



Musculoskeletal Case No. 4, March 2000

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Presenting Symptom(s): Periscapular and Shoulder Pain

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Appropriate Audience: Residents and practicing attendings

Learning Objectives: (1) Appropriately evaluate shoulder and neck Trauma; (2) Establish a differential diagnosis of shoulder pain; (3) Establish a differential diagnosis for periscapular pain and paresthesias; and (4) Expand the differential diagnosis when the working clinical diagnosis is not confirmed.

History

A 16-year-old female, high school junior, competitive soccer player presents with acute right shoulder pain and moderately severe periscapular and trapezius pain. She has had vague right shoulder pain for 18 months that is not functionally limiting. The periscapular and trapezius pain has been present for 8 weeks since a fall on her neck and right shoulder when upended during a game while attempting a "header". The right shoulder pain has not been worsened by this fall. She reports no limitation of shoulder motion, or pain reproduction with shoulder movements. She has no shortness of breath or pain upon inspiration or with neck movement. Cervical spine films (AP, lateral, oblique and open mouth views) and shoulder x-rays (including axillary and true anteroposterior views of the scapula) performed in the emergency room at the time of the fall are within normal limits. The patient does remember a traumatic shoulder injury, which she sustained 18 months ago in a collision with another player. She simply played through that injury.

- *Prior to continuing, please develop a differential diagnosis and list each possible diagnosis in order of likelihood.*
- *Is there any additional information regarding the clinical history that might be helpful in clarifying your differential list or changing its order of priority?*

Commentary I

A fracture of the humerus, clavicle, or the more rare scapular fracture has been ruled out via x-rays. She most likely would have decreased range of motion and functional limitation in the presence of such fractures. An acute acromioclavicular (A-C) separation would also result in limited range of motion and probable decreased functional use of the arm. The symptoms with A-C separation would be localized, not diffuse, vague, and chronic. No history of symptoms of shoulder dislocation, instability, or subluxation is elicited. Her only history is the somewhat insidious onset of the shoulder pain around 18 months prior.

Traumatic brachial plexopathy or cervical radiculopathy would present with radiating limb paresthesias, pain and/or weakness. Any shoulder pain would most likely improve over time. A cervical facet injury would cause localized pain that would worsen with cervical range of motion, especially extension combined with rotation to the affected side, which was not present in this case. An isolated nerve lesion (axillary, suprascapular, accessory, long thoracic) would not likely be associated with this mechanism of trauma and would have associated weakness, scapular winging and/or atrophy, none of which is present in this



case. Had the patient had a history of acute subluxation, this might have been a mechanism for axillary nerve injury.

Radiating chest wall pain from intrathoracic pathology such as neoplasm, thoracic aortic aneurysm, sarcoidosis, cardiac causes (i.e. cardiac insufficiency, aortic stenosis, coronary artery disease, etc.), or infectious processes would all have associated systemic symptomatology not evident in this highly competitive athlete. They also are generally not associated with tenderness and would not have an acute traumatic onset.

Any rib fracture would most likely have improved by now and would be more localized. The pain is too diffuse, too lateral, and not increased with inspiration. The pain is too lateral to be costovertebral in origin. Intrinsic shoulder pathology and muscular strain must be ruled out.

Further history regarding the onset of her shoulder symptoms should be elicited.

History, continued

She can give no further history regarding her initial shoulder injury. She is sent for physical therapy for treatment of her periscapular and trapezius pain. She underwent ultrasound, electrical stimulation, myofascial release, judicious use of heat or ice and flexibility exercises progressing to strengthening exercises, with little benefit. Four weeks into the treatment program, while trying out for a state-wide All-Star team, she is again upended, sustaining right shoulder and neck trauma. This time her right shoulder and periscapular and trapezius pain worsened significantly and she developed pain with right shoulder abduction, external rotation, and forward flexion above 120° .

