

# Intramuscular Synovial Cyst of the Shoulder

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## Abstract

In this article, we report a case of intramuscular synovial cyst of the rotator cuff musculature with associated supraspinatus and infraspinatus tears. The patient was treated arthroscopically with cyst decompression and inside-out rotator cuff repair. We also present a review of the current literature on intramuscular synovial cysts of the rotator cuff.

Periarticular synovial cysts of the shoulder are a commonly reported cause of shoulder pain.<sup>1-7</sup> The most common form of periarticular cyst in the shoulder is a paralabral cyst secondary to a glenoid labral tear.<sup>8</sup> When many in number, they can create a compressive suprascapular neuropathy that results in pain and muscle wasting.<sup>1,3-6,9-16</sup> In addition, juxta-articular cysts have been reported in a degenerated acromioclavicular joint and are associated with full-thickness rotator cuff tears.<sup>17,18</sup>

A seldom reported periarticular synovial cyst of the shoulder occurs as an intramuscular cyst within the fascial sheath or substance of one of the rotator cuff muscles.<sup>19,20</sup> These cysts are typically identified on the T<sub>2</sub>-weighted magnetic resonance imaging (MRI) series of the rotator cuff, but are far more difficult to identify visually or palpably during arthroscopy.<sup>19</sup> Some authors believe these intramuscular synovial cysts are analogous to paralabral cysts in that they are secondary to fluid leakage through a tear in the rotator cuff itself.<sup>20</sup>

In this article, we report a case of intramuscular synovial cyst of the rotator cuff musculature with associated supraspinatus and infraspinatus tears. The patient was treated arthroscopically with cyst decompression and inside-out rotator cuff repair. We also present a review of the current literature on intramuscular synovial cysts of the rotator cuff. The patient provided written

informed consent for print and electronic publication of this case report.

## CASE REPORT

A 35-year-old man presented to our clinic for a dominant right shoulder injury sustained while participating in Brazilian jiu-jitsu 2 months earlier. He reported mild pain and weakness since the injury and stated that the pain was mainly anterior, with some pain extending posteriorly.

Physical examination revealed full active and passive range of motion (ROM) to the affected shoulder with mild pain on forward elevation, despite full muscle strength. External rotation strength was only mildly decreased with pain. There was full muscle strength in all other planes of motion, and neurovascular examination findings were normal. There was no muscle atrophy. There was tenderness to palpation over the long-head biceps brachii tendon with a positive Speed sign.

Radiographs showed a flat acromion with an os acromiale. MRI showed an articular-sided infraspinatus tear with a delaminating component extending medially and evidence of an associated large intramuscular cyst within the infraspinatus (Figures 1A–1C). Other findings were a partial-thickness tear of the supraspinatus, a partial-thickness tear of the long head of the biceps brachii, a degenerative posterior labral tear, degeneration of the superior labrum, and a small calcified intra-articular body with re-demonstration of an os acromiale.

The patient was taken to the operating room for arthroscopic shoulder surgery. At surgery, the frayed posterior and anterior aspects of the labrum were debrided. The high-grade partial-thickness tear of the biceps was identified, and tenodesis was performed. In addition, supraspinatus thinning and an articular-sided and intrasubstance tear of the infraspinatus were confirmed (Figure 2A). The senior author (G.L.J.) proceeded through the substance of the tear and decompressed the large intramuscular cyst within the infraspinatus into the joint. Copious amounts of cystic fluid were draining from the cyst, and thorough decompression was performed (Figure 2B). Inside-out repair of the rotator cuff tear was performed with side-to-side sutures across the tear to close the articular-sided and intrasubstance defects (Figures 2C, 2D). During the first 6 postoperative weeks, the patient wore a sling, performed daily pendulum exercises, and participated in physical therapy for passive ROM.

