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TECHNIQUE

Management of Recalcitrant Scapulothoracic Bursitis: Endoscopic Scapulothoracic Bursectomy and Scapuloplasty

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ABSTRACT

Scapulothoracic crepitus and bursitis of the scapulothoracic articulation are uncommon and poorly understood disorders. Painless crepitus may be physiological, whereas the opposite, a clinically significant bursitis, may occur without crepitus or sound. Scapular noises attributed to crepitus arise from anatomical changes of the soft tissues in the articulation or from bony incongruity. Physical examination may find tenderness over the superomedial border, pseudowinging, sometimes a mild fullness can be palpated with or without audible crepitus. Initial treatment is nonoperative with rest, nonsteroidal anti-inflammatory drugs, activity modification, and shoulder rehabilitation. Nonoperative treatment is quite effective for bursitis secondary to overuse; but surgery, open or arthroscopic, may be warranted if the structural lesions are causing painful crepitus.
Keywords: scapulothoracic crepitus, scapular noises, pseudowinging, scapular superomedial border

HISTORICAL PERSPECTIVE

The first description of scapulothoracic crepitus is accredited to Boinet[1] in 1867. By 1904, Mauclaire[2] had described 3 subclasses: froissement, frottement, and craquement, depending on the loudness and character of the sound. Later, Milch[3] and then Kuhn[4] and Kuhn et al[5] added to the understanding by differentiating sounds of soft tissues (frottement) from those arising from an osseous lesion (craquement or crepitus). Precise distinction, when possible, can often be made radiographically or even surgically. Moreover, it is important to note that a painless crepitus may be physiological, whereas the converse, a clinically significant bursitis, may occur without crepitus or sound.

Ciullo and Jones[6] introduced the concept of arthroscopic debridement of the scapulothoracic articulation in 1992, and Harper et al[7] reported on the first series of endoscopic bony debridements of the superomedial angle of the scapula in 1999. The endoscopic anatomy was thoroughly described by Ruland et al,[8] and a recent alternative arthroscopic portal was introduced by Chan et al[9] in 2002. In 2004, Manske et al[10] published a sports medicine update indicating that this condition is commonly seen in overhead-throwing athletes. Initial treatment for athletes should be nonoperative strengthening and conditioning exercises and postural reeducation for scapulothoracic crepitus. The article encourages surgical intervention only after failed conservative treatment. Pearse et al[11] reported that 70% satisfactory results in 13 patients that had arthroscopic bursectomy of a snapping scapula but indicated clear surgical indications are necessary to avoid poor results.

INDICATIONS AND CONTRAINDICATIONS

Symptomatic scapulothoracic bursitis and crepitus are uncommon and often poorly understood disorders of the scapulothoracic articulation. The anatomy and

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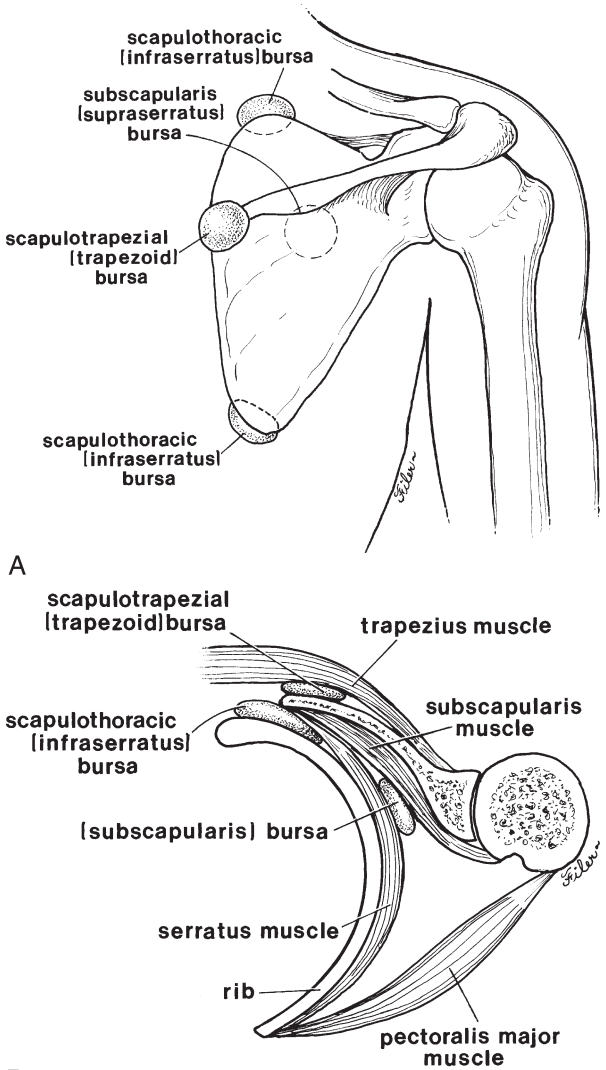

