Scapulothoracic bursitis and snapping scapula: Imaging perspectives.

Poster No.: P-0047
Congress: ESSR 2015
Type: Educational Poster
Authors: B. J. H. Boden, R. Campbell; Liverpool/UK
Keywords: Education, Ultrasound, MR, CT, Musculoskeletal joint, Developmental disease
DOI: 10.1594/essr2015/P-0047

Any information contained in this pdf file is automatically generated from digital material submitted to EPOS by third parties in the form of scientific presentations. References to any names, marks, products, or services of third parties or hypertext links to third-party sites or information are provided solely as a convenience to you and do not in any way constitute or imply ECR's endorsement, sponsorship or recommendation of the third party, information, product or service. ECR is not responsible for the content of these pages and does not make any representations regarding the content or accuracy of material in this file.

As per copyright regulations, any unauthorised use of the material or parts thereof as well as commercial reproduction or multiple distribution by any traditional or electronically based reproduction/publication method ist strictly prohibited.

You agree to defend, indemnify, and hold ECR harmless from and against any and all claims, damages, costs, and expenses, including attorneys' fees, arising from or related to your use of these pages.

Please note: Links to movies, ppt slideshows and any other multimedia files are not available in the pdf version of presentations.

www.essr.org
Learning objectives

To learn about the anatomy of the scapulothoracic articulation.

To understand the pathophysiology of scapulothoracic disorders, learn about their common causes and become familiar with the imaging techniques and findings.

Background

Introduction.

The scapulothoracic articulation plays an important role in overall shoulder function by providing a stable base for glenohumeral rotation. The only skeletal connections of the scapula are the acromioclavicular and coracoclavicular ligaments and therefore its motion completely relies on the surrounding periscapular musculature (table 1). Dysfunctioning of any of these muscles may cause abnormal scapular motion and predispose to scapulothoracic joint disorders.

Anatomy.

The scapulothoracic joint is one of the most incongruent articulations in the human body and differs from other joints due to the absence of articular cartilage, synovium and capsule. It consists of several layers of bursae and muscles, allowing the concave scapula to glide over the convex thoracic cage. The periscapular bursae can be divided into anatomic and adventitial bursae. The anatomic bursae are thought to be physiologic and facilitate gliding of surfaces in between the scapulathoracic joint. The infraserratus and supraserratus bursae, divided by the serratus anterior muscle, are the most consistently found anatomic bursae (Fig. 1). Adventitial bursae are considered pathologic and are less consistently found than anatomic bursae. They are usually present as a response to abnormal scapulothoracic motion and are often located near the superomedial or inferomedial scapular angles.

Pathophysiology.

Scapulothoracic disorders, often referred to as snapping scapula syndrome, include scapulothoracic bursitis and snapping scapula. Scapulothoracic bursitis is thought to be the result of inflammation caused by abnormal motion between the anterior surface of the scapula and posterior chest wall. Snapping scapula may coexist with bursitis and is often the result of an underlying bony or soft tissue mass, although it may be secondary to bursitis without an overt mass.
Clinical presentation.

Patients with snapping scapula syndrome typically are young and active persons involved in overhead- or throwing activities and present with an insidious onset activity-related pain with or without crepitus or snapping. Women are more commonly affected than men (2:1) with an average age of 30 in women and 24 in men. Occasionally a single traumatic event is seen as a precipitating factor. Pain is usually located at the superomedial angle or the inferior pole of the scapula. Physical examination may reveal postural changes such as an increased thoracic kyphosis or scoliosis. Scapular asymmetry in the form of true winging or pseudo-winging and scapular dyskinesis may also be seen.

Images for this section:

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Origin</th>
<th>Insertion</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supraspinatus</td>
<td>Supraspinous fossa</td>
<td>Superior facet greater tuberosity</td>
<td>Abduction humerus</td>
</tr>
<tr>
<td>Infraspinatus</td>
<td>Infraspinous fossa</td>
<td>Middle facet greater tuberosity</td>
<td>External rotation humerus</td>
</tr>
<tr>
<td>Teres minor</td>
<td>Lateral border scapula</td>
<td>Inferior facet greater tuberosity</td>
<td>External rotation of humerus in abduction</td>
</tr>
<tr>
<td>Subscapularis</td>
<td>Subscapular fossa</td>
<td>Lesser tuberosity</td>
<td>Internal rotation humerus</td>
</tr>
<tr>
<td>Trapezius</td>
<td>Spinous processes C7-T12</td>
<td>Lateral aspect lavicle, acromion</td>
<td>Scapular rotation and elevation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and scapular spine</td>
<td></td>
</tr>
<tr>
<td>Serratus anterior</td>
<td>Outer surface upper 9 ribs</td>
<td>Costal aspect medial margin</td>
<td>Scapular protraction and upward rotation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>scapula</td>
<td></td>
</tr>
<tr>
<td>Levator scapulae</td>
<td>Transverse processes C1-C4</td>
<td>Superior part medial border</td>
<td>Scapular elevation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>scapula</td>
<td></td>
</tr>
<tr>
<td>Rhomboid minor</td>
<td>Spinous processes C7-T1</td>
<td>Medial border scapula, superior</td>
<td>Scapular retraction and rotation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>to insertion rhomboid major</td>
<td></td>
</tr>
<tr>
<td>Rhomboid major</td>
<td>Spinous processes T2-T5</td>
<td>Medial border scapula, inferior</td>
<td>Scapular retraction and rotation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>to insertion rhomboid minor</td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Periscapular musculature
**Fig. 1:** Cross-sectional illustration of the anatomic bursae and their relationship to the periscapular muscles.
Imaging findings OR Procedure Details

Snapping scapula syndrome usually is a result of abnormal anatomy, abnormal scapulothoracic motion, space-occupying bony or soft-tissue lesions or a combination of these. Imaging is commonly used to determine the nature and location of snapping scapula syndrome and is essential in treatment planning. Conventional radiographs normally are the first diagnostic step, but since the anterior aspect of the scapula is difficult to visualize and soft tissue masses are not well visualized on plain films, additional cross-sectional imaging is commonly performed.