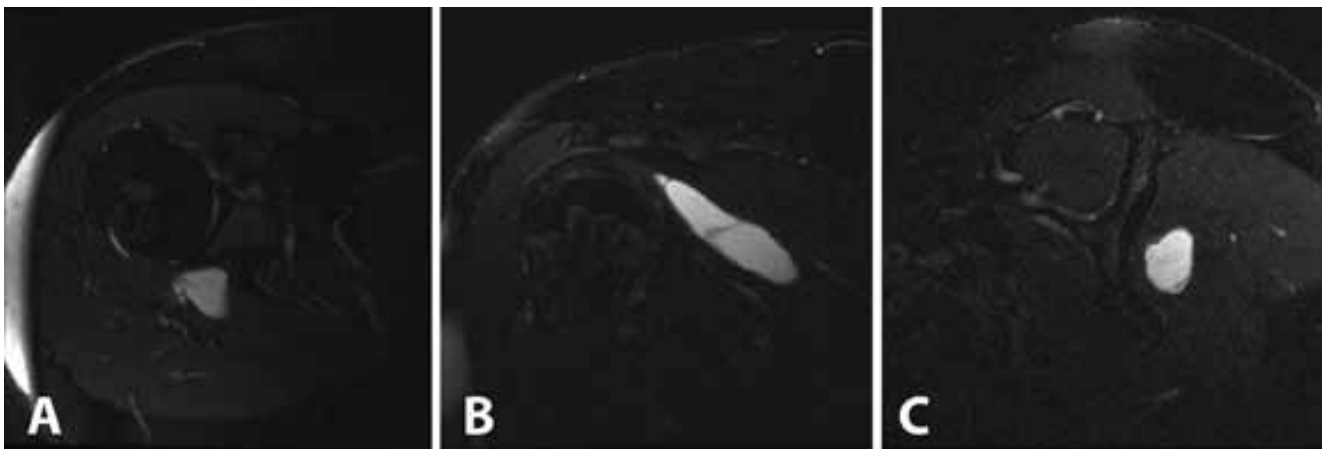
At 6-week follow-up, the patient reported improved shoulder pain over preoperative levels and began for-

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**Figure 1.** Axial T<sub>2</sub>-weighted (A), coronal T<sub>2</sub>-weighted (B), and sagittal T<sub>2</sub>-weighted (C) magnetic resonance imaging shows large intramuscular infraspinatus cyst with hyperintense, single-loculation, round, homogeneous-appearing cystic mass.

mal physical therapy consisting of gradual stretching and strengthening through active ROM. At 3-month follow-up, he reported complete (further) resolution of pain. Passive ROM included 180° forward elevation and 70° external rotation. Active ROM included 170° forward elevation without pain. Supraspinatus was 5/5 strength, and external rotation was 4+/5 strength. By 4 months after surgery, American Shoulder and Elbow Surgeons (ASES) pain and functional self-assessment scores had improved to 80 (out of 100), from 45 before surgery.

## DISCUSSION

We have reported a case of intramuscular synovial cyst of the shoulder and rotator cuff tear managed arthroscopically with cyst decompression and rotator cuff repair. Literature reports on this entity are rare and mostly consist of radiologic reports.<sup>19,21</sup> It has been theorized that synovial cysts form secondary to glenohumeral joint leakage through rotator cuff tears.<sup>18,20</sup> These cysts can become large and may present as a large supraclavicular mass that has leaked into a degenerated acromioclavicular joint.<sup>17,18</sup> However, intramuscular synovial cysts of the shoulder are seldom reported, and little is known about appropriate management.<sup>19-22</sup>

