4 MILD INFLAMMATION PERSISTS IN THE GLENOHUMERAL JOINT OF PATIENTS WITH RECURRENT SHOULDER DISLOCATION

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Purpose: Approximately two-thirds of patients with a history of shoulder dislocation have the potential to develop OA in the future; however, the cause is unclear. The purpose of this study was to evaluate the expression of inflammatory mediators in the glenohumeral joint of patients with recurrent shoulder dislocation (RSD). We hypothesized that the high prevalence of OA in RSD is due to persistent mild inflammation.

Methods: This study included 26 patients with RSD who underwent arthroscopic Bankart repair and 25 patients with rotator cuff tears (RCTs) who received arthroscopic rotator cuff repair (control group). Synovial tissue samples were harvested from the patients in both test groups for the analysis of *TNF-α*, *IL-1β*, *β-FGF*, and *VEGF* expressions using quantitative reverse transcription polymerase chain reaction. Differences between the samples of the patients with RSD and those with RCT were compared using the Welch *t* test or Mann-Whitney *U* test.

Results: The expression levels of *TNF-α*, *IL-β*, *β-FGF*, and *VEGF* were significantly higher in the RSD group than in the control group ($p<.01$).

Discussion: Cartilage abrasion occurs in the glenohumeral joint owing to dislocation or joint instability. The destructive response of the synovium, which is induced by cartilage damage, upregulated the inflammatory mediators. Inflammatory mediators can act independently or in conjunction with other cytokines to initiate and propagate inflammation. In addition, mild inflammation may play a role in the development of shoulder OA, similarly to hip and knee OA.

Conclusion: Mild inflammation persists in the shoulder with RSD and can induce OA progression.

5 FOUR-DIMENSIONAL COMPUTED TOMOGRAPHY EVALUATION OF THE SHOULDER JOINT IN BASEBALL PLAYERS

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Background: Glenohumeral (GH) joint instability and internal impingement have been recognized as causes of shoulder pain in throwing athletes; however, in vivo GH joint kinematics is controversial. The GH contact patterns reflect joint pathogeneses.*Purpose:* The purpose of this study was to evaluate the GH contact area (GHCA) and the center of the GHCA (CGHCA) during simulated pitching motion in baseball players using a 4-dimensional (4D) computed tomography (CT) device.

Methods: We obtained 4D CT data from the dominant and nondominant shoulders of 8 baseball players (mean age, 18.6 years) during the cocking motion. The humeral head and glenoid surface were extracted, and the GHCA and CGHCA were calculated from 3-dimensional bone models using a custom-written computer program. The GHCA and translation of the CGHCA between the dominant and nondominant sides were statistically compared.

Results: There was no apparent difference in mean GHCA between the dominant and nondominant sides. No remarkable change in mean GHCA was observed during the cocking motion. The CGHCA was remarkably translated from anterior to posterior during maximum external rotation to maximum internal rotation.

Conclusion: Our 4D CT analyses produced interesting results. The CGHCA was translated during shoulder external rotation to internal rotation in abduction on both the dominant and nondominant sides. Further, 4D CT scanning and the tracer program for bone surface modeling of the GH joint could quantitatively assess the GH micromotion and could be used for kinematic evaluation with low radiation exposure.

6 THREE-DIMENSIONAL ANALYSIS OF WINGED SCAPULA USING FOUR-DIMENSIONAL COMPUTED TOMOGRAPHY

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Background: It is difficult to evaluate complicated motions of winged scapula in the presence of dyskinesis. This study aimed to analyze the 3-dimensional (3D) motion of winged scapula using upright 4-dimensional computed tomography (upright 4DCT) during elevation.

Methods: Two patients with a unilateral winged scapula caused by long thoracic or accessory nerve palsy were prospectively included in this study. Upright 4DCT of the bilateral shoulder girdles during elevation was performed for 10 seconds at 5 frames per second. Three-dimensional surface models of the thorax, clavicle, scapula, and humerus in all frames were reconstructed using 3-dimensional (3D)-3D registration. We evaluated shoulder girdle motion relative to the thorax using Euler angles. The angles of the clavicle and scapula during elevation were compared between the aff5cted and intact shoulders and between the patients with long thoracic nerve palsy and those with shoulder accessory nerve palsy.

Results: The motions of the clavicle and scapula during elevation were different between the aff5cted and intact shoulders and between the patients with long thoracic nerve palsy and those with shoulder accessory nerve palsy. An obvious difference was observed in the horizontal plane of motion. Long thoracic nerve palsy delayed the clavicular retraction and scapular external rotation during elevation compared with those in the intact shoulders. Shoulder accessory nerve palsy increased the clavicular protraction and scapular internal rotation during elevation.

Conclusion: Upright 4DCT enables visualization of the motion of winged scapula and 3-dimensional analysis. The study findings indicate that on the basis of the differences between long thoracic and accessory nerve palsies, not only scapular motions but also clavicle motions due to the trapezius muscle can be detected.

7 DYNAMIC IN VIVO RELATIONSHIP BETWEEN ACROMIOCLAVICULAR JOINT AND CORACOCLAVICULAR SPACE DURING HUMERAL ELEVATION

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Clinically, the best treatment for acromioclavicular joint impairment is controversial. The coracoclavicular ligament is speculated to be important in the treatment of acromioclavicular joint impairment; however, limited information is available on acromioclavicular kinematics. Several studies have attempted to analyze the acromioclavicular kinematics, but few noninvasive and high-accuracy dynamic studies have been conducted. Moreover, there is limited objective information on how the body posture aff5cts the shoulder motion. This study aimed to compare the kinematic features of the