- *If necessary, revise your differential diagnosis based on the additional clinical history.*
- *On which details of the physical examination should you focus at this point?*

Commentary II

The patient's shoulder pain now seems much more clearly definable. She apparently has the residual effects of an old shoulder joint injury by history, although it is initially not found on any examination maneuvers. She had no impingement signs, no pain or weakness on range of motion or manual muscle test, and no scapulohumeral dissociation or instability were noted. After the recent re-injury, she is now presenting with symptoms suggestive of rotator cuff pathology. Physical examination must concentrate on the patient's shoulder joint.

Physical Examination

Physical examination shows no evidence of right shoulder instability, with negative apprehension signs. No anteromedial glenohumeral tenderness is elicited, anterior glide load and shift, and clunk (active compression) tests are negative. Since being seen 4 weeks prior, she has developed positive impingement signs, painful humeral external rotation, painful supraspinatus resistance, a painful arc of shoulder abduction of 60-120° , and tenderness over the long head of the biceps, subacromial regions, and greater tuberosity of the humerus. She has full shoulder range of motion throughout with pain. Despite her periscapular and trapezius pain worsening significantly, there is very little palpatory tenderness, pain with movement, or decreased flexibility in this area or in the acromioclavicular joint or ribs.



- *At this point, review your differential diagnosis and revise as appropriate.*
- *Are there additional observations on physical examination that might be helpful in narrowing your differential list*

Commentary III

The patient now has a classic presentation of intrinsic shoulder pathology. Osseous, neurologic, neoplastic, and intrathoracic pathology seem much less likely. However, the persistence of her original complaint of periscapular and trapezius pain is worrisome. The trapezius pain, if it is muscular in nature, should have responded, at least partially, to the appropriate therapeutic physical therapy regimen.

The patient's trapezius pain could be secondary to a functional adaptation complex or altered mechanics from some intrinsic shoulder pathology. However, if that were the case, one would have expected to have found rotator cuff pathology earlier and it should have worsened with the patient's new onset of increased shoulder joint pain.

Physical Examination, continued

A subacromial injection of 2 cc of 1% Xylocaine without Epinephrine and 1 cc of 6 mg/cc of Celestone is performed for diagnostic as well as therapeutic purposes. She immediately experiences a 70% improvement in her shoulder pain.

Muscle stretch reflexes are 2+ at the triceps, biceps, and brachioradialis. Sensory and motor examinations are within normal limits (except where limited by pain). No atrophy or fasciculations are noted. Hoffman signs are negative, plantar reflexes are downgoing, and there is no evidence of clonus in the lower limbs. She has no upper or lower limb dysmetria, no nystagmus, no arm drift, and Romberg's sign is negative. Spurling's sign is negative. Lhermitte's maneuver results in reproduction of bilateral paresthesias into the third and to a lesser degree second and fourth digits, and an increase in her periscapular pain. This finding was not present on her prior examination.

- *If necessary, revise your differential diagnosis based on the additional physical findings.*

Clinical Impression

Right shoulder rotator cuff tendinitis with impingement. Secondary subacromial bursitis and bicipital tendinitis. This is based on her history and physical examination. The reliable reproduction of the bilateral C7 paresthesias, in the absence of any other upper or lower motor neuron findings, may be consistent with a spinal cord contusion or other posttraumatic residual at the spinal cord level, possibly related to pre-existing factors such as a cervical bar or congenital stenosis.

- *What diagnostic tests would you order at this time?*

Commentary IV

Shoulder MRI should be performed to evaluate the extent of any possible rotator cuff tear that may limit her sports participation (a national invitational tournament, with college scouts in attendance, is scheduled in 2 weeks). The MRI should be performed more than 3 days after subacromial injection, to avoid any possible MRI signal misinterpretations.

The cervical spine MRI should be performed to evaluate a possible mechanical lesion causing neurologic impingement, again possibly impacting upon her sports participation, on a longer-term basis.

The patient was sent for an MRI of the right shoulder and an MRI of the cervical spine with gadolinium.

Test Results

The right shoulder MRI reveals a tiny right shoulder joint effusion, isointense signal in the supraspinatus tendon suggestive of tendinopathy and a high signal T2 weighted focus in the distal supraspinatus tendon consistent with an intrasubstance tear.