FIGURE 1. A–B, Common bursae of the scapulothoracic articulation.

biomechanics of the scapulothoracic articulation are important to understand when treating these problems.[4,5,8,9,12–15] Two major and 4 minor, or adventitial, bursae have been described in the scapulothoracic articulation (Fig. 1). The first major bursa, the scapulothoracic (infraserratus) bursa, is located between the serratus anterior muscle and the chest wall. The second, the subscapularis (supraserratus) bursa, is found between the subscapularis and the serratus anterior muscles. The anatomical consistency of these bursae is well documented.[4,5,16] In addition, 4 minor bursae have been identified; these, however, have not been consistently found in cadaveric or clinical studies. These bursae have been postulated to be adventitial in nature, arising in response to abnormal biomechanics of the scapulothoracic articulation.[17] Two have been described at the superomedial angle of the scapula, and historical accounts identify the location to be either infraserratus or supraserratus. A third site of pathology is at the inferior angle of the scapula, thought to be an infraserratus bursa. The fourth location, the scapulotrapezial (trapezoid) bursa, is at the medial base of the spine of the scapula, underlying the trapezius muscle. It is most commonly the bursa in the region of the superior angle of the scapula that is symptomatic. The scapular noises encountered in crepitus arise from anatomical changes of the soft tissues in the articulation or from bony incongruity.

The differential diagnosis includes soft tissue lesions such as atrophied muscle, fibrotic muscle, anomalous muscle insertions, and elastofibroma, which is a rare but benign soft tissue tumor located on the chest wall and elevating the scapula.[4,5,12,15,17–19] The differential diagnosis of scapulothoracic crepitus is expansive and includes several anatomical anomalies located between the scapula and the chest wall.[4,5,12] Osteochondromas can arise from the undersurface of the scapula or the posterior aspect of the ribs. Luschka tubercle is a prominence of bone at the superomedial aspect of the scapula, and that same region can have an excessively hooked surface that alters scapulothoracic dynamics (Fig. 2). Malunited fractures of the scapula or the ribs can lead to crepitus. Reactive bone spurs can form from repetitive microtrauma of the periscapular musculature. Infectious etiologies such as tuberculosis or syphilis can lead to pathological changes in the soft tissues. In addition, incongruity of the articulation can exist secondary to scoliosis or thoracic kyphosis, leading to altered biomechanics and crepitus. Lastly, the differential diagnosis of all forms of scapulothoracic pathology must include unrelated disorders, such as cervical spondylosis and radiculopathy, glenohumeral pathology, and periscapular muscle strain.

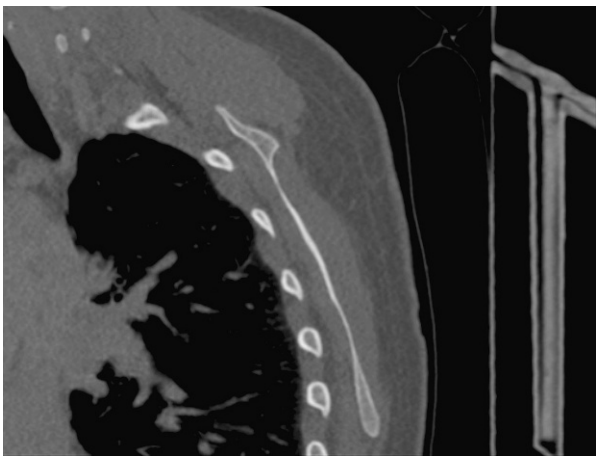

FIGURE 2. Computed tomography sagittal view of scapula depicting superomedial border bony anatomy.

PREOPERATIVE PLANNING

Evaluation

Clinical evaluation of the painful shoulder begins with a thorough history and physical examination. Patients report pain with activity, often with a history of trauma or repetitive overuse in work or recreation. In severe cases, patients may report pain at rest. It is occasionally bilateral.