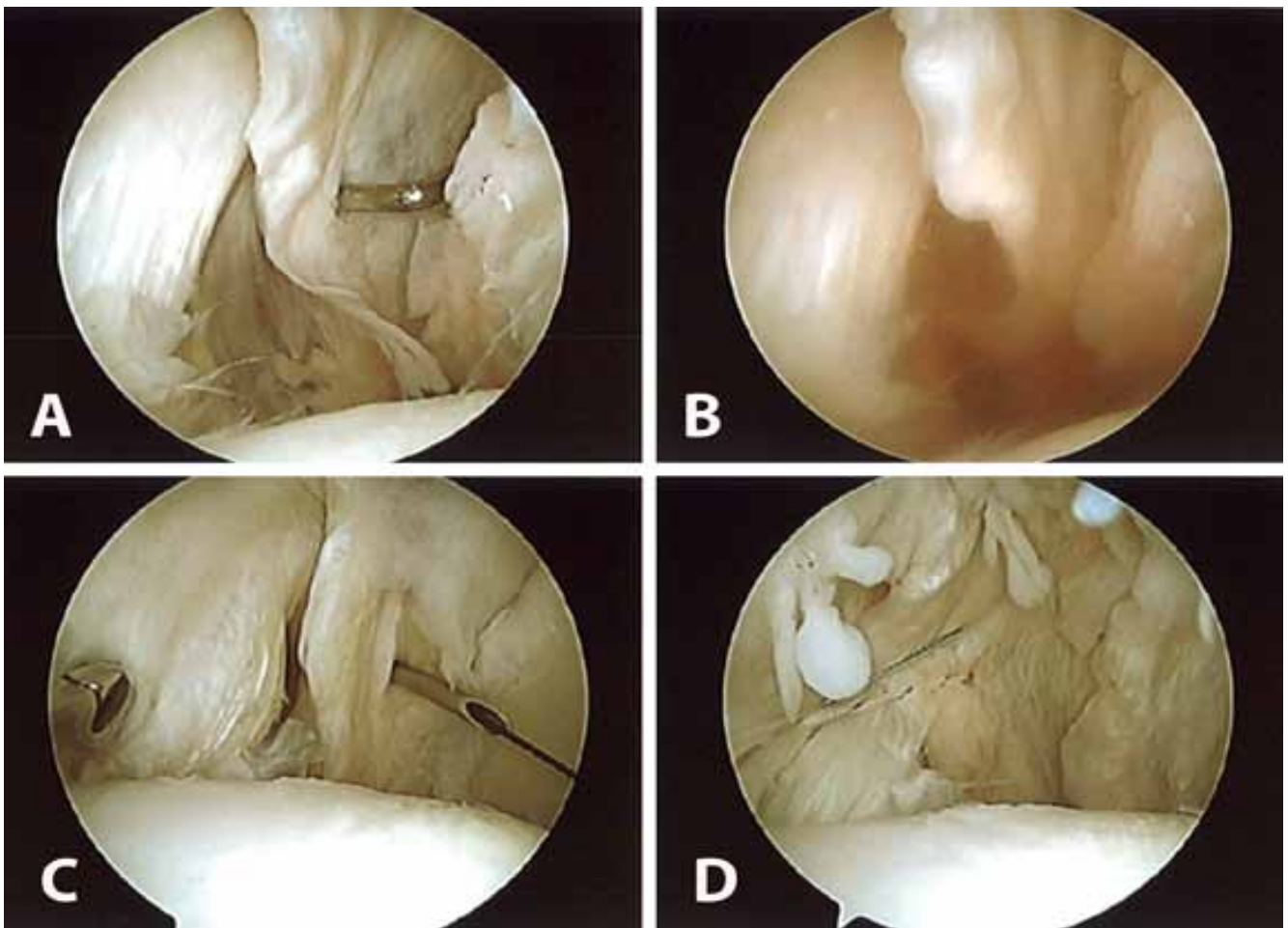
To our knowledge, intramuscular shoulder cysts were first reported by Sanders and colleagues,<sup>20</sup> who identified 13 cases, all on T<sub>2</sub>-weighted MRI. Five cases were managed with arthroscopy. The authors showed that intramuscular cysts of the rotator cuff were likely associated with small, full-thickness tears or articular-sided partial-thickness tears of the rotator cuff. The central point of their study was that a search for rotator cuff pathology should be undertaken whenever a large intramuscular cyst is identified. However, their study had its limitations: It was primarily an MRI retrospective review, the cysts were not visualized during arthroscopy, and there was no report of follow-up for symptom resolution.

Kassarjian and colleagues<sup>19</sup> reported on 32 MRI-identified intramuscular cysts of the rotator cuff.

