

## Accuracy of office –based ultrasonography compared with MR imaging and surgery in the diagnosis of rotator cuff tears

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### Intro●duction

Diagnosis of rotator cuff tear is sometimes vague and depends on the imaging modalities. MR imaging has been considered as the most useful diagnostic method for evaluating the rotator cuff tears, but it's availability is limited for high cost and in the patients with claustrophobia. Shoulder ultrasonography is not yet popular tool in orthopaedic surgeons, but its application rapidly increased these days because of it's usefulness and low cost.

The object of this study was to compare the accuracy of ultrasonography and MR arthrography (MRA) imaging in detecting of rotator cuff tear with arthroscopic finding used as the reference standard.

### Materials and Meth●ods

We analyzed prospectively ultrasonographic findings and MRA findings of 51 shoulders in 51 patients who underwent the arthroscopic shoulder surgery after checking both ultrasonography and MRA of shoulder joint. All of the ultrasonographic evaluation of the shoulder joint was performed according to a standard protocol by an orthopaedic surgeon at the orthopaedic office. Two orthopaedic doctors independently interpreted the ultrasonography findings and MRA findings. The size of the tear, partial/full thickness tear, and articular/bursal side tear were evaluated with ultrasonography, MRA and during surgery. The findings of ultrasonography and MRA were then compared with the operative findings for each parameter.

Each tear size measured at ultrasonography and MRA were compared with paired measurement at operation with Pearson correlation coefficients(r). A kappa coefficient was calculated to verify inter–observer agreement.

### Results

The arthroscopic diagnosis was a partial–thickness rotator cuff tear in eleven shoulders, a full–thickness tear in thirty shoulders, subacromial impingement syndrome in seven shoulders and biceps pathology in three shoulders.

The sensitivity of ultrasonography and MRA for detecting partial–thickness rotator cuff tears was 45.5 and 72.7%, respectively, and that for full–thickness tears was 80.0 and 100%,

respectively. The specificity of ultrasonography and MRA for detecting partial-thickness tears was 22.5 and 92.5%, respectively, and that for full-thickness tears was 89.1 and 95.2%, respectively. Therefore, the accuracy of ultrasonography and MRA for detecting partial-thickness rotator cuff tears was 27.5 and 88.2%, and that for full-thickness tears was 84.3 and 98%, respectively. The overall accuracy for detecting all tears was 74.5% for ultrasonography and 88.2% for MRA. Tear size measured based on ultrasonography examination poorly correlated with the size measured at arthroscopic surgery ( $r=0.21$ ;  $P < .005$ ). However, tear size estimated with MRA highly correlated with actual size ( $r=0.75$ ;  $P < .005$ ). The kappa coefficient was 0.47 between the two independent examiners.

## Discussion

In current study, we demonstrated that the accuracy of office-based ultrasonography for detecting full-thickness rotator cuff tears was comparable with that of MRA. However, it was less sensitive for detecting partial thickness rotator cuff tears and for estimating the tear size. One of the reasons of low sensitivity of ultrasonography for detecting the partial tear is an inability to distinguish between anisotropy and articular partial tear in ultrasonographic image. And inter-observer agreement on interpretation of ultrasonographic findings was fair, not good. These results emphasize the important of the correct technique and experience in operation of ultrasonography in shoulder joint.

Eventhough office-based ultrasonography has a limitation in some aspects, it is very useful tool for diagnosis of rotator cuff tears since it is a real-time and dynamic evaluation, less expensive and less time-consuming than MR imaging. Therefore ultrasonography evaluation should be placed on the first line imaging modality for the detection of rotator cuff tears in the office.