Physical findings often reveal a localized tenderness over the inflamed area. The superomedial border of the scapula is the most common location, but the inferior pole is also a site of pathology. A mild fullness can be palpated, and palpable and sometimes audible crepitus may be present. It is important when palpating to differentiate whether the source of pain is the scapulothoracic bursa which will be tender superomedially deep to the levator scapulae and superomedial angle of the scapula or the trapezoid bursa which will be tender more superficially, over the junction of the spin and the body more medially and inferiorly. The trapezoid bursa is rarely the source of pain, but more importantly, it is not easily amenable to endoscopic treatment. Pseudowinging (not neurological in nature) from compensation of scapular muscles may be seen. The scapula will grate as the shoulder is put through a range of motion, but crucial to differentiating crepitus from true winging is the presence of a normal neuromuscular examination with overall normal scapulothoracic motion. Crepitus alone, in the absence of pain, may be physiological and does not warrant treatment.[11,14]

A lidocaine injection test can help confirm the source of pain. Injection of corticosteroid with the local anesthetic may can also be therapeutic and facilitate physical therapy and recovery. Whereas a positive injection test increases the likelihood that surgery will be successful if conservative measure fail, a negative injection test does not however rule out the possibility that surgery can be beneficial.

Radiographs should include tangential scapular views to identify bony anomalies. The role of CT, with or without 3-dimensional reconstruction, is still debated.[20,21] In patients with suspected structural, space-occupying lesions and normal radiograph findings, this additional imaging is often helpful. Magnetic resonance imaging (MRI) can identify the size and location of bursal inflammation, but its usefulness is also debated.

Initial Treatment

Initial treatment is nonoperative with rest, nonsteroidal anti-inflammatory drugs, activity modification, and shoulder rehabilitation. Therapy should emphasize various local modalities and periscapular muscle strengthening, particularly in adding physical bulk to the subscapularis and serratus anterior to elevate the scapula further off the chest wall.[3,5,15,19,20,22,23] For those with aggravating factors such as kyphosis or excessive scapular protraction, a postural training program and a figure-of-eight harness may help. Subtle weakness of the serratus anterior muscle may allow the scapula to tilt forward so that its upper boarder will "washboard" over the ribs and irritate the bursa. Therefore, strengthening of this muscle is very important, as it may resolve pain by restoring normal scapular mechanics. As noted previously, an injection test should be performed, injecting a corticosteroid and a local anesthetic to confirm the diagnosis and to assist in treatment.

Most of the patients will improve with conservative measures. As in other areas of the body, endoscopic treatment of scapulothoracic disorders has been proposed as an alternative to open surgery in an attempt to minimize the morbidity of exposure by obviating muscle takedown and to facilitate early rehabilitation and return to preoperative function.

IDEAL INDICATIONS FOR SURGERY

The ideal surgical indications include a motivated and compliant patient with pain and mechanical symptoms at the superomedial angle of the scapula that is significantly interfering with his or her quality of life. Examination should be consistent with a snapping scapula syndrome with tenderness to palpation and grinding at the supermedial angle. Radiographs and computed tomography (CT) or MRI may demonstrate a mild increase in the sagittal angle of the superomedial border of the scapula, but there will be no mass lesions in the periscapular region. An injection test will have improved symptoms transiently. A trial of conservative treatment, including, rest, ice, anti-inflammatory medications, and physical therapy will not have resolved symptoms to an acceptable level. There will be no associated cervical spine or glenohumeral pathology.

SURGICAL TECHNIQUE

After adequate general anesthesia, the patient is positioned in the prone position. The authors have no experience with the lateral or beach chair positions for this procedure. The prone position allows excellent access to the entire scapula. The affected upper extremity is then prepared and draped in the usual sterile fashion. The arm is placed in extension and internal rotation to wing the medial border of the scapula so that it can be easily palpated, the so-called chicken wing position (Fig. 3). To assist with orientation, it can be helpful to mark out the region of crepitation preoperatively.

The scapulothoracic articulation is then insufflated with 150 mL of saline. This distends the space and

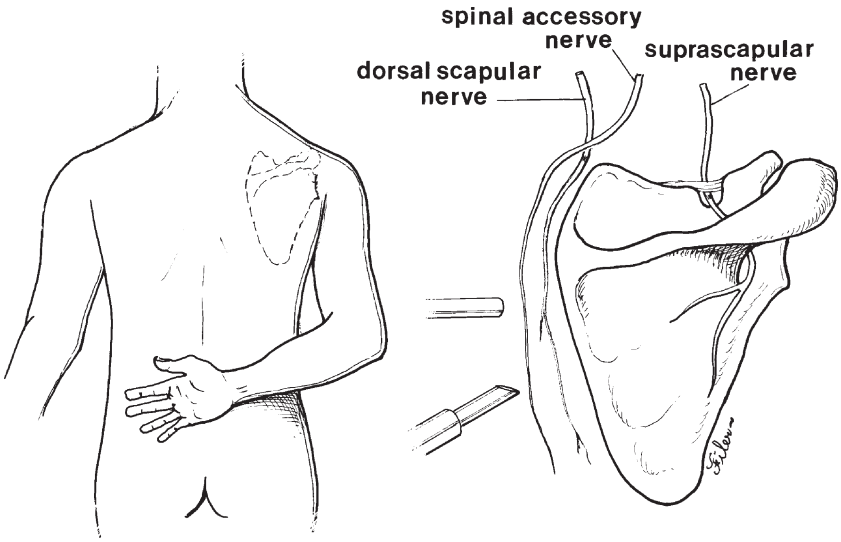

FIGURE 3. Representation of patient position and portal placement.

