MRI appearance of latissimus dorsi tear: Case reports and review of literature

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Learning objectives

Describe the MRI aspect of latissimus dorsi tear and its most frequent pattern based on three (3) cases and literature review.

Background

The latissimus dorsi is the major muscle of the human body and has an extensive origin at the last six (6) thoracic and lumbar vertebrae spinal process and posterior aspect of iliac crest; it has a large lumbar dorsal fascia and is innervated by thoracolumbar nerve (C6-C8). Its fibers converge into an unique tendon and cross inferiorly on the scapula attaching on the humerus distally the bicipital groove, where it sits posterior to the pectoralis major tendon and anterior to the teres major tendon. Functionally the latissimus dorsi participates in adduction, flexion and internal rotation of the arm, conjoined with pectoralis major and teres major doing the movement of flexion of the arm or extension of the trunk.

Tear of latissimus dorsi presents with shoulder pain or discomfort at posterior aspect of axilla, associated with swelling, ecchymosis on acute and subacute phases. On physical exam patients might present functional reduction of arc movement and mild strength loss, especially under resistance.

In the majority of cases, tears were related with sports activities as rock climbing, water skiing, golf, baseball, tennis, occurring either by acute traumas during movements of flexion/adduction on great tensions, or during overuse movements. They are classified by grade (partial or complete) and localization (humeral insertion or myotendinous junction).

Latissimus dorsi tears can be treated conservatively or with surgery, depending on the extension of tearing, functional loss and demanding activities such as in competitive sports. Professional athletes tend to undergo surgery in order to avoid incomplete recovery.

Literature presents few case reports; most of them show partial tears at humeral insertion with or without osseous avulsions. Cases of tears at myotendinous junction are less frequent.
Three (3) cases of traumatic latissimus dorsi partial tear at myotendinous junction are presented and their MRI aspect and review literature are described.

**Imaging findings OR Procedure details**

**Case 1**

37 yo male, presented sudden right shoulder pain during hyperextension movement while playing squash. The pain was localized on the posterior aspect of the axilla. On physical exam limited arc movement was also verified.

Ultrasound (Phillips HDI 5000) performed at the site of pain showed loss of fibrillar pattern and discontinuity of some muscle fibers at myotendinous junction, as well as a small intramuscular fluid collection. **Figure 2**

MRI (GE Signa HDxt 1.5T) exam taken on the same day of trauma displayed partial tear on T2 fat-sat axial and coronal images, characterized by increased signal intensity at the myotendinous junction and intramuscular fluid. **Figure 2**

Patient was treated with rest, rehabilitation and NSAID and recovered full strength and went back to regular sport activity.
Fig.: A, B, C - Axial and coronal T2 fat-sat showing partial tear at myotendinous junction of latissimus dorsi, with edema and perifascial fluid. D - Ultrasound on axillary region of the same patient showing descontinuity of the muscular fibers at anechoic area.

References: F. Albertotti; Imagem, Instituto Fleury, São Paulo, BRAZIL

Case 2
48 yo, female, during a flu presented an intense sneeze developing posterior right chest pain that persisted for 12 days when she decided to look for medical care. On physical exam there was mild ecchymosis and strength loss against resistance, but no loss on motion range.

On T1, T2 fat-sat and T1 enhanced MRI sequences (GE Signa HDxt 1.5T), a partial tear on inferior myotendinous junction was diagnosed with mild intramuscular hematoma. Figure 3

Patient was treated conservatively with NSAID and rehabilitation and achieved full recovery of symptoms.

![Images of MRI sequences showing hematoma inside the inferior portion of Latissimus dorsi, with adjacent edema and subcutaneous fluid and peripheral enhancement.]

**Fig.** A, B, C Axial, sagital and coronal T2 fat-sat, D Coronal T1 fat-sat GD, showing hematoma inside the inferior portion of Latissimus dorsi, with adjacent edema and subcutaneous fluid and peripheral enhancement.

