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Case Report

An Unusual Case of Shoulder Pain

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Shoulder pain is a common musculoskeletal ailment. The process of determining the etiology of shoulder pain can be difficult. The differential diagnoses include: both intracapsular and extracapsular lesions; and neurologic, vascular, postural, and visceral causes. We present an unusual case of shoulder pain accompanied by loss of shoulder range of motion (ROM), initially thought to be caused by an intrinsic shoulder disorder. However, it ultimately was determined that a cervical radicular disorder caused both the impaired ROM and the patient's shoulder pain.

Keywords: Shoulder pain, cervical radiculopathy, selective nerve-root block, radicular pain, diagnostic selective nerve-root block

Shoulder pain is the second most common musculoskeletal complaint in primary care medicine (1). In an epidemiologic study of chronic pain in a Swedish rural area, the neck and/or shoulder region was the most common site of pain (2). In the United States, the 1971-1975 Health and Nutrition Examination Survey studied an adult population and found that 6.7% had experienced shoulder complaints of longer than 1-month's duration (3).

In a community-based rheumatology clinic, Vecchio and colleagues (4) observed that the most common causes of shoulder pain were lesions of the rotator cuff (65%), pericapsular soft-tissue pain (11%), acromioclavicular joint pain (10%), and referred pain from the cervical spine (5%). Smith and Campbell (5) reported similar data when they compiled frequencies of specific painful shoulder conditions based upon the reports of Symonds (6), Kessel (7), and Chard (8). Sixty percent (60%) had subacromial bursitis or supraspinatus tendinitis, 12% had an adhesive capsulitis, 10% had tearing of the supraspinatus tendon, 7% had acromioclavicular joint arthritis and 7% had an indeterminate etiology.

Intrinsic shoulder pathology usually presents as shoulder pain accompanied by decreased range of motion (ROM) and weakness of the shoulder musculature. Cervical radicular pain is differentiated from intrinsic shoulder pathology by the characteristics of arm symptoms being greater than neck or shoulder symptoms; painless shoulder ROM; painless palpation of periarticular and articular shoulder structures; and, occasionally, neurologic deficits within a defined nerve root distribution (5). We report a case of shoulder pain presenting with classical features of intrinsic shoulder pathology that proved to be of cervical radicular origin.

CASE REPORT

A 50-year-old right-handed woman with a 10-year history of bilateral neck pain presented to a local orthopedist with symptoms of left-sided shoulder pain. Her neck pain was primarily right-sided with radiation posteriorly to the occiput and anteriorly across her scalp. Approximately 18 months prior to presentation, she had noted a "deep," achy left shoulder pain. She rated the pain as 80/100 on a visual analog scale. The pain radiated to her lateral upper arm and dorsal forearm, but these symptoms were objectively rated at only 20/100 and subjectively perceived as tolerable. A dramatic loss of ROM of the left shoulder was also noted over 1 year. Hyperextension of her shoulder as well as abduction of her shoulder aggravated the pain. Ameliorating factors included using ice, and nonsteroidal anti-inflammatory medication, and avoiding use of the left upper extremity. Self-care activities limited by her impaired ROM included hairwashing, hair combing, and lifting objects over shoulder level. Her past medical history was unremarkable. She had no allergies and her

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medications included hormone replacement therapy, butalbital, acetaminophen and caffeine (Fioricet ®) and oxaprozin. Her family history and review of systems were noncontributory.

The initial diagnosis given was that of rotator cuff syndrome, subacromial bursitis and adhesive capsulitis. Subsequent imaging studies revealed normal plain radiographic findings. Magnetic resonance imaging (MRI) of the shoulder revealed a small inferior acromial spur and minimal fluid in the region of the subacromial bursa. An MRI of the cervical spine demonstrated a small right posterolateral disc herniation at C5-6, which was contralateral to the involved shoulder. An electromyographic (nerve conduction) study of the upper extremities was normal.