makes it easier and safer to insert the arthroscope. An inferomedial portal is then established, and a 4.0-mm 30-degree arthroscopy scope is inserted. Diagnostic endoscopy is then performed.

Frequently, there are thickened fibrous bands and bursal tissues which can obscure the visualization (Fig. 4). A second midmedial portal can be created by triangulating with a spinal needle. This should be placed just inferior to the spine of the scapula to avoid the dorsal scapular nerve (Fig. 3). A shaver or radiofrequency probe can then be inserted to remove the bursa and enhance visualization. Red muscle fibers should not be resected, and one should strive for good visualization before shaving blindly. The intercostal muscles and ribs should be visualized inferiorly, the subscapularis should be visualized laterally, and the rhomboids and levator scapulae should be visualized medially. Radiofrequency tissue ablation is very helpful to remove fibrous bands and to prevent any bleeding. A spinal needle can be used to outline the superomedial angle of the scapula to help with orientation and to assess the adequacy of the soft tissue resection.

SCAPULOPLASTY

After all the soft tissue work is completed, an endoscopic scapuloplasty can be performed. The superior medial angle of the scapula can be prominent and angled downward toward the thoracic rib cage (Fig. 5). In such instances, it should be resected. The soft tissues are removed using radiofrequency tissue ablation to skeletonize and outline the bone, similar to an arthroscopic acromioplasty. A high-speed motorized burr is

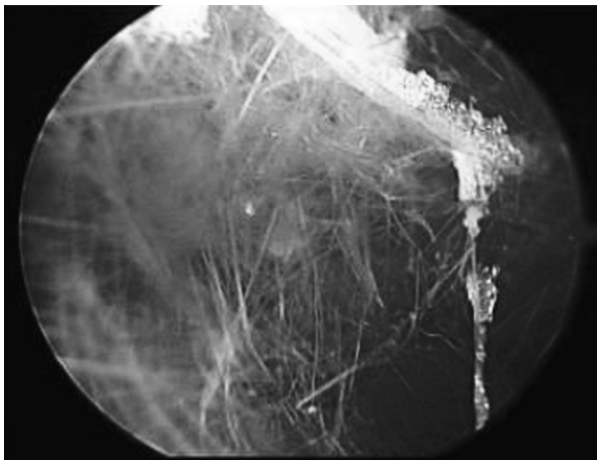

FIGURE 4. Endoscopic view of scapulothoracic space and bursa.

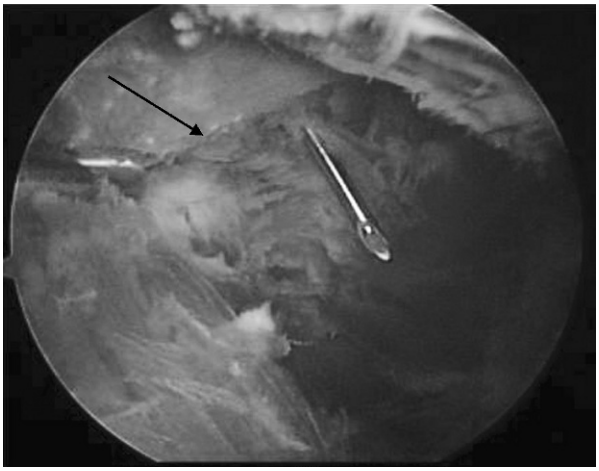

FIGURE 5. Spinal needle marking the superomedial border. Note prominence of bone at this site (arrow) and its diminished space from rib cage.

then used to perform the scapuloplasty (Fig. 6). The bone is extremely thin, so resection is fairly easy. The superomedial angle can be resected (approximately 20 × 20 mm of bone). This should be contoured in 2 planes to assure that it is smooth. An arthroscopic rasp can also be used to smooth the bone (Fig. 7).

The arm should then be placed through a range of motion to assess the resection.

