The Ability Of Ultrasound To Determine Rotator Cuff Tear Reparability

Andrew KH Tse, Patrick H. Lam, PhD, Lisa Hackett, AMS, George AC Murrell, MD, DPhil.
1Orthopaedic Research Institute, Kogarah, Australia, 2Orthopaedic Research Institute, Sydney, Australia.


Introduction: Rotator cuff tears are common and often require surgery to reattach the torn tendon to the humeral head (primary repair). However, primary repair is sometimes not feasible for massive rotator cuff tears. On our service irreparable tears are either repaired with an expanded polytetrafluoroethylene (ePTFE) patch to fill the defect, left alone or managed with a reverse total shoulder replacement. Traditionally, magnetic resonance imaging (MRI) has been used to determine the reparability of rotator cuff tears, by evaluating tear size and fatty atrophy of the supraspinatus muscle. However, ultrasound is being utilised more frequently, due to advantages such as its lower economic burden, easier accessibility and ability to assess global and dynamic shoulder movements. The aim of the study was to assess the diagnostic accuracy of ultrasound in predicting the reparability of rotator cuff tears.

Methods: The study consisted of a post hoc analysis of measurements made prospectively in a cohort of patients who had ultrasounds of their shoulder by a single sonographer and subsequently came to rotator cuff repair surgery by a single surgeon. Measurements of tear size and muscle atrophy were made at pre-operative ultrasound and a prediction of repair method was made. The predictions of reparability at ultrasound were classified into repairable, repairable with patch and irreparable, and were correlated with the final assessment of reparability at arthroscopy or open surgery. Quantification of tear size dimensions and final assessment of repair method were made intra-operatively.

Results: Ultrasound prediction of rotator cuff repair method and reparability has a positive correlation with final surgical determination of repair method and reparability (positive likelihood ratio= 2.6, p<0.0001; sensitivity= 0.86, p<0.0001; specificity= 0.67, p<0.0001). Logistic regression analysis showed that the best sonographic independent predictors of rotator cuff reparability were antero-posterior tear length (Spearman’s Rank correlation coefficient r= 0.71, p<0.0001), tear size area (r= 0.70, p<0.0001) and medio-lateral tear length (r=0.73, p<0.0001). Tear size greater than 30 mm in antero-posterior and medio-lateral dimensions were indicative for an irreparable rotator cuff tear (p<0.0001).

Discussion: Ultrasound had accuracy in predicting the repair method and reparability of rotator cuff tears. Measures of tear size, particularly antero-posterior tear length, were the best predictors of rotator cuff tear reparability. Tear size equal to or greater than 4 cm2 was indicative for an irreparable rotator cuff tear.

Significance: Ultrasound had accuracy in predicting the repair method and reparability of rotator cuff tears. Tear size equal to or greater than 4 cm2 was indicative for an irreparable rotator cuff tear.
ORS 2015 Annual Meeting
Poster No: 1873

Graph 1: Antero-Posterior Tear Length by Arthroscopy (mm) vs. Antero-Posterior Tear Length by Ultrasound (mm)

Graph 2: Tear Size Area by Arthroscopy (cm²) vs. Tear Size Area by Ultrasound (cm²)

$r = 0.71, p < 0.0001$

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