Initial management consisted of a subacromial injection with a corticosteroid, oral nonsteroidal anti-inflammatory medication and physical therapy. The patient initially experienced symptom relief with the subacromial injection, but her pain recurred within a few weeks. Physical therapy did not lead to pain relief or any perceptible increase in passive or active shoulder ROM. Following her failure to improve with therapy and medication, she underwent surgical arthroscopy of the shoulder. Arthroscopy revealed no evidence of impingement of the rotator cuff tendons, no increase in laxity of the glenohumeral joint and a normal appearing labrum. Thickening of the subacromial bursa and reactive synovitis were observed. The bursa was arthroscopically debrided. Postoperatively, the patient experienced no change in her pain symptoms or increased ROM. She was then referred to our multidisciplinary spine center.

Upon our initial examination, ROM of the left shoulder was limited in abduction to 60 degrees, extension to 20 degrees, internal rotation to 90 degrees, external rotation to less than 10 degrees and forward flexion to 60 degrees. Neck ROM was limited, with ipsilateral and contralateral rotation to 70 degrees. Extension was achieved to 60 degrees. Sensory examination revealed no dermatomal or peripheral nerve deficits. Motor strength examination revealed decreased strength of left shoulder abductors, flexors, and internal and external rotators. However, shoulder pain limited this component of the examination. Deep tendon reflexes were 2+ and symmetric at the triceps, biceps and brachioradialis. Long tract signs were negative. Specific shoulder maneuvers such as Neer's and Hawkin's were nondiagnostic due to diffuse, global pain with minimal passive ROM.

Our differential diagnosis included C6 radicular pain, which was causing deep-seated shoulder pain and a secondary adhesive capsulitis. Other entities considered included somatically referred facet-joint pain and cervical internal disc disruption syndrome.

We then performed an electromyographic nerve conduction study, which was nondiagnostic. A repeat cervical MRI was performed due to the suboptimal quality of the previous study. The new MRI also revealed a right-sided, small, posterolateral, herniated disc at C5-6.

As the electromyographic nerve conduction study, imaging studies, and arthroscopy of the shoulder were nondiagnostic, we decided to perform a diagnostic left C6 selective nerve root block with 0.5 cc of 2% lidocaine under fluoroscopic guidance. This diagnostic injection provided complete relief of the shoulder pain and an immediate return of full shoulder ROM. Based on this positive diagnostic response, two therapeutic cervical selective nerve root block's were performed. In each instance, a combination of 12 mg of betamethasone and 0.5 cc of 1% Xylocaine was infused after confirmation of needle placement with 1.0 cc of iodine contrast dye.

Following relief of her pain and return of full shoulder ROM with these injection procedures, the patient was restarted on physical therapy. The therapy program consisted of cervical spine stabilization techniques and total body reconditioning. No specific therapy for adhesive capsulitis or intrinsic shoulder pathology was provided. At both 3-month and 18-month follow-up visits, she has remained asymptomatic, exhibiting normal ROM of the shoulder, and she has been able to return to her premorbid activity level.

DISCUSSION

Etiologies of shoulder pain can be categorized by location as either intrinsic or extrinsic (Table 1). The intrinsic causes can be further separated into intracapsular lesions, those limited to the glenohumeral joint; and extracapsular lesions, those that are outside the glenohumeral joint, but still within the shoulder complex.

Rotator cuff pathology is the most common cause of shoulder pain, the most common presenting features of which are shoulder pain, decreased shoulder ROM, and weakness (9, 10). In this case our patient presented with these features; and, therefore, rotator cuff pathology was fore-

Table 1. *Intrinsic and Extrinsic causes of shoulder pain*

Intrinsic Causes

Intracapsular	*Extracapsular*
Glenohumeral instability/dislocation	Rotator cuff pathologies:
Adhesive capsulitis due to:	cuff impingement
Trauma, diabetes mellitus	cuff tear, tendinitis
Glenohumeral arthritis due to:	calcific tendinitis
Rheumatoid arthritis, osteoarthritis	Subacromial bursitis
Ankylosing spondylitis	Subdeltoid bursitis
Gout, pseudogout	A-C joint pathology
Idiopathic synovial osteochondromatosis	Bicipital tenosynovitis
Ochronosis, acromegaly	Postsurgical scarring
Aseptic necrosis of humeral head	Hemiplegic shoulder