- **See diagram A.**

Test Results, continued

The cervical spine MRI with gadolinium reveals a linear tubular CSF intensity fluid collection (diminished T1 and increased T2 weighted signal intensity) measuring 2.5cm in length x 3mm in diameter at the C6-7 level. There is no gadolinium enhancement, no spinal cord enlargement or other mass effect, and no Arnold-Chiari malformation.

- **See diagram B and diagram C.**
- *If necessary, revise the clinical impression based on the test results.*

Commentary V

The patient's chronic periscapular and trapezius pain is likely explained by the syrx. It has been present since her first fall (the more violent of the two falls according to her mother) 8 weeks prior to presentation. The pain does not seem related to her intrinsic shoulder joint pathology and does not respond to physical therapy directed at treating soft tissue pain. It would not seem related to the prior onset of shoulder pain 18 months ago in the absence of any acute event; she only had vague shoulder pain at that time with no history of periscapular pain that started only around 8 weeks ago.

The more chronic history (approximately 8 weeks) may explain the lack of gadolinium enhancement on the cervical spine MRI, performed shortly after the second fall. There is no evidence of an Arnold-Chiari malformation and no neoplasm is expected in the absence of gadolinium enhancement. There is no evidence of myelomalacia, cord enlargement or cavitation, hence the absence of any long tract signs. The syrx is not large enough to compromise anterior horn cells causing radicular lower motor neuron weakness. Based on the level of the syrx radicular motor deficits if present would more likely be in the C6-C7 distribution, rather than C4-C6 distribution. C4-C6 involvement would more likely contribute to any shoulder muscle imbalances. The syrx is likely posttraumatic in nature, probably related to her first fall 8 weeks prior to presentation, although now presenting with a positive Lhermitte's sign.

She may have had a pre-existing subclinical chronic rotator cuff tendinitis with impingement that was exacerbated and may have extended into a small intrasubstance tear due to her second fall. The findings seen on the shoulder MRI may be due to chronic degenerative changes. This differential diagnosis is somewhat of a moot point since the patient is certainly not an operative candidate and non-operative care is indicated at this point.



- *What additional diagnostic testing would you order?*

Commentary VI

No further tests are ordered. An EMG could be performed, however, the clinical indication is low and it would not change the patient's treatment or activity level. The cervical spine MRI will be repeated in 12 months.

- *Considering all the data from the history, physical examination and laboratory studies, what is/are your final diagnostic impression(s)?*

Final Diagnostic Impression

1. Posttraumatic syrinx at C6-7.
 2. Right shoulder partial tear or tendinopathy of the supraspinatus tendon with impingement. Secondary subacromial bursitis and tendinitis of the long head of the biceps tendon.
- *What treatment would you now initiate for this patient?*

Commentary VII

Oral nonsteroidal anti-inflammatory medications(NSAID) are introduced after the subacromial injection. The patient is started on a physical therapy program consisting of shoulder range of motion and stretching exercises; limited arc open chain Thera-Band strengthening below 90° of abduction and forward flexion, progressing as tolerated to closed and open chain (free weight) exercises. Scapulohumeral rhythm is re-established and proper training regimen biomechanics are reviewed.

A trial of gabapentin (Neurontin) or tricyclic medication was considered for treatment of the patient's neuropathic pain. The patient and her mother declined medication use, because of concern regarding effects on cognitive performance, and sedating effects of these medications, which could effect performance in school and sports activities.

A neurosurgical specialist evaluated the patient and cleared her for unrestricted sports participation once her Lhermitte's sign had resolved. The Lhermitte's sign was no longer present in a few weeks. The patient and her mother are counseled to watch for long tract signs or progressive neurologic deficits. The MRI should be repeated in 12 months.

The patient responded well to the recommended treatment regimen. No further intra-articular shoulder injections were required and the NSAID was discontinued within a short period of time. She remains competitive and is quite successful in her sports activities. She still complains of the periscapular and trapezius tightness, which it is tolerable, and does not correlate to her shoulder symptomatology. She is counseled to continue her home exercise program. No further neurologic abnormalities have presented over 18 months follow up.

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