Computed Tomography

CT is indicated when an underlying osseous abnormality is suspected and plain films do not reveal any abnormalities. Anatomical variations comprise the most common subgroup of osseous abnormalities causing snapping scapula syndrome and include (a) an excessive anterior curvature of the superomedial scapular angle rubbing across the ribs, (b) a Luschka’s tubercle being a bony prominence at the superomedial angle of the scapula and (c) a teres major process representing an anterior curvature towards the chestwall at the inferior aspect of the scapula. It is important to realize that these anatomic variants are commonly seen and increase the risk of snapping scapula, but do not cause symptoms in the majority of people. Other common causes of snapping scapula include malunited scapula- or ribfractures, reactive spurs and osteochondromas arising from the rib (Fig. 2) or anterior surface of the scapula (Fig. 3). Chondrosarcomas are a rare cause of snapping scapula and are usually seen in an older age group (40-70 years of age).

Ultrasound & Magnetic Resonance Imaging

MRI is usually performed when soft tissue pathology is expected and is especially useful in the diagnosis of bursitis and soft-tissue masses. Ultrasound is less usefull than MRI since the majority of the scapulothoracic joint can’t be visualized, but it is commonly used to guide needle placement in bursitis for diagnostic and therapeutic injections. On ultrasound bursitis is seen as a fluid filled bursa (Fig. 4) which usually is anechoic and does not show any internal vascularity. On MRI bursitis is seen as a well-demarcated cystic mass with low signal on T1-, high signal on T2 weighted sequences and rim enhancement after administration of intravenous contrast (Fig. 5). Adventitial bursae may show a more ill-defined area of low T1- and high T2 signal intensity (Fig. 6). Soft tissue tumors are another cause of snapping scapula syndrome with elastofibroma dorsi being the most frequently seen tumor responsible for it. Elastofibroma dorsi is a slow-growing benign soft tissue tumor composed of fibrous and fatty tissue located deep to the serratus anterior and latissimus dorsi musculature. It is predominantly seen in elderly women with an average age of presentation between 65 - 70 years and is seen bilaterally in up to 60% of cases. The MRI appearance matches the underlying pathology and shows
mixed signal intensities on both T1- and T2 weighted sequences (Fig. 6) and low level enhancement when contrast is given.

Muscular imbalance, scoliosis and kyphosis are among the causes of snapping scapula syndrome where structural abnormalities of the scapulothoracic articulation are usually absent. If imaging is performed however, muscle atrophy, anomalous muscle insertions, secondary bursitis or formation of an adventitial bursa (Fig. 7) may be seen.

Images for this section:

Fig. 2: (a) Axial CT image of a 29-year old man showing an osteochondroma (arrow) arising from the posterior aspect of the 8th rib. (b) T2 FS weighted image of the same patient showing the osteochondroma (arrow) with an associated bleeding in the supraserratus bursa (arrowheads) due to an acute injury.
Fig. 3: X-ray of the right shoulder in a 30 year old man with snapping scapula syndrome showing an osteochondroma (arrow) arising from the anterior aspect of the scapula.
Fig. 4: Longitudinal sonographic image in a 53-year old woman presenting with pain at the inferior aspect of her left scapula and associated snapping showing a fluid filled infraserratus bursa (arrows) abutting the 7th posterior rib (arrowhead).
Fig. 5: Axial T1 FS weighted image after administration of intravenous contrast of the same patient as shown in figure 4 showing rim enhancement of a thick walled and fluid filled infraserratus bursa (arrows).
**Fig. 6:** Axial T1 weighted image showing an ill-defined mass (white arrows) with mixed signal intensities, representing alternating fibrous and fatty components, between the serratus anterior and the thoracic cage in keeping with an elastofibroma dorsi.
Fig. 7: (a) Axial and (b) sagittal T2 FS weighted images of the right chest wall of a 34 year old man who presented with a painful snapping scapula due to an adventitial bursa (arrows) which was thought to be related to his thoracic kyphosis which he developed 1 year earlier after sustaining multiple wedge compression fractures of his thoracic spine.
Conclusion

The scapulo-thoracic joint is a complex anatomical structure that plays an important role in shoulder function. Scapulothoracic bursitis and snapping scapula are rare disorders producing pain and a palpable crepitus or snapping with active shoulder movement. Imaging may be of assistance in the diagnostic work-up of patients with snapping scapula syndrome. CT is indicated if osseous pathology is expected, otherwise, MRI is the preferred imaging modality of choice.

References


Frank RM, Ramirez J, Chalmers PN, McCormick FM, Romeo AA. Scapulothoracic anatomy and snapping scapula syndrome. Anatomy research international 2013; article ID 635628


**Personal Information**

BJH Boden, Department of Radiology and Nuclear Medicine, VU University Medical Center, Amsterdam, the Netherlands. E-mail: b.boden@vumc.nl

RSD Campbell, Department of Radiology, Royal Liverpool University Hospital, Liverpool, UK. E-mail: rob.campbell@rlbuht.nhs.uk