The Hara test comprises 11 physical examinations relevant to the scapular and humeral kinetic chain: (1) scapula–spine distance; (2) elbow extension test (Figure 2); (3) elbow push test (Figure 3); (4) manual muscle strength of abduction; (5) manual muscle strength of external rotation; (6) manual muscle strength of internal rotation; (7) combined abduction test (Figure 4); (8) horizontal flexion test (Figure 5); (9) capsular laxity tests; (10) subacromial impingement tests; and (11) hyper external rotation test (Figure 6). The number of "intact" results among the 11 physical examinations was recorded as the total Hara test score for each subject. The maximum total score (11 points) represents no abnormality; subjects with low scores (7 or less) were considered abnormal shoulder condition.

In the scapula–spine distance test, the distance from the medial edge of the scapular spine to the spinous process of the thoracic spine is measured with the arms at the sides. The reference point on the thoracic spine was defined as the nearest spinous process. A difference of more than 1.0 cm between the left and right sides was considered abnormal. To assess the scapular stabilizers, the elbow extension test (Figure 2) and elbow push test (Figure 3) were performed with the shoulders in 90° of forward flexion. For the elbow extension test, the subject extended the elbow joint from 90° of flexion by using maximum force while the examiner held the subject's forearm to resist his extension force (Figure 2). For the elbow push test, while grabbing the contralateral elbow with each hand, the subject pushed each elbow in turn anteriorly with maximum force as the examiner resisted his pushing by holding the elbow (Figure 3). Muscle strength was evaluated by manual muscle testing on a scale of 0 to 5. Muscle strength of shoulder abduction was assessed with the subject's thumb up; this is known as the "full can position."[6,9] External rotation strength was assessed with the subject's arm at the side.[2] To assess internal rotation strength the subject's strength was recorded in lifting his hand off his back.[3] The

results of the elbow extension test, elbow push test, and manual muscle tests of abduction, external rotation, and internal rotation were considered to be abnormal when the muscle strength on the dominant side was less than that on the non-dominant side. To assess the posterior tightness of the shoulder joint, subjects performed the combined abduction test (Figure 4) and horizontal flexion test (Figure 5) while the examiner fixed the scapula and prevented it from moving by holding it. The humerus was passively abducted in the coronal plane for the combined abduction test (Figure 4) and horizontally flexed for the horizontal flexion test (Figure 5). If the subject's upper arm failed to touch his head during glenohumeral abduction with a fixed scapula, the combined abduction test was graded as abnormal. The horizontal flexion test was considered abnormal when the subject was unable to reach around the other shoulder to touch the bed during horizontal flexion with a fixed scapula. Capsular laxity was evaluated by load-and-shift testing in the anterior, posterior, and inferior directions; anterior apprehension and relocation tests were also done. When the dominant side showed increased laxity, or when the subject felt that the shoulder was unstable during any test, capsular laxity was considered abnormal. To evaluate subacromial impingement, the Neer,[15] Hawkins,[4] and Yocum[8] tests were performed. If the subject felt shoulder pain during any of these tests, subacromial impingement testing was graded as abnormal. The hyper-external rotation test (Figure 6), which evaluates peel-back of the superior labrum[1,12,13] and pathologic internal impingement,[5,11] was performed in 90° of shoulder abduction with the elbow flexed at 90° in the supine position. The test was considered to be abnormal when a subject felt pain as the examiner applied external rotation torque beyond the maximum external rotation position.

Figure 1 Hara test scoring sheet

Hara test scoring sheet

Date of Examination_____

Name _____ Age_____ Sex_____

Dominant Hand (R) _____ (L) _____

Sport _____ Position _____ Years Played _____

Instructions to examiners:

Please perform and score the following 11 physical examinations and then calculate the total score (i.e., the number of "intact" results).

Scapular function		
Scapula–spine distance	Abnormal	Intact
Elbow extension test	Abnormal	Intact
Elbow push test	Abnormal	Intact
Manual muscle strength		
Abduction	Abnormal	Intact
External rotation	Abnormal	Intact
Internal rotation	Abnormal	Intact
Posterior tightness		
Combined abduction test	Abnormal	Intact
Horizontal flexion test	Abnormal	Intact
Capsular laxity tests	Abnormal	Intact
Subacromial impingement tests	Abnormal	Intact
Hyper external rotation test	Abnormal	Intact

Total Hara test score _____

(number of "intact" results)

Figure 2 Elbow extension test for assessment of scapular stability. The elbow extension test is performed with the shoulders in 90° of forward flexion. The subject extends the elbow joint from 90° of flexion with maximum force while the examiner holds the subject's forearm to resist his extension force. The test is considered abnormal when the muscle strength on the dominant side is less than that on the non-dominant side.

