

# Brachial plexus neuropathy

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*Brachial plexus neuropathy is characterized by acute onset of intense pain in the shoulder or arm followed shortly by focal muscle weakness. This presentation may mislead the clinician into diagnosing shoulder or cervical spine pathology. Although brachial plexus neuropathy is not common, it should be considered in the differential diagnosis of pain and weakness of the arm. We present a patient with brachial plexus neuropathy who was originally misdiagnosed as having a cervical disc herniation.*

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**KEY WORDS:** brachial plexus neuropathy, brachial plexus neuritis, neuralgia amyotrophy.

*La neuropathie du plexus brachial est caractérisée par une sensation intense de douleur aiguë à l'épaule ou au bras, suivie rapidement par une faiblesse musculaire focale. Ces manifestations pourraient amener le clinicien à diagnostiquer une pathologie au niveau de l'épaule ou de la colonne cervicale. Bien qu'elle ne soit pas fréquente, une neuropathie du plexus brachial devrait être prise en considération lors du diagnostic différentiel de douleur et de faiblesse au bras. Nous citons l'exemple d'un patient avec une neuropathie du plexus brachial à qui l'on avait diagnostiqué par erreur une hernie au disque cervical.*

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**MOT-CLÉS :** neuropathie du plexus brachial, névrite du plexus brachial, amyotrophie névralgique.

## Introduction

Pain and weakness of the shoulder is a common reason for patients to present to chiropractors. The differential diagnosis includes conditions of the shoulder and cervical spine; however, it should also include disorders of the brachial plexus, even though they occur less frequently.

Brachial plexus neuropathy is one of the most common pathologies of the brachial plexus. This idiopathic condition can mimic other more common conditions seen by chiropractors. The following case presentation demonstrates the salient features of brachial plexus neuropathy.

## Case presentation

A 49-year-old man was referred to the neurological outpatient clinic at Royal University Hospital for evaluation of weakness and atrophy of the right shoulder and arm with paraesthesia of the forearm. Ten days before the onset of this problem, the patient experienced intense pain in the right shoulder. The pain gradually subsided and was replaced by biceps and deltoid muscle weakness with atrophy and a tingling sensation in the lateral proximal forearm. The patient attributed his symptoms to lifting a heavy roofing beam at work.

The patient's family physician had diagnosed a cervical disc herniation and referred the patient for neurological evaluation. However, the cervical myelogram and computed tomography studies ordered by the physician were normal. No therapy had been provided.

In the previous year the patient had episodic mild right shoulder pain that he felt was related to overuse. Otherwise, his past health was good and there was no family history of similar complaints.

On examination there was moderate atrophy of the right deltoid and biceps muscles (Figures 1-3). There was a large scar over the left arm from a previous deep laceration. Movement of the right shoulder was mildly painful and abduction was limited to 90 degrees because of weakness and pain. Muscle strength

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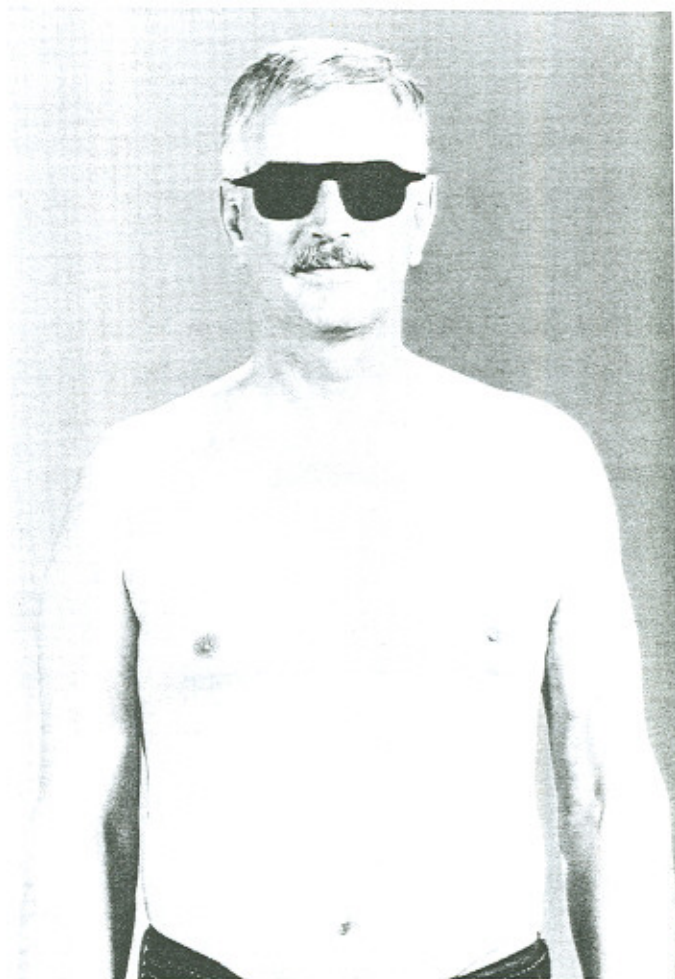
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**Figure 1** There is atrophy of the right deltoid muscle. Note the prominent crease in the anterior border of the right deltoid.