**References:** F. Albertotti; Imagem, Instituto Fleury, São Paulo, BRAZIL

**Case 3**

65 yo female, amateur golf player, during practice felt pain on right shoulder and posterior aspect of axilla while swinging, associated with ecchymosis and swelling. Pain persisted after 10 days with prejudice in motion range.

On T1, T2 fat-sat and T1 gadolinium enhanced MRI sequences (GE Signa HDxt 1.5T), performed 10 days after initial symptoms, displayed partial tear at myotendinous junction with large hematoma inside latissimus dorsi muscle. **Figure 4**

Patient was treated with rest, NSAID, and rehabilitation, with complete recovery of symptoms and went back to sports activity.
Fig.: A, B and C axial, coronal and sagittal T1 and D, E and F axial, coronal and sagittal T2 fat-sat, showing large hematoma inside the latissimus dorsi, with adjacent edema.

References: F. Albertotti; Imagem, Instituto Fleury, São Paulo, BRAZIL

Images for this section:
Fig. 1: MRI normal anatomy of right latissimus dorsi at different levels on axial and coronal T1 images. A and B Humeral insertion (straight arrow), Pectoral major belly (PM), Pectoral major humeral insertion (curved arrow), Coracobrachialis muscle (CB). C and D Latissimus dorsi myotendinous junction (curved arrow) D and E Latissimus dorsi muscular belly (star).
Fig. 2: A, B, C - Axial and coronal T2 fat-sat showing partial tear at myotendinous junction of latissimus dorsi, with edema and perifascial fluid. D - Ultrasound on axillar region of the same patient showing descontinuity of the muscular fibers at anechoic area.
**Fig. 3:** A, B, C Axial, sagital and coronal T2 fat-sat, D Coronal T1 fat-sat GD, showing hematoma inside the inferior portion of Latissimus dorsi, with adjacent edema and subcutaneous fluid and peripheral enhancement.

**Fig. 4:** A, B and C axial, coronal and sagittal T1 and D, E and F axial, coronal and sagittal T2 fat-sat, showing large hematoma inside the latissimus dorsi, with adjacent edema.
Conclusion

Latissimus dorsi tears are uncommon in literature, and in the majority of cases feature pain at the shoulder or at the posterior aspect of axilla, associated with swelling and ecchymosis. On physical exam patients might have functional arc movement reduction and strength loss mainly against resistance. Not always is the physical exam capable to distinguish between partial and complete tears.

Muscle tears are frequently related to sports activities such as rock climbing, water skiing, golf, baseball, tennis, occurring either by acute traumas during movements of flexion/adduction on great tensions, or during overuse movements. They are classified by grade (partial or complete) and localization (humeral insertion or myotendinous junction).

Patients usually seek medical care days or weeks after the onset of injury; therefore, patients with shoulder or axilla pain associated with physical activities should be investigated for muscle tears even in the earlier phases.

Conservative treatment consisting on rest, rehabilitation and NSAID should be proposed for partial tears only, when it is possible to achieve a complete recovery of strength and arc movement. However, surgery should be performed in case of complete tears or larger partial tears in professional athletes to avoid incomplete recovery.

Based on literature review, partial tears at humeral insertion were far more common. But three cases of partial tears at myotendinous junction were described and the possibility of complete ruptures must be kept in mind since the treatment might differ drastically.

Three cases of partial tears at myotendinous junction are presented, all of them associated with different degrees of intramuscular hematoma and edema. All three cases had pain at posterior aspect of axilla / hemithorax, with mild strong loss. MRI was performed ambulatory on acute and subacute phases and helped on final diagnosis once latissimus dorsi tears did not belong to the hypothesis in question.

All patients were treated without surgery in spite of the absence of any strong test, complete recovery of symptoms was achieved and daily or sports activities restarted.

Based on the cases related in the literature and the cases presented, a total of twenty (20) cases, it was observed that fifteen (15) occurred at humeral insertion, 33% of them complete and five (5) occurred at myotendinous junction, 20% of them complete.
It is believed that latissimus dorsi tears are more frequent than it is observed in literature and the great recovery from non-surgical treatment has limited its search for diagnosis on daily practice. In cases where MRI is performed, it is important to distinguishing partials from complete tears.

