. Ludewig, P.M. and T.M. Cook., *J Orthop Sports Phys Ther*, 2002. 32(6): p. 248-59.
3. Soslowky, L.J., et al., *Orthop Clin North Am*, 1997. 28(1): p. 17-30.
4. Crisco et al., *J Biomech*. (1995) 28, 119-124.

ACKNOWLEDGEMENTS

We would like to thank Diana Raponi for technical assistance with the fluoroscopy. Partial funding for this project was provided by a grant from NIOSH: 5R01OH008288.



Northwest 2009 BIOMECHANICS Symposium

June 5-6, 2009
Washington State University
Pullman, WA



**An American Society of Biomechanics
Regional Meeting**

