Brachial Neuritis: An Uncommon Cause of Shoulder Pain

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Brachial neuritis, an uncommon idiopathic syndrome, should be considered in the differential diagnosis of acute nontraumatic shoulder pain with weakness.

Shoulder pain is one of the leading complaints of athletes seeking care from sports medicine physicians. Differential diagnosis includes a spectrum of orthopedic and nonorthopedic problems. In individuals who report acute atraumatic onset of shoulder pain followed by weakness, brachial neuritis should be considered. Brachial neuritis is an uncommon, idiopathic syndrome that typically affects the lower motor neurons of the brachial plexus. Involvement of a single nerve or nerve branches can also occur. Although symptomatology and physical examination findings may vary, the clinical course is generally characterized by acute onset of severe pain followed by weakness and gradual recovery.

CASE REPORT

A 31-year-old recreational swimmer and weightlifter presented with severe right shoulder pain and weakness of 3 weeks’ duration. No inciting injury or trauma was reported. Initially, pain involved the deltoid and periscapular region followed by radiation to the proximal arm. Parasthesias and weakness subsequently developed in the same locations. The patient was initially treated by his primary physician with anti-inflammatories and muscle relaxers without symptom improvement. Medical history revealed a viral illness 3 weeks prior to symptom onset.

Physical examination revealed significant atrophy of the trapezius, supraspinatus, and infraspinatus muscles on the affected side. Full active range of motion of the right shoulder resulted in moderate to severe discomfort. Cervical spine examination was unremarkable. The remainder of the musculoskeletal/neurologic examination was normal.
Plain radiographs of the cervical spine and right shoulder revealed no significant bony abnormality. Electromyography (EMG) revealed decreased motor action potential of the serratus anterior and abnormal fasciculation of the extensor carpi radialis, and paralytic brachial neuritis, the most notable has been Parsonage-Turner syndrome.2-4

The difficulty naming this disorder reflects the lack of understanding regarding the etiology and pathophysiology of brachial neuritis. The ability of this disorder to affect the brachial plexus with involvement of one or more nerves allows its presentation to mimic multiple other diagnoses. This confusion at presentation makes diagnosis difficult, leading to inappropriate treatment, including unnecessary surgery.2,3,5,6

**Epidemiology**

Brachial neuritis has been described to occur from age 3 months to 75 years.2 According to Tsairis et al., the highest incidence occurs in patients in their 30s and 70s. Predilection to affect males more than females has been reported to occur at a 2:1 ratio.2,5 Magee and DeJong9 reported an 11.5:1 male to female ratio in their patient population. The condition does not seem to affect one extremity more than another, or correlate to hand dominance.2,5 The condition can affect both upper extremities but usually reveals an asymmetric onset and presentation.2,7,10

**Clinical Presentation**

Despite the lack of evidence supporting an etiology for brachial neuritis, the clinical presentation appears to be consistent based on two symptoms. The first symptom is severe, acute, burning pain in the shoulder and upper arm. The pain normally subsides within a few hours to 2-3 weeks. As the pain diminishes, the second symptom to present is muscle weakness.2,3

Physical examination reveals abnormalities in the distribution of the brachial plexus (usually the upper trunk) with involvement of one or more nerves.2,3,5,6 Weakness usually involves muscles innervated by the suprascapular, axillary, long thoracic, and musculocutaneous nerves. Involvement of the radial, anterior interosseous, and median nerves has been described.2 Weakness, therefore, commonly occurs in the deltoid, supraspinatus, infraspinatus, serratus anterior, biceps, triceps muscles, and wrist and finger extensors.2 The phrenic nerve has been involved in rare cases, either unilaterally or bilaterally, with the most common presenting symptom being dyspnea.11

Sensory changes have been noted but usually are minimal in degree compared to the motor deficits. Sensory loss usually follows the distribution of the affected motor nerves.2,12

When bilateral shoulders are affected, the presentation usually is asymmetric. The contralateral shoulder is subclinical in presentation for weakness and sensory changes. Abnormal findings are detected by EMG.2,12

**Differential Diagnosis**

The differential diagnosis of brachial neuritis can be vast, allowing for misdiagnosis. The physical findings consistent with brachial neuritis can be misconstrued for other conditions that cause acute pain and weakness around the shoulder, including rotator cuff tears, impingement syndromes, adhesive capsulitis, and calcific tendinitis. Less common conditions that mimic brachial neuritis include diskogenic cervical spine disorders, poliomyelitis, amyotrophic lateral sclerosis, herpes zoster, spinal or brachial plexus tumors, and traumatic compressive nerve injuries.2