testing revealed moderate weakness (grade 3/5) of the right deltoid muscle and severe weakness (grade 1/5) of the right biceps muscle. The strength of the remaining upper limb muscles, including the serratus anterior, was normal. The right biceps reflex was absent. The brachioradialis and triceps were symmetrical with the left side. Light touch sensation was decreased over the right lateral proximal forearm, but the patient could distinguish sharp and dull objects. Cervical spine motion was full and pain free.

Electromyography revealed fibrillation of the right biceps muscle without detectable motor unit potentials. The right brachioradialis and pronator teres muscles demonstrated no fibrillation or fasciculation and had normal motor unit potentials. The electrodiagnostic studies were interpreted as severe denervation of the right biceps muscle with normal brachioradialis and pronator teres muscles.

The clinical and electrophysiologic data confirmed the diagnosis of brachial plexus neuropathy with involvement of the musculocutaneous and axillary nerves. The patient was given shoulder flexibility exercises and told that his condition was not serious and to expect a gradual recovery of function.

A follow-up examination four months later showed that motor and sensory function had improved. There had been a gradual, but incomplete, return of strength in the affected muscles. The shoulder remained mildly painful.

### Discussion

Brachial plexus neuropathy is a well defined clinical entity characterized by acute onset of severe pain in the shoulder or arm.<sup>1-3</sup> The pain is described as sharp, aching or burning, and can be severe enough to awaken the patient at night. Pain referred to the hand and scapular area have been reported.<sup>4</sup> During the painful phase, the patient will avoid moving the shoulder and will hold the arm adducted and internally rotated with the elbow flexed.<sup>1,4</sup> This antalgic position may mask the developing muscle weakness. In the majority of cases, the shoulder and arm pain persists for only a short duration (days to weeks), and as the pain subsides, muscle weakness and atrophy become evident.<sup>1,5</sup>

Strength testing may reveal moderate weakness to total paralysis of the shoulder girdle muscles.<sup>4</sup> The presence of paralysis can help rule out a nerve root lesion, which rarely causes complete muscle paralysis.<sup>6</sup> As many as two-thirds of patients experience mild hypaesthesia.<sup>1,3</sup> However, the sensory loss is usually minor compared to the motor loss. Deep tendon reflexes may be normal, decreased or absent, depending on the severity of the neuropathy and muscles affected. Movement of the cervical spine and coughing or sneezing are usually not aggravating factors.

Laboratory studies, cervical spine radiographs, myelograms and CT scans show no abnormality. Needle electromyography of the affected muscles demonstrates fibrillation potentials, positive sharp waves, decreased recruitment and increased amplitude of motor unit potentials.<sup>1,7,8</sup> These findings are consistent with axonal degeneration that results in flaccid muscle paralysis.