(Sensitivity and specificity of MRI in identifying full-thickness rotator cuff tears range from 84% to 96% and from 94% to 98%, respectively,<sup>23</sup> but sensitivity and specificity of MRI in identifying partial-thickness tears range from 35% to 82% and from 85% to 97%, respectively.<sup>23,24</sup>) The association of intramuscular cysts and delaminating-type partial-thickness tears led Kassarjian and colleagues to suggest that intramuscular cysts are a secondary sign of rotator cuff tear. Therefore, indirect identification of an intramuscular cyst should improve the sensitivity and specificity of MRI identification of partial-thickness tears.<sup>19</sup> Further, Kassarjian and colleagues showed that, contrary to Sanders and colleagues,<sup>20</sup> many of the intramuscular cysts were found in rotator cuff muscles other than those having the tears. However, 1 limitation of the study by Kassarjian and colleagues is that there was surgical confirmation of these tears in only 11 of the 32 cases (34%), and the authors' report did not include any information on resolution of cysts or symptoms.<sup>19</sup>

Manvar and colleagues<sup>21</sup> reported on their study of 134 shoulders (134 patients) with intramuscular cysts. Results confirmed a relationship between both partial- and full-thickness rotator cuff tears and intramuscular cysts. Results also identified intramuscular cysts not associated with rotator cuff tears in 32 cases (24%), only 5 (16%) of which underwent arthroscopy. A weakness of that study, as with other MRI studies, is that well under 50% of its surgical and nonsurgical cases were clinically followed up.<sup>21</sup> In addition, none of these MRI-identified, arthroscopically "treated" intramuscular cysts were visible arthroscopically. Thus, arthroscopic evidence of MRI-documented cysts was lacking.

Tan and colleagues<sup>22</sup> reviewed a case of a symptomatic intramuscular synovial cyst of the infraspinatus (without associated labral or rotator cuff tear) managed with open arthrotomy and cyst decompression. By 24 months after surgery, the patient was fully recovered, pain-free, without limitations, and had returned to work. This patient's case represents the first true clinical



**Figure 2.** (A) Arthroscopic image from anterior portal shows rotator cuff (infraspinatus) intrasubstance and articular-sided rent with probe being introduced into intramuscular cyst. (B) Fluid extravasating from cyst after thorough decompression with probe and arthroscopic switching-stick. (C) Tear reduction and inside-out, side-to-side repair of rotator cuff (infraspinatus) tear. (D) Two-suture side-to-side repair of rotator cuff (infraspinatus) tear.

cal follow-up of an intramuscular synovial cyst of the shoulder managed with surgery.

Our patient's case is another example of an intramuscular synovial cyst of the shoulder. Surgical management resulted in symptom resolution and return to full, pain-free activity. To our knowledge, this is only the second reported case of intramuscular cyst of the shoulder having adequate clinical follow-up. This is also the first case of intramuscular synovial cyst of the shoulder to be adequately visualized and managed with arthroscopic surgery alone.

### CONCLUSION

Although much has been written about periarticular synovial cysts of the shoulder, intramuscular synovial cysts of the shoulder have received very little attention. Most of the current literature consists of retrospective MRI reviews and is burdened by lack of clinical follow-up. Before the present report, only 1 case with adequate clinical follow-up was associated with open excision of the cyst (the lesion could not be identified arthroscopi-

cally). We have reported a case of intramuscular cyst of the shoulder with clinical follow-up showing complete resolution of pain with activities and full return of motion. In addition, we have presented a comprehensive review of the current literature on intramuscular synovial cysts. It can be stated that most, but not all, of these intramuscular cysts are associated with rotator cuff tears, both full- and partial-thickness. These cysts can be readily identified with T<sub>2</sub>-weighted MRI but are difficult to identify with arthroscopy. Due to lack of clinical follow-up, however, the need for surgery remains unknown, and further clinical data are required to characterize appropriate management.

### AUTHORS' DISCLOSURE STATEMENT

The authors report no actual or potential conflict of interest in relation to this article.

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