



## Original article

# Magnetic resonance imaging without contrast as a diagnostic method for partial injury of the long head of the biceps tendon<sup>☆</sup>

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## ABSTRACT

**Objective:** To evaluate the use of magnetic resonance imaging (MRI) without contrast as a diagnostic method of partial lesions of the long head of the biceps, using arthroscopic surgery as the gold standard.

**Methods:** We evaluated data from MRI and arthroscopic surgical findings of patients operated due to rotator cuff and SLAP injuries. MRI without contrast of at least 1.5 T, with a radiologist report, was used as a criterion for the detection of long head of the biceps injury. All cases were operated by the same surgeon at this hospital.

**Results:** This study evaluated data from 965 patients, 311 women (32%) and 654 men (68%), with a mean age of 45 years, who underwent arthroscopic surgery for rotator cuff and SLAP repair from September 2012 to September 2015. Overall, the sensitivity and specificity of MRI was 0.22 (CI: 0.17–0.26) and 0.98 (CI: 0.96–0.99), respectively.

**Conclusions:** MRI has a low sensitivity and high specificity for detection of partial tears of the long head of the biceps tendon.

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## Avaliação da ressonância magnética sem contraste como método para diagnóstico de lesões parciais do tendão da cabeça longa do bíceps

## RESUMO

**Objetivo:** Avaliar a ressonância magnética (RM) sem contraste como método diagnóstico da lesão parcial da cabeça longa do bíceps com o uso da cirurgia artroscópica como padrão ouro.

<sup>☆</sup> Study conducted at the Hospital Orthoservice, Grupo de Ombro e Cotovelo, São José dos Campos, SP, Brazil.

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**Métodos:** Foram avaliados dados de RM e achados cirúrgicos artroscópicos de pacientes operados devido à lesão do manguito rotador e à lesão do alto do labrum de anterior para posterior (do inglês *superior labral anterior to posterior* SLAP). Foi usado como critério de detecção de lesão da cabeça longa do biceps ressonância magnética sem contraste de no mínimo 1,5 Tesla, com laudo de radiologistas. Todos os casos foram operados por um único cirurgião em nosso hospital.

**Resultados:** O estudo avaliou dados de 965 pacientes, 311 mulheres (32%) e 654 homens (68%), com média de 45 anos, que se submeteram a cirurgia artroscópica para reparo do manguito rotador e da SLAP, entre setembro de 2012 e setembro de 2015. De forma geral, a sensibilidade e a especificidade da RM fora, de 0,22 (IC:0,17 a 0,26) e 0,98 (IC: 0,96 a 0,99), respectivamente.

**Conclusões:** A RM tem baixa sensibilidade e alta especificidade para detecção de roturas parciais do tendão da cabeça longa do biceps.

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## Introduction

Injuries of the long head of the biceps tendon are common in patients with shoulder pain; surgery is required in approximately half of cases. Pathological changes of the long head of the biceps tendon include tenosynovitis, partial rupture, complete rupture, subluxation, and dislocation.<sup>1,2</sup>

Although in most cases the lesion of the long head of the biceps is part of a syndrome or is associated with other conditions, it is not uncommon to identify it as the sole cause of shoulder pain.<sup>3-5</sup>

Magnetic resonance imaging (MRI) is routinely used as a method to assess cases of shoulder pain and diagnose rotator cuff injury and injuries of the long head of the biceps. The literature on the effectiveness of MRI without contrast consists of small case series that examined biceps injury, but as a secondary objective.<sup>1,6</sup> There are only four studies that specifically examined the validity of MRI without contrast in the detection of partial injuries of the long head of the biceps tendon as the primary goal, none of which were conducted in Brazil.<sup>3,7-9</sup>

This study aimed to assess the use of MRI as a diagnostic method for partial rupture of the long head of the biceps tendon. Arthroscopic surgery was adopted as the gold standard (Fig. 1).

## Material and methods

Data from 965 patients operated at a single center by a single surgeon were retrospectively evaluated. Data from the MRI report of patients who would undergo arthroscopic surgery for rotator cuff repair or SLAP lesions were recorded, with special attention to the description of the conditions of the long head of the biceps. After arthroscopy, data on the long head of the biceps were recorded in cases of partial rupture of its fibers.

Inclusion criteria comprised patients with a diagnosis of rotator cuff injury or SLAP injury, who had undergone MRI without contrast of at least 1.5 Tesla, with a radiologist report, and who had undergone arthroscopic shoulder surgery.

Patients with MRI of less than 1.5 Tesla, with a diagnosis of instability of the glenohumeral joint, with complete rupture of the long head biceps, and those who had undergone previous surgery, in which tenotomy or tenodesis of the long head of the biceps was performed, were excluded from the study. Cases of previous surgery that did not approach the long head of biceps were not excluded.

## Arthroscopic treatment

All surgical procedures were performed by the same surgeon, with patient under general anesthesia and nerve block, in the beach chair position. Both glenohumeral joint and subacromial space were examined, which allowed for the assessment of the glenoid labrum, rotator cuff, and long head of the biceps. The long head of the biceps tendon was directly visualized and inspected for tendinitis and partial or total rupture. Only the exams in which there was partial rupture of the fibers of the long head of the biceps tendon were considered as positive.

## Statistical analysis

Surgical findings were recorded in  $2 \times 2$  tables as true and false positives and true and false negatives for partial rupture of the biceps tendon. Tables were created to determine sensitivity, specificity, predictive values, likelihood ratio, and odds ratio, which were calculated by Excel. A 95% confidence interval was considered for the analysis of all data. Pearson's correlation coefficient was used to assess the correlation between the severity of the condition and the presence of partial damage, through Excel. Values between 0 and 0.3 were considered as a weak correlation; between 0.3 and 0.6, moderate correlation; and greater than 0.6, strong correlation. To assess this relationship, the Mann-Whitney test was also used in the Minitab program.

## Results

Data were collected from 965 patients, 311 women (32%) and 654 men (68%), mean age 45 years, who underwent

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