INTRODUCTION:
It has been suggested that a Bankart lesion should be repaired with a "bumper" of the capsulolabral tissue created to obtain a more stable shoulder. Also, some recommend that the suture anchors should be placed on the glenoid surface a few millimeters from the glenoid rim in order to effectively create the bumper effect although there is a risk to developing glenohumeral arthritis if the anchors back-out and contact the humeral head. However, it has not been biomechanically determined that these surgical techniques really contribute to stability. The purpose of this study was to determine 1) whether the shoulder would become stable by creating a "bumper", and 2) whether placing the suture anchors on the glenoid surface would make the shoulder more stable.

MATERIALS AND METHODS:
Nine fresh-frozen cadaveric shoulders (mean age, 77 years) were investigated. A custom multiaxis electromechanical testing machine with a six-degrees-of-freedom load-cell was utilized (Figure 1). With a 50-N axial force constantly applied to the humerus in order to keep the humeral head centered in the glenoid fossa, the humeral head was translated 10 mm in the anterior direction, and the peak translational force was measured at both the end-range (60° of abduction relative to the anatomical position and maximum external rotation) and at the mid-range (60° of abduction and neutral rotation) positions with the intact capsule, with a Bankart lesion, and after Bankart repair with and without a "bumper". The lateral displacement of the humeral head was measured by a linear-position transducer (TR-50; Novotechnik, Stuttgart, Germany).

Bankart lesion was arthroscopically repaired with use of suture anchors (2.4 FASTak, Arthrex, Karlsfeld, Germany) inserted into five different sites: glenoid rim, glenoid surface-2 mm (2 mm medial from the glenoid rim), glenoid surface-5 mm, scapular neck-2 mm (on the scapular neck from the glenoid rim), and scapular neck-5 mm (Figure 2). A "Bumper" was created by incorporating the anterior capsular as previously reported. Three suture anchors were placed at the 2:30, 4:00, and 5:30 positions at the right shoulder.

RESULTS:
The peak translational force which had significantly decreased (P<0.05) after creating a Bankart lesion returned to almost the intact condition level after Bankart repair at both arm positions (Figures 3, 4). However, there were no significant differences between the forces after Bankart repair with and without a "bumper". The force did not significantly increase even after glenoid surface fixation-2mm at both arm positions. In addition, humeral displacement did not significantly increase with glenoid surface fixation-2mm at both arm positions. Also, our results showed that glenoid surface fixation did not make the shoulder more stable at either the end-range or mid-range positions. Therefore, repairing a Bankart lesion at the anatomical position (glenoid rim) without creating a "bumper" seems to be appropriate. There is no advantage of placing the anchors on the face of the glenoid. However, we are not able to negate the efficacy of creating a "bumper" of the capsulolabral tissue if the labrum is worn or has disappeared. Because it is well known that the shoulder becomes less stable without the labrum. Our results indicate that the shoulder became unstable if a Bankart lesion was fixed on the scapular neck more than 2 mm away from the glenoid rim. We conclude that the Bankart lesion should be repaired back to the glenoid rim and that a bumper is unnecessary if the labrum is present.

DISCUSSION:
It was demonstrated that the shoulder did not become more stable even after creating a "bumper". Also, our results showed that glenoid surface fixation did not make the shoulder more stable at either the end-range or mid-range positions. Therefore, repairing a Bankart lesion at the anatomical position (glenoid rim) without creating a "bumper" seems to be appropriate. There is no advantage of placing the anchors on the face of the glenoid. However, we are not able to negate the efficacy of creating a "bumper" of the capsulolabral tissue if the labrum is worn or has disappeared. Because it is well known that the shoulder becomes less stable without the labrum. Our results indicate that the shoulder became unstable if a Bankart lesion was fixed on the scapular neck more than 2 mm away from the glenoid rim. We conclude that the Bankart lesion should be repaired back to the glenoid rim and that a bumper is unnecessary if the labrum is present.

REFERENCES: