



Natural history of infraspinatus fatty infiltration in rotator cuff tears

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Background/hypothesis: Muscular fatty infiltration (FI) represents an important prognostic factor in rotator cuff repair. The goal of this study was to analyze the natural history of infraspinatus FI in rotator cuff tears to determine the timing of the appearance and the speed of progression of this phenomenon.

Method: The preoperative MRI or CT-arthrograms of 1688 patients operated for rotator cuff tears were reviewed. The degree of infraspinatus FI was correlated with the type of tendon tear, patient sex, dominant hand, presence of traumatic injury, delay between the onset of symptoms and imaging studies, and age of the patients at imaging. Infraspinatus FI was graded on axial images according to Goutallier classification and described as minimal (stage 0 or 1), medium (stage 2), and severe (stages 3 and 4). Statistical regression was used to determine the most significant factors.

Results: Infraspinatus FI increased significantly in presence of an infraspinatus tendon tear and when multiple tendons were torn ($P < .0005$), with increasing delay between the onset of symptoms and imaging studies ($P < .0005$) and increasing patient age ($P < .0005$). Medium FI appeared on average 2 and a half years after the onset of symptoms, and severe FI appeared at an average of 4 years after symptom onset.

Conclusion: Larger tendon tears, longer delays after tendon rupture and older patient age are associated with more severe and frequent FI. Stage 2 FI appears at an average of 2 and a half years after the onset of symptoms, and surgical repair should be done within this time frame if possible.

Level of evidence: Level IV, Case Series, Prognosis Study.

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Keywords: Muscle; fatty infiltration; rotator cuff

Goutallier et al⁸ first described fatty infiltration of the rotator cuff after cuff tear in 1989. In addition to the description of the 5 stages of fatty degeneration, subsequent

studies have shown that fatty changes are irreversible and influence the final results of surgical repair.^{2,9-11} Fuchs et al,⁴ Jost et al¹³, and Liem¹⁴ have independently verified and expanded the concept of fatty infiltration, showing that the degree of infiltration does not diminish after surgical repair and actually has a tendency to increase depending on the preoperative state. While the biologic cause of fatty infiltration remains unclear, it has been shown that the loss of strength associated with fatty changes of the cuff musculature are not affected by repair of the cuff tendon.^{1,7,17}

The infraspinatus muscle is the main depressor of the humeral head and fatty infiltration of the muscle can result

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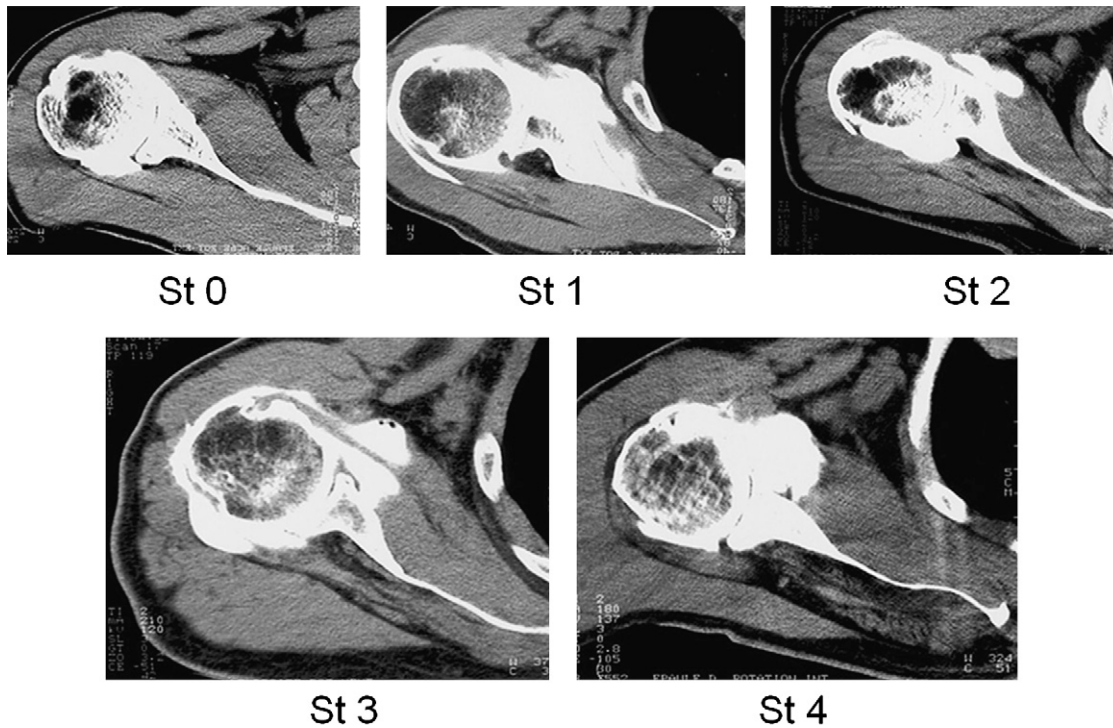