Extrinsic Causes

Neurologic	*Neurovascular*
Cervical spine	Thoracic outlet syndrome
Intradural	Scalenius, costoclavicular,
Syringomyelia	Clavipectoral compression syndrome
Intramedullary tumor	Hyperabduction syndrome
Extradural	Atherosclerosis
Neoplasm	Venous occlusion of axillosubclavia
Ruptured intervertebral disc	
Vertebral bone tumors	
Foraminal	*Visceral*
Degenerative disc disease	
Spondylosis	Pancoast tumor
Peripheral nerves	Pneumonitis
Brachial plexus lesions	Empyema, neoplasms
Parsonage-Turnher syndrome	Hepatobiliary diseases
Accessory, suprascapular neuropathies	Splenic injury
Long thoracic and ulnar neuropathies	Pulmonary embolism
	Pulmonary infarction
Postural	Subphrenic abscess
	Pseudocyst of pancreas
Dorsal kyphotic scapula	Neoplasms

most in our differential diagnosis. The MRI appeared to substantiate this diagnosis. Magnetic resonance imaging remains the most accurate noninvasive method available for imaging the rotator cuff (11) with an 80% to 82% accuracy in detecting partial tendon tears or degeneration of the tendon. Our patient's study revealed a small subacromial spur and fluid in the subdeltoid bursa, and such a diagnostic impression seemed reasonable.

Her transient relief of shoulder pain following a subacromial local anesthetic and corticosteroid injection further supported the initial impression. The diagnostic (12) and therapeutic value of subacromial steroid injections for impingement syndrome (13), rotator cuff tendinitis (14), and

rotator cuff partial tears (15) is well accepted. It is commonly believed that corticosteroid injections are beneficial in nonoperative management of intrinsic shoulder pathology (11, 12, 13, 16). However, these generally accepted treatment strategies employed for rotator cuff pathology, including a subacromial corticosteroid injection and formal physical therapy, failed to ameliorate this patient's symptoms. After arthroscopy of the shoulder did not reveal rotator cuff pathology, less likely etiologies of shoulder pain needed to be evaluated.

Cervical spine pathologies may refer pain to the upper extremity. In fact, the most common cause of persistent shoulder pain with concurrent radicular arm pain is cervical radiculopathy due to foraminal stenosis (17). Such spondylotic or degenerative changes are more commonly responsible for cervical radiculopathies than focal disc protrusions (17). Cervical spondylotic radicular pain typically presents with gradual neck stiffness, and shoulder and neck pain, which may be followed by extension of the pain to the upper arm (18).

Our patient ultimately was seen to experience radicular pain from the C6 nerve root. Her shoulder symptoms resolved when treatment was directed to this area. In retrospect, we believe pursuing the diagnosis of rotator cuff pathology was an appropriate course of action given her initial clinical presentation. However, when her symptoms did not improve with treatments aimed at an intrinsic shoulder disorder, it became apparent that underlying extrinsic causes should be sought.

In the course of this investigation, the electromyographic study was not helpful in diagnosing her cervical root pathology. An electromyelogram has been reported to have low sensitivity in detecting radiculopathy (19). Magnetic resonance imaging, in contrast, has a high sensitivity for anatomic disorders of the spine, approaching nearly 100% in the lumbar region (20). However, the MRI of her C-spine was similarly not diagnostic, as it demonstrated only a small focal protrusion on the contralateral side. There was no evidence of ipsilateral foraminal stenosis, and only a mild spondylosis at the C5-6 height. Therefore, we had no identifiable anatomic abnormality to account for this patient's cervical radicular pain.

Irritation of the nerve root caused by leakage of chemical inflammagens can cause radicular pain (21). This may explain why the cervical MRI was not diagnostic. In our patient, a diagnostic selective nerve root block was instrumental in identifying cervical nerve root irritation that referred pain to the shoulder.

When imaging studies are negative or do not correlate with clinical findings, an electromyographic study is negative or equivocal and the pain pattern is atypical, diagnostic blocks are advocated when working up radicular pain in the lumbar (22-27) and cervical spine (24-26, 28, 29). The accuracy of a diagnostic selective nerve root block in identifying pain emanating from a lumbar nerve root has been demonstrated (30).

CONCLUSION

Diagnosis of shoulder pain can be challenging given the extensive differential diagnosis. When common etiologies such as rotator cuff disease do not improve with treatment, extrinsic causes must be considered. In this instance, a cervical root was identified as causing shoulder pain and decreased ROM from a seemingly intrinsic shoulder pathology.

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