In conclusion it is important that radiologists be aware of this entity since patients eventually perform exams with other hypothesis, normally shoulder MRI protocols, which will lead to partial characterization of the latissimus dorsi tendon and potential myotendinous junction lesion loss. MRI with large field of view (FOV) and cutaneous marker or directed ultrasound exams should be performed when a suspicious lesion exists.

Summary of literature:

**Table 1 - Literature case reports**

<table>
<thead>
<tr>
<th>Author / Year</th>
<th>Clinical Findings</th>
<th>Type of Tear</th>
<th>Treatment</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schickendantz 09.</td>
<td>Sudden onset of pain in the upper arm and posterior auxiliary region. Physical exam: tenderness on palpation. Reproduction of pain on resistance shoulder extension. Asymmetry and ecchymosis.</td>
<td>6 cases of partial tears at humeral insertion</td>
<td>Non surgical treatment</td>
<td>Professional Baseball players (pitchers)</td>
</tr>
<tr>
<td>Le 09.</td>
<td>&quot;Giving-away&quot; sensation on shoulder while pulled against</td>
<td>Partial tear with at least 50% of fibers.</td>
<td>Conservative treatment</td>
<td>Ø</td>
</tr>
</tbody>
</table>
Pain on posterior aspect of axilla for two months. Reduction in adduction and external rotation

Acute pain on shoulder while water skiing

Acute complete avulsion at humeral insertion

Surgical repair, with screw fixation

Complete recovery

Pain at the posterior aspect of the shoulder after arm abduction movement in a professional rodeo

Acute complete avulsion at humeral insertion with 6.5 cm retraction

Surgical repair

Deficit of extension and external rotation

Left shoulder pain while water skiing, with local bulging

Acute more than 90% avulsion at humeral insertion

Surgical repair with 3 screws

Complete recovery after 5 months

Pain in the posterior aspect of axilla after lifting weight

Partial tear at humeral insertion, with decreased range of movement.

Conservative treatment, with NSAIDs\(^1\) and rest

Persistent symptoms after 12 months
<table>
<thead>
<tr>
<th>Turner 05.</th>
<th>Acute strong loss while playing cricket, without pain.</th>
<th>Partial avulsion at humeral insertion diagnosed after 6 months</th>
<th>Conservative treatment</th>
<th>Complete recovery after 18 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butterwick 03.</td>
<td>Professional rodeo with chronic trauma at shoulder, present with acute trauma with abduction and external rotation of the arm and acute strong loss and bruises.</td>
<td>Over 90% tear of the myotendinous associated with tears of the teres major and long head of the biceps.</td>
<td>Conservative treatment</td>
<td>Partial recovery after 5 months</td>
</tr>
<tr>
<td>Livesey 02.</td>
<td>Semiprofessional rock climber with acute onset of posterior shoulder pain, with strong loss and tearing sensation. Persist with 2,5 year with strong loss and muscle gap on palpation. Incapable of rock climbing.</td>
<td>Complete tear at humeral insertion.</td>
<td>Surgical repair</td>
<td>Complete recovery of range of motion and strong after surgery.</td>
</tr>
<tr>
<td>Henry 00.</td>
<td>Acute trauma with pain at axilla, strong loss and swelling.</td>
<td>Complete tear at humeral insertion with 3,0 cm gap.</td>
<td>Surgical repair</td>
<td>Complete recovery</td>
</tr>
<tr>
<td>Spinner 98.</td>
<td>Golf player with pain at posterior.</td>
<td>Partial tear of Pectoralis major and</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non surgical treatment</td>
<td>Complete recovery</td>
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</tr>
</tbody>
</table>
aspect of the shoulder after playing 4 matches
Latissimus dorsi with cortical irregularity (overuse)

1 - NSAIDs - non-steroidal anti-inflammatory drugs

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