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Does scapular dyskinesis affect top rugby players during a game season?

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Background: Scapular dyskinesis represents a considerable risk of shoulder injury to overhead athletes; however, there is a shortage of detailed epidemiologic information about scapular dyskinesis among the participants in collision sports.

Purpose: To describe the incidence and relationship of scapular dyskinesis to shoulder discomfort and variables related to the shoulder in top rugby players.

Methods: One hundred twenty top rugby football players in Japan were evaluated by means of questionnaires, physical examinations, and a video analysis during their preseason. Data were assessed by a logistic regression analysis calculating odds ratios. The primary outcome was processed to assess the relationship between scapular dyskinesis and other variables at the preseason. The secondary outcome was processed to assess an influence of scapular dyskinesis to shoulder discomfort during their regular season that were reassigned by second questionnaires.

Results: Scapular dyskinesis was identified in 33 (32%) shoulders, and type III was prominent. Scapular dyskinesis was significantly associated with shoulder discomfort (OR [odds ratio] = 4.4), and was also associated with variables of the affected shoulder. In addition, the players with asymptomatic scapular dyskinesis at the preseason would have high incident with shoulder discomfort during their regular season (OR = 3.6).

Conclusions: Scapular dyskinesis was associated significantly with both subjective and objective symptoms of the affected shoulder. These appearances may be of particular relevance in the early screening of chronic shoulder disorders in the rugby population. Further study to investigate and evaluate its reliability is needed to characterize its impact on the participants in collision sports.

Level of evidence: Level I, Prospective Design, Prognostic Study.

Keywords: Scapular dyskinesis; rugby; collision sports; shoulder; longitudinal study; prevention

Rugby is a major collision sport and the players are exposed to various injuries during a game season. The incidence of injuries was reported to be 91 per 1000 playing hours, which is higher than in most of other sports.[4,5] Of these injuries, 10% appeared in shoulders, for which possible preventive measures should be investigated. If one is able to predict shoulder injuries before the games, some

Ethics approval: Ethics approval for the study was received from the Juntendo University School of Medicine Research Ethics Committee (No. 21067).

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injuries can be avoided. There are reports[16,25] dealing with the pre-seasonal conditions of rugby players and the incidence of injuries; namely, the ones with poor conditions in their pre-season are much more prone to injuries in the following game season in general; but whether it can be applied to the shoulder is not certain.

Scapular dyskinesis (SD) is a kinematic abnormality of the scapula often associated with pathological conditions such as impingement, instability, and injury of the acromioclavicular joint.[1,2,11,17] Overhead throwing athletes frequently present SD. Burkhart et al[6] mentioned that SD had something to do with the occurrence of shoulder problems in throwing players, and suggested that SD would be a possible indicator of shoulder at risk of injury. McClure et al[22] and Tate et al[29] examined 142 baseball pitchers to reveal its effective reliability and validity of visually 2-dimentional (2-D) evaluation. However, precise implication of SD remains to be seen. Various types of SD are seen in rugby players; but their characteristics and association with shoulder injuries have not been proven. This prompted us to carry out this study, in order to know SD and its clinical implications. Additionally, we studied whether pre-seasonal presence of SD affects shoulder conditions during the game season.

Materials and methods

Subjects

In 2009, one hundred twenty male roster players for top-league rugby teams in Japan, playing nearly 30 games during a regular season, were enrolled in this study. Twelve of them had participated in international games. Those who had shoulder or elbow surgeries in the past and those with a time-loss injury to shoulder or elbow in the previous 3 months were excluded. Examinations were conducted on both shoulders of each subject.

Demographics of the subjects

Demographic data were collected on all the subjects, using a questionnaire form before the regular season started. The data included: age; years of experience in rugby; height; body weight; position, such as forwards (FW) or backs (BK); side of dominant hand; side of shoulder frequently used for collision; subjective discomforts (ie, pain, apprehension, or fatigue) of the shoulder, if any, persisting more than 2 weeks; and shoulder trauma requiring off-game more than 7 days. Newly developed shoulder discomfort persisting for more than 2 weeks during the regular season was also questioned, and recorded at the end of the 2009 game season.

Physical examination

Both shoulders were examined in the same manner and consisted of the following tests: detection of impingement signs as evaluated by Neer and Hawkins maneuvers[12,24]; detection of instability of the glenohumeral joint through the multi-directional apprehension test[3,27]; and muscle weakness of the rotator cuff muscles and the shoulder girdle—the former being tested by manual testing of abduction force in the scapular plane[13] as well as external rotation force with the arm at the side of the shoulder, and the latter by scapular assistance test[6] which is positive when it gives relief of symptoms of impingement, clicking, or rotator cuff weakness. The muscle weakness was evaluated as positive or negative, comparing with that of the opposite side when the respective evaluations of the subjects and examiners were in accordance. Another test was conducted for tenderness over the acromioclavicular joint. None of the examiners (TK, JY, and TK) were notified of the subjects' demographic data prior to the examination to make it a blind fashion.

Definition of scapular dyskinesis

Detailed description of SD has been provided by Kibler et al.[15,30] Type I dyskinesis is characterized by prominence of the inferior medial scapular angle and associated with excessive anterior tilting of the scapula. Type II is characterized by prominence of the entire medial border and associated with excessive scapular internal rotation. Type III is characterized by prominence of the superior scapular border and associated with excessive upward translation of the scapula. When clinicians observed asymmetry in multiple planes of motion, they were instructed to choose the single most prominent type. Type IV is characterized as ''normal,'' indicating no asymmetries or nonprominence of the medial or superior border of the scapula. All subjects performed 5 repetitions of bilateral, active movements of shoulders with 3-kg handheld load in anterior elevation and lowering, as well as abduction and lowering in the scapular plane. At the time of final lowering, arms were kept horizontally. The distance between the inferior angle of scapula to the thoracic spinous process were then measured bilaterally to elucidate their side-to-side differences. Each of these activities was video recorded and rated by 2 of the authors (KT and JY). The percentage of agreement for inter-rater reliability and the kappa coefficient in the evaluation of scapular dyskinesis were explored (Figure).

Statistical analysis

In order to maintain independency of the samples to explore the following analysis, 1 shoulder was chosen from each subject[28] on the basis of the following priority order: the presence of SD, frequent side of the shoulder for collision, and the dominancy of the shoulders.

Age, body mass index (BMI), and years of rugby experience were quantitative data; however, other variables such as the results of physical examinations and the presence of past trauma were qualitative ones, so that they were simply defined as being positive or negative. The variables of physical examinations, including more than 2 tests, were considered positive if at least 1 of these tests was positive. The difference in proportion of the types of SD was assessed using Fisher's exact test. Intergroup differences of the distance between the inferior angle of scapula and spinous process were also assessed by the Kruskal-Wallis H test, followed by the Mann-Whitney's U test for post hoc analysis.

The primary analysis was focused on the relationship between the presence of SD (types I- III) and each of the variables. Data were assessed by a logistic regression analysis calculating odds ratio (OR). The secondary analysis was performed on the same