Our preference is to place an analgesic pain catheter under arthroscopic visualization and connect it to a Marcaine infusion pump for postoperative analgesia.

The portal sites are closed in routine fashion. The patients typically have the procedure performed on an outpatient basis.

■ POSTOPERATIVE MANAGEMENT

Postoperative management consists of a sling for comfort only, as opposed to the 4 weeks required for an open approach. Gentle passive motion is initiated immediately to avoid stiffness. At 4 weeks, active and active assisted range of motion is begun, together with isometric exercises. After 8 weeks, strengthening of the periscapular muscles begins.

■ RESULTS

Early results of arthroscopic treatment seem promising, with minimal morbidity and early return to function.[7] Nevertheless, no large series has been published, and it must be emphasized that this technique is used primarily by experienced arthroscopists.

■ COMPLICATIONS

Complications of endoscopic treatment of scapular disorders, although rare, need to be considered and include pneumothorax, neurological or vascular injury, and failure to resect all pathological tissues. To our knowledge, there are no published reports of these complications, although the experience is still in its infancy.

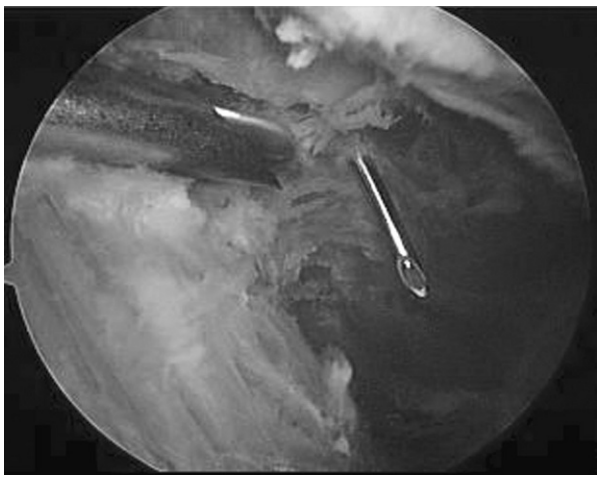

FIGURE 6. Scapuloplasty with high-speed burr.

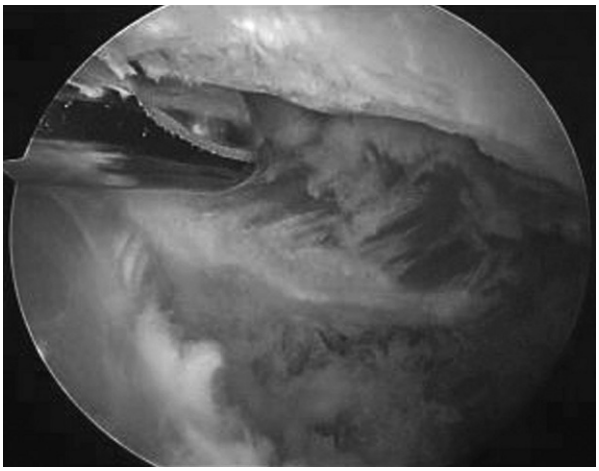

FIGURE 7. Appearance of border after contouring with shaver and rasps.

■ SUMMARY

Scapulothoracic bursitis is the inflammation of the bursal tissue within or around the scapulothoracic articulation. It is a soft tissue lesion, largely secondary to overuse and repetitive strain from overhead activities. The physical findings in bursitis include point tenderness over the superomedial angle or the inferior pole of the scapula and pain on range of motion. Although crepitus may exist, it is mild.

Scapulothoracic crepitus is also inflammation, with or without secondary bursitis, of the scapulothoracic space. The inciting lesion is usually a bony or firm mass, but the differential diagnosis is extensive. A similar history to bursitis is often presented, yet there is occasionally a familial component. Physical findings in crepitus include a fullness or prominence of the involved area, occasionally with a palpable mass. The scapula will grate palpably and/or audibly.

Radiological studies may include tangential scapular radiographs, CT with or without 3-dimensional reconstruction, and MRI. Local injection of corticosteroid and a local anesthetic may serve a role in diagnosis as well as treatment. Great caution must be practiced to avoid a pneumothorax.

The mainstay of treatment is conservative, using rest, nonsteroidal anti-inflammatory drugs, activity modification, and physical therapy. Nonoperative treatment is quite effective for bursitis secondary to overuse; structural lesions causing painful crepitus, however, are more resistant to such measures and often need to be surgically excised.[11]

Surgical options include open and arthroscopic removal of the offending bursa or lesion. Complications of endoscopic bursitis and partial scapular resection include pneumothorax, neurovascular injury, or incomplete resection.

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