Weakness may persist for several weeks to months.<sup>1</sup> Strength usually returns within 6-12 weeks, although it may take longer than one year. Eighty to 90% of individuals can expect a full recovery by three years.<sup>4</sup> Longer recovery times for motor function appear related to a longer duration of pain. Dillin and associates suggest that if the pain recurs or is persistent and motor function is not recovering after three months, the prognosis for complete recovery is poor.<sup>1</sup>

Brachial plexus neuropathy has been reported in patients of all ages, but most commonly occurs between the third and seventh decades of life.<sup>4,8</sup> Men are affected twice as frequently as women.<sup>1,4</sup> The annual incidence is reported to be 1.64 per 100,000 population.<sup>5</sup>

The variety of patterns of neuromuscular involvement and





**Figure 2** Atrophy of the right deltoid muscle gives the shoulder a flattened appearance (Epaulette sign).



**Figure 3** Atrophy of the right biceps and deltoid muscles cause asymmetry of the shoulder muscle bulk and the patient's inability to contract the right biceps muscle. There is a large scar over the left arm from a previous deep laceration that has not affected muscle power.



inability to identify the etiology has led to much debate on the site and nature of the lesion and appropriate nomenclature. This condition is also known as brachial neuritis, neuralgic amyotrophy, Parsonage and Turner syndrome, brachial neuralgia and paralytic brachial neuritis.<sup>1-4,8</sup>

Brachial plexus neuropathy is actually a mononeuritis multiplex involving individual nerves arising from the brachial plexus.<sup>9</sup> Any portion of the plexus or peripheral nerves may be affected. However, there is a predilection for involvement of the upper trunk of the brachial plexus and therefore weakness is common in the proximal muscles.<sup>3</sup> Lesions may be incomplete, resulting in paralysis of one muscle while another supplied by the same nerve root or peripheral nerve is spared. Weakness in the distribution of a single nerve – including the long thoracic, suprascapular, axillary, musculocutaneous, radial and anterior interosseous nerves – has been noted with varying frequency.<sup>2-4</sup> More commonly, multiple nerves are affected simultaneously. The axillary and suprascapular nerves are the most frequent combination affected, and therefore, the deltoid and spinati muscles are often weak. Bilateral plexus involvement and recurrence of the neuropathy are possible.

Brachial plexus neuropathy has been described secondary to radiation therapy, trauma, infection, collagen diseases and vaccination.<sup>8</sup> In the idiopathic form, the patient will often relate the onset of pain to a prior event, such as overexertion of the upper limbs, however, this is usually a red-herring.<sup>4</sup> The neuropathy may be the result of an immune-mediated inflammation, a hypersensitivity reaction, or an infectious disorder.<sup>1-5,10</sup>

Brachial plexus neuropathy can mimic several other conditions, resulting in misdiagnosis and mismanagement of the patient. This condition may be mistaken for rotator cuff tears and tendonitis, subacromial bursitis, impingement syndrome, cervical spine stenosis and disc herniation, upper extremity nerve entrapment, or malignant processes compressing or invading the brachial plexus.

The acute onset of severe shoulder pain that slowly resolves and is replaced by muscle weakness and atrophy is the hallmark of brachial plexus neuropathy. Cervical spine radiculopathy can be excluded by the paucity of local cervical spine examination findings, the antalgic posturing of the shoulder, the presence of total paralysis, and the preservation of motor function in other myotomally related muscles. The painful phase of brachial plexus neuropathy can resemble shoulder conditions such as rotator cuff tears and tendonitis. However, in brachial plexus neuropathy there is usually no trauma, and as the pain subsides and the weakness and atrophy increase, the diagnosis becomes more evident.

Most patients with brachial plexus neuropathy recover spontaneously despite the severity of initial symptoms and signs. Management is directed at symptomatic relief, preserving shoulder motion through active and passive exercises and reassurance. Corticosteroids have been reported to help relieve pain, but other benefits remain questionable.<sup>3,4</sup>

### Conclusion

Brachial plexus neuropathy is a self-limiting condition with a good to excellent prognosis. Its recognition is important for several reasons. Diagnostic tests for other presumptive disorders can be costly and are not without risk. Treatment based on an inaccurate diagnosis may be ineffective. Finally, an accurate diagnosis allows one to reassure the patient of a good prognosis.

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