Can 2.0mm Diameter Operative Arthroscopy Predict Appropriate Surgical Management of Intra-Articular Shoulder Pathology More Accurately than MRI? A Prospective, Blinded Clinical Trial

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ABSTRACT

Purpose: The purpose of this study was to compare intra-articular information obtained from a novel 2.0mm arthroscope to that obtained using magnetic resonance imaging (MRI) and determine which was more effective at predicting the appropriate surgical procedure in patients with glenohumeral pathology.

Methods: This was a prospective, blinded, single-center trial performed with patients who were scheduled to undergo operative arthroscopy for intra-articular shoulder pathology. Thirty consecutive patients were included between May 2020 and July 2020. Each patient underwent an MRI pre-operatively and, on the day of surgery, two recorded diagnostic arthroscopies were performed: first using a novel 2.0mm arthroscope, followed by a standard 4.0mm arthroscope. Both videos and MR images were then de-identified and blindly reviewed by two fellowship-trained orthopedic sports surgeons. Analysis included diagnostic agreement of the 2.0mm arthroscope and MRI as compared to the 4.0mm arthroscope which is considered the gold standard. The descriptive quality of the intra-articular pathology as well as the most appropriate treatment recommendation in the form of Current Procedural Terminology (CPT) was compared between the diagnostic modalities.

Results: For all intra-articular pathologies except humeral head chondromalacia, the 2.0mm arthroscope had a higher percentage agreement and positive predictive value (PPV) compared to MRI. The 2.0mm arthroscope had a higher sensitivity, specificity, PPV and negative predictive value (NPV) when evaluating the long-head biceps (LHB), superior labrum, infraspinatus, subscapularis and glenoid cartilage. The 2.0mm arthroscope had the highest accuracy when identifying lesions of the LHB (Kappa 0.73) followed by tears of the subscapularis (Kappa 0.65), and articular-sided lesions of the supraspinatus (Kappa 0.62). MRI accuracy was highest when identifying lesions of the LHB (Kappa 0.52), followed by tears of the subscapularis (Kappa 0.31), and articular-sided supraspinatus lesions (Kappa 0.29) but these values were all lower in the MRI group when compared to the 2.0mm arthroscope group. When predicting the appropriate CPT codes for each shoulder, the 2.0mm group had a higher kappa value than the MRI group (kappa 0.87 v 0.56) and a higher agreement percentage (93.1% v 76.7%) (p=0.0003). When considering rotator cuff repair (CPT 29827), the 2.0mm arthroscopy was equally sensitive (93.3 and 93.8) but had a higher PPV as compared to MRI (100 and 83.3). There were no complications related to the use of the 2.0mm arthroscope in this series.

Conclusion: 2.0mm arthroscopy is a safe and effective method of diagnosing intra-articular glenohumeral pathology. When diagnosing pathology within the shoulder, the 2.0mm arthroscopy had a higher positive predictive value than MRI when assessing all anatomic pathology except for humeral head chondromalacia. When compared to MRI, the 2.0mm arthroscope was able to more accurately predict which rotator cuff tears would require surgical repair (CPT 29827). When considering all CPT codes for the shoulders in this series, the 2.0mm arthroscope was more accurate at predicting the appropriate surgical procedure than the MRI (Kappa 0.87 v 0.56). This study shows that 2.0mm arthroscopy can be used as a good alternative to MRI for diagnosing intra-articular shoulder pathology and help determine which patients will require surgical intervention.

Level of Evidence: Level II, prospective cohort, development of diagnostic criteria (consecutive patients with consistently applied, blinded, reference “gold” standard)