Relationship between preoperative size of rotator cuff tears measured using radial-slice magnetic resonance images and postoperative rotator cuff integrity: a prospective case-control study

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INTRODUCTION:

MRI is useful for diagnosing shoulder diseases preoperatively. However, preoperative risk factors for retears have not been previously reported using a radial- slice MRI. We investigated the relationship between the preoperative tear area of the rotator cuff evaluated using radial-slice MRI and the postoperative rotator cuff integrity.

METHODS:

We treated 102 consecutive patients who underwent shoulder arthroscopy for reparable rotator cuff tears.

The tear area was measured using radial-slice MRI acquired using fat-suppressed T2-weighted imaging. The imaging procedure for the radial slices inluded the following steps: First, the rotation axis was defined as the line passing through the center of the humeral head and the center of the glenoid; second, according to the axis, 18 slices were obtained (Fig. 1).

The calculation of the tear area included the following steps: First, the size of the rotator cuff tear was measured in all the slices; second, we defined the tear area as two areas of a triangle and some area of a trapezoid. Thus, the formula for the tear area became easier to obtain and was calculated as the value computed by multiplying the sum of the tear size by the radial-slice interval (0.4 cm) (Fig. 2).

The rotator cuff integrity was evaluated by a postoperative MRI according to Sugaya's classification during the 2-year follow-up.

The patient demographics, medical comorbidities, radiologic factors, tear size, fatty infiltration, muscle atrophy measured using oblique coronal and oblique sagittal MRI, and the tear area were assessed to compare the intact and retear groups in univariate and multivariate logistic regression analyses. The cutoff values of the independent factors were obtained using the receiver operating characteristic curve.

RESULTS:

Retears were identified in 15 (14.7%) of the reparable 102 patients.

The rates of retears were similar regardless of the demographic and medical comorbidities were not significant contributors to retears (Table I).

In imaging studies, no significant difference was found in the AHI , CSA , and fatty infiltration of the subscapularis tendon between the two groups. The occurrence of a retear was significantly affected by the AP and ML tear length , fatty infiltration of the supraspinatus and infraspinatus , occupation ratio , tangent sign , and tear area as measured using the radial slices (Table II).

All these imaging factors except for the fatty infiltration of the subscapularis had excellent intraobserver reliability and interobserver reproducibility (Table III).

in the multivariate logistic analyses, tear area was the independent factor that most significantly affected the rate of retear (TableIV).

The cutoff values for predicting retears were a tear area of 6.3 cm2 with a sensitivity of 86.7%, specificity of 96.6%, and an AUC of 0.965 (Fig. 3).

DISCUSSION AND CONCLUSION:

The tear area was the independent factor that most significantly affected the rate of retear and showed excellent accuracy with a cutoff value of 6.3 cm2. Radial-slice MRI may be a valuable diagnostic tool for assessing the postoperative rotator cuff integrity.