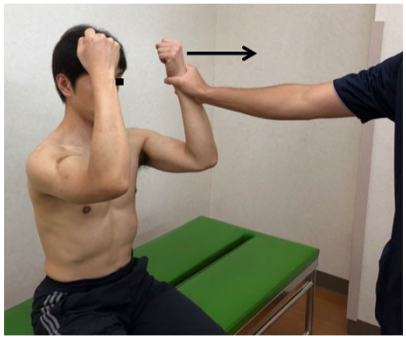


Figure 3 Elbow push test for assessment of scapular stability. The elbow push test is performed with the shoulders in 90° of forward flexion. While grasping the contralateral elbow with each hand, the subject pushes each elbow in turn anteriorly with maximum force. The examiner resists this pushing by holding the elbow. The test is considered to be abnormal when the muscle strength on the dominant side is less than that on the non-dominant side.

Figure 4 Combined abduction test for assessment of posterior shoulder tightness. The examiner completely prevents any movement of the scapula by holding it. The humerus is passively abducted in the coronal plane. This test is considered abnormal when the upper arm fails to touch the head during glenohumeral abduction with a fixed scapula. Left: intact; right: abnormal.

Figure 5 Horizontal flexion test for assessment of posterior shoulder tightness. The examiner completely prevents any movement of the scapula by holding it and horizontally flexes the humerus. This test is considered to be abnormal when, during shoulder horizontal flexion with a fixed scapula, the subject is unable to reach around the other shoulder to touch the bed. Left: intact; right: abnormal.

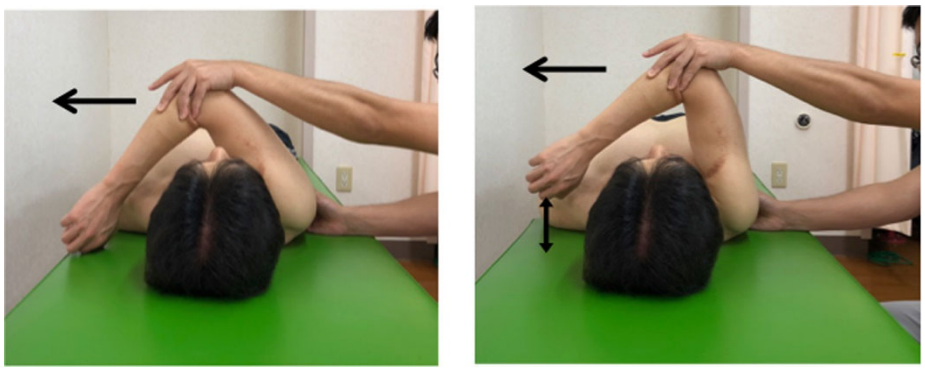
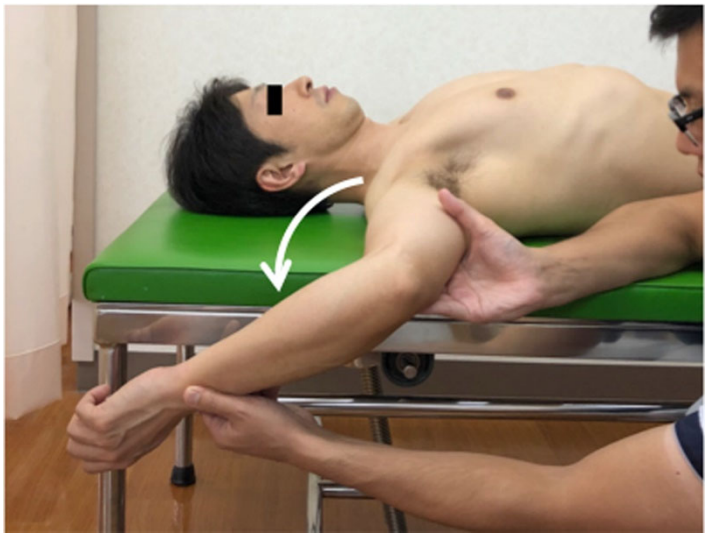


Figure 6 The hyper external rotation test, which evaluates peel-back of the superior labrum and pathologic internal impingement, is performed in 90° of shoulder abduction with the elbow flexed at 90° in the supine position. The test is considered abnormal when the subject feels pain as the examiner applies external rotation torque beyond the maximum external rotation position.



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