Figure 1 Infraspinatus fatty infiltration grading according to Goutallier and Bernageau classification.

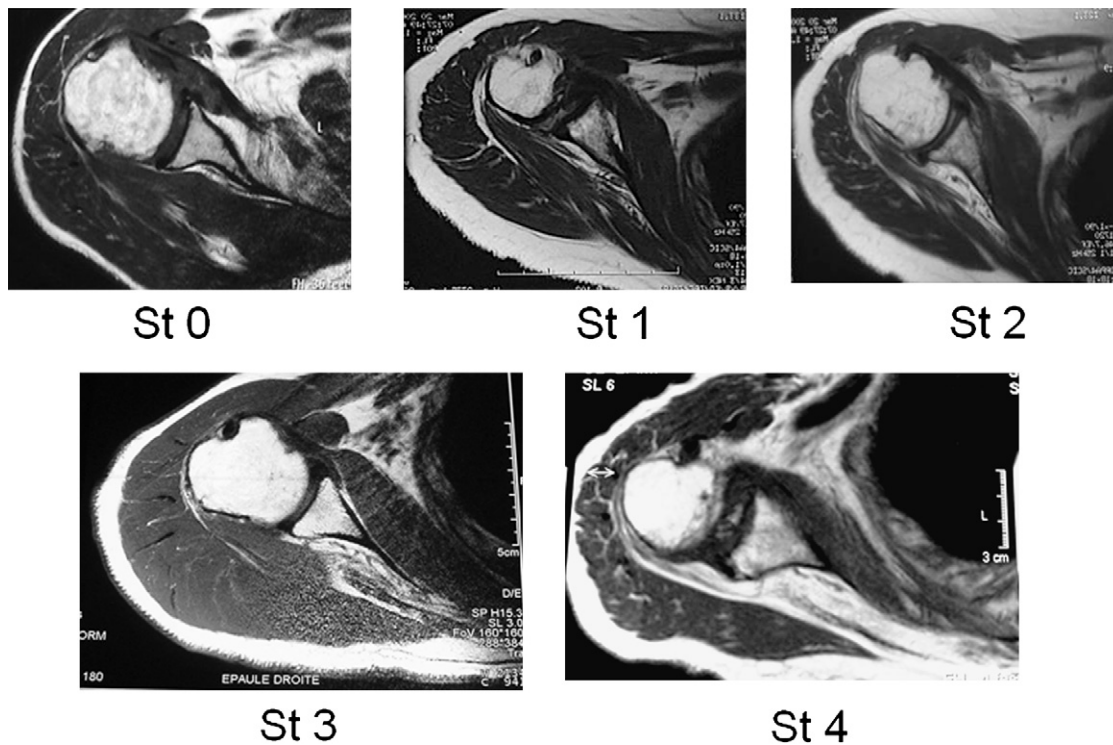


Figure 2 Infraspinatus fatty infiltration grading according to Goutallier and Bernageau classification applied to MRI.

in proximal migration of the humerus with subacromial impingement and loss of strength in external rotation and elevation.^{1,3,12,16,18} Therefore, the infraspinatus muscle plays a vital role in shoulder function by statically and

dynamically centering the humeral head within the glenoid.

All rotator cuff tears are not necessarily treated surgically. In certain cases, conservative treatment is sufficient,

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