CASE REPORT

Bilateral Brachial Plexus Injury

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ABSTRACT

Brachial plexus injuries can occur as a result of various mechanisms such as stretching, direct and indirect trauma or following childbirth. Bilateral brachial plexus injuries are uncommon and associated with a poor functional outcome. We report a case of bilateral brachial plexus injury resulting from prolonged immobilization of the arms in hyper-abducted position resulting in compression of the brachial plexus on both sides. The injuries were treated conservatively and following 4 months of active rehabilitation in our unit, the patient still had poor arm functions and required care and support in the community on discharge.

Key words: *Bilateral. Brachial plexus. Injury. Rehabilitation.*

INTRODUCTION

Brachial plexus is a network of nerves originating from fifth to seventh cervical (C5-C7) and the first two thoracic (T1-T2) spinal nerves. These networks of nerves innervate the muscles and skin of the chest, shoulder, arm and hand. Damage to these nerves lead to symptoms ranging from a completely paralyzed upper limb to a lack of muscle control in the arm, wrist or hand and diminished sensations. Injury to the brachial plexus could be the result of trauma to the shoulder,[1] traction injury to the spine, inflammation or tumour. Prognosis of the brachial plexus injuries is variable and is associated with the nature and site of the nerve damage. Spontaneous recovery may occur in cases of neuropraxia, whereas severe avulsion and rupture of the trunk is not associated with spontaneous recovery.

We present an unusual case of bilateral brachial plexopathy related to alcohol intoxication in a 44-year-old woman.

CASE REPORT

A 44-year-old lady with alcohol-related brain injury was admitted with an inability to move arms after a vague history of drinking heavily at home. Neurological examination of the upper limb on admission is summarized in Table I. Investigations showed raised muscle enzymes (creatine kinase and transaminase) and normal urea and electrolyte levels. Computed tomographic (CT) scan of the brain showed marked cerebral atrophy but no acute cause for her symptoms.

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Table I: Summary of neurological findings.

	Medical research council grading of muscle power			
	At admission		Following rehabilitation	
	Right	Left	Right	Left
Shoulder abduction	2	1	4	3
Shoulder flexion	0	0	4	3
Elbow flexion	0	0	0	0
Elbow extension	0	0	0	0
Wrist flexion	0	0	3	2
Wrist extension	0	0	0	0
Finger flexion	1	0	3	2
Finger extension	0	0	0	0
Sensations				
Pain and light touch	Absent bilaterally from C3 to C6 dermatomes		Absent bilaterally from C5 to T1 dermatomes	
Reflexes				
Deep tendon reflexes in upper limbs	Absent bilaterally		Absent bilaterally	
Tone				
Tone in bilateral upper limbs	Reduced		Reduced	

CT scan of the cervical spine showed no acute bony injury. Magnetic resonance imaging (MRI) scan of her head and spine had no evidence of spinal cord or nerve root compression.

Nerve conduction studies of her upper limbs showed absent sensory response from bilateral median, ulnar and superficial radial nerves. Motor conduction studies showed no response from both median nerves or left ulnar nerve. Although very small motor responses were obtained from the right ulnar nerve, F wave responses were absent on both sides. Electromyographic (EMG) studies showed profuse fibrillations with positive sharp waves in bilateral deltoids, triceps and biceps without voluntary contractions. A diagnosis of severe bilateral plexopathy was made on the basis of nerve conduction studies and negative brain and spinal cord imaging. Rhabdomyolysis responded well to fluid therapy.

After 4 months of active rehabilitation, she still had significant deficit in her upper limb function (Table I).

A dynamic right upper limb splint was provided to help maximise her residual hand function. The splint aids in passive finger extension, which enabled her to pick objects with her right hand using her finger flexors and shoulder abductors (Figure 1). Despite being independently mobile, she is now fully dependent for her all activities of daily living (ADL's).

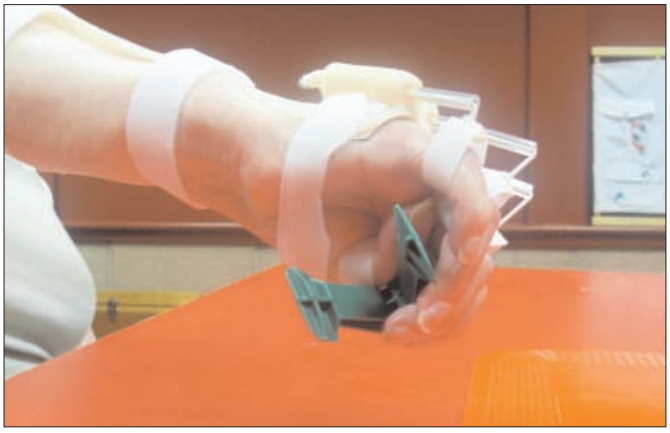

Figure 1: Dynamic splint to aid passive finger extension.

DISCUSSION

Brachial plexus injuries in adults can result from excessive traction of the shoulder as a result of trauma,[1] tumours or inflammation. Spontaneous inflammation of the brachial plexus (Parsonage-Turner Syndrome) is very uncommon and can cause disabling symptoms.[2] Due to advances in trauma care, more multiple trauma patients are surviving, hence increasing the number of traumatic brachial plexus injuries. On the other hand, improvement in the obstetric care has reduced the incidence of brachial plexus injuries during difficult childbirth.

Bilateral brachial plexus injury is not very common and has been described in literature following trauma, use of crutches, use of shoulder brace, following prolonged surgical procedures and following malpositioning in a brain injury patient.[3-7] Silber *et al.* described a complete right and partial left sided brachial plexus injury following alcohol intoxication in a 69-year-old gentleman.[8] The mechanism of brachial plexus injuries in adults is thought to be due to distractions of the shoulder or arm from the rest of the body. Shoulder abduction to 90 degree when combined with arm extension and head rotation tends to put pressure on the brachial plexus in cadaveric studies.[8]

The exact cause of bilateral brachial plexus injury in this patient was not known. It was postulated that she had prolonged period of immobilization whilst under the influence of alcohol with her arms hyper-abducted resulting in compression injuries to both the brachial plexi. Prolonged immobilization also result in rhabdomyolysis. Focal rhabdomyolysis is a common disorder secondary to skeletal muscle trauma or prolonged immobilization due to any reason. It has also been described with chronic alcohol use.[9] The resultant swelling of the muscles, due to rhabdomyolysis, may compromise the blood supply to the nerves resulting in neural ischaemia and paralysis.

The brachial plexus injuries can be classified according to the anatomical site of damage. Lesions proximal to the dorsal root ganglion (pre-ganglionic injuries) result in damage to the nerves within the spinal canal or the foramen. This diminishes the chances of any spontaneous recovery or surgical reconstruction. In contrast, lesions distal to the dorsal root ganglion (post-ganglionic) are similar to the peripheral nerve injuries with possibility of spontaneous recovery and surgical reconstruction. The nerve roots are more susceptible to traction and compression injuries as the meningeal covering over the nerve roots is very thin compared to the thick sheath covering the peripheral nerves. The lack of spontaneous recovery and a normal MRI scan in this case suggests that the primary pathology was severe avulsion with axonal degeneration.

The symptoms of the brachial plexus injury depend upon the site and extent of insult to the nerves and range from numbness and weakness in the involved arm to a complete motor paralysis of the limb. Severe neuropathic pain usually accompanies the motor paralysis.[10] In the presence of multiple life and limb threatening injuries, the diagnosis of brachial plexus injuries may be delayed. It is, therefore, essential to perform a secondary survey as soon as possible keeping in mind the insult to the brachial plexus in multiple trauma patients.

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