Two conditions that closely mimic brachial neuritis are acute upper cervical disease and compressive lesions of peripheral nerves. By paying
Close attention to the history, many conditions can be eliminated. Acute upper cervical disk disease (C4, C5, and C6) can present with acute pain with or without a history of trauma. However, the pain usually is related to the simultaneous presentation of weakness and sensory changes in a dermatomal distribution restricted to one nerve root. The sensory deficit seen with cervical disk disease generally is greater than that seen in brachial neuritis.\(^2\)\(^,\)\(^3\)

Compressive peripheral nerve lesions can be difficult to distinguish from brachial neuritis. Patients with this disorder usually present with a more insidious onset of pain. Pain duration is longer compared to brachial neuritis.\(^2\)\(^,\)\(^12\)

**Diagnostic Studies**

Most diagnostic tests, including laboratory tests and plain film radiographs, are negative in patients with brachial neuritis. Even cerebral spinal fluid has been found to be normal, with only a few reports revealing slight increases in total protein.\(^2\)\(^,\)\(^7\)\(^,\)\(^9\)\(^,\)\(^10\)

Immunologic studies are typically normal.\(^2\)

Magnetic resonance imaging of the affected shoulder girdle may show high-signal intensity of the affected muscles on T2 images that can occur within days of symptom onset, revealing edema. Helms et al\(^4\) demonstrated these findings in the supraspinatus, infraspinatus, and deltoid muscles. Muscle atrophy without fatty infiltrate was found after prolonged periods of muscle weakness.\(^4\) These findings were confirmed in a study by Bredella et al\(^13\) correlating to EMG findings consistent with three patients diagnosed with brachial neuritis.

Magnetic resonance imaging is also valuable in eliminating other disorders such as rotator cuff tears, impingement syndromes, and ganglion cysts, which can compress peripheral nerves causing compressive neuropathies. Ganglion cysts most commonly occur around labral tears with compression along the suprascapular nerve.\(^4\) Magnetic resonance imaging of the cervical spine is useful in determining cervical disk disease with root compression.\(^3\)

Electromyography is the cornerstone for diagnosis of brachial neuritis, as it differentiates brachial neuritis from traumatic upper trunk or plexus lesions. Lesions are usually localized to the upper plexus. Findings can vary depending on the severity of neural damage and the timing of the examination. Nerve conduction velocities usually are normal. Electromyography reveals acute denervation indicating axonal neuropathy. The most common findings on EMG include fibrillation potentials and positive waves suggestive of muscle denervation. Delayed distal latencies and decreased amplitude of active potentials are also present. Three weeks following symptom onset is sufficient time to determine findings on EMG.\(^2\)\(^,\)\(^3\)\(^,\)\(^5\)

**Treatment**

Treatment of brachial neuritis is supportive secondary to the self-limiting disease process. A combination of narcotic and nonsteroidal analgesics are used to control acute pain. During the pain phase, the extremity is rested secondary to increased activity exacerbating pain. A sling may provide a more comfortable position during this acute time.\(^2\)\(^,\)\(^3\)\(^,\)\(^5\)

As pain subsides, the entire upper extremity and upper body (secondary to subclinical involvement) must be rehabilitated to regain strength. Therapy is recommended although it has not been proven to correlate with faster recovery.\(^2\)\(^,\)\(^3\)\(^,\)\(^5\)\(^,\)\(^7\)

Range of motion begins passively and is switched to active rehabilitation once the patient begins to recover in strength.\(^2\) Corticosteroid use has not been proven to decrease recovery time.\(^2\)\(^,\)\(^3\)\(^,\)\(^5\)

**Prognosis**

Recovery is generally good. Improvement in strength begins from 1 month after symptom onset to \(\geq 3\) years. The majority of patients have substantial improvement within 3 years.\(^1\)\(^,\)\(^2\) Misamore and Lehman\(^12\) found that patients could be subjected to persistent mild weakness for \(\geq 3\) years. Magee and DeJong\(^6\) reported that full recovery of strength may take as long as 8 years. McCarty et al\(^2\) and Tsairis et al\(^7\) estimated the rate of complete recovery to be 89% by the end of 3 years. According to McCarty et al,\(^2\) “the greater the severity and duration of pain and/or weakness usually leads to prolonged recovery.” Bilateral involvement may have a longer recovery, and patients with upper trunk lesions tend to do best.\(^2\)\(^,\)\(^7\)

Return to sport is determined on a case-by-case basis. A plateau in strength recovery must be attained before allowing return to sport. Some athletes fully recover with no limitations, whereas other athletes may require counseling concerning limitations. Decisions are made on an individual basis taking into account the individual’s abilities.\(^2\)\(^,\)\(^5\)\(^,\)\(^6\)

**CONCLUSION**

The recognition of a few key historical and physical examination findings includes acute brachial neuritis in the differential diagnosis of acute nontraumatic shoulder pain with weakness. The awareness of this disorder, although uncommon, helps prevent unwarranted treatment and possibly inappropriate surgical procedures, which could change a relatively
benign prognosis into a worse outcome.

**REFERENCES**
