**Case Report**

**Back Pack Palsy as an Unusual Cause of Shoulder Pain and Weakness—A Case Report**

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**Abstract**

Heavy back packs carried for prolonged durations can cause different musculoskeletal and neurological problems especially in the untrained and physically vulnerable individuals. They can cause postural disorders, gait abnormalities, muscular strains, pains and injuries to the brachial plexus and nerves resulting in significant morbidity and at times permanent disability. We report a case of brachial plexus injury in a young soldier wearing back pack for prolonged period. He developed weakness and pain in right shoulder which was not relieved with rest and analgesics. On examination he had weakness in deltoid, biceps and scapular muscles along with numbness in axillary nerve area. Brachial plexus injury (upper trunk) was suspected and confirmed by electrodiagnostic evaluation. His baseline investigations were normal. He was advised rest and avoidance to lift heavy weight. He was managed with electrical muscle stimulation for weak muscles, strengthening exercises and analgesics. He responded well to the treatment and had minimal residual weakness at the end of the six weeks’ treatment.

Back pack palsy should be suspected in people carrying back packs and presenting with pain, weakness and numbness in the upper limbs. It can be prevented by education in the use of back packs, its weight limits, physical fitness and frequent breaks with changing positions.

**Key words** : Back pack, brachial plexus.

**Introduction:**

Back pack is commonly worn by soldiers, skiers, adventurers, scouts and even children. Over weight back packs worn for prolonged times and poor quality along with compromised physical health can cause significant disability at times. Weakness, pain and numbness are the most frequent symptoms and it is commonly labelled backpack palsy. The exact incidence of back pack palsy is not known but has been reported to be around 53.7 per 100,000 in a study carried out among recruits in Finland.

We report a case of back pack palsy in a young soldier after a night long operation in a mountainous terrain.

**Case Report:**

Twenty-eight years old previously healthy old soldier presented with weakness and pain in the right shoulder region. He had participated in an operation the night before during which, he had to carry his 30 kg back pack along with heavy weapon on his shoulder for ten hours. He was managed symptomatically but didn’t improve. Over the next two weeks the weakness worsened and he was unable to participate in the daily military routine. He was referred to our department with a provisional diagnosis of adhesive capsulitis. He had no previous history of trauma or infection. He had stable vital signs. There was slight wasting of deltoid, supraspinatus and Infraspinatus on the right side. He was unable to abduct his shoulder (Fig 1), and there was numbness in axillary nerve distribution. On motor examination he had weakness in biceps 4/5, supraspinatus, infraspinatus, subscapularis and teres minor 3/5 each. The biceps and brachioradialis reflexes were depressed on the right. A provisional diagnosis of...
Brachial plexus injury secondary to lifting heavy weight on shoulders was made. Baseline investigations including blood complete picture, erythrocyte sedimentation rate, C reactive protein, alanine transaminase, urine routine examination, renal and liver function tests were normal. X-ray right shoulder and cervical spine revealed no abnormality (Fig 2). Electrodiagnostic evaluation was done. The right axillary nerve was not recordable; there were reduced compound motor action potential (CMAP) of musculocutaneous nerve, (1.4mV on the right side as compared to 7.5 mV on the left side). Electromyography (EMG) revealed neuropathic pattern in right deltoid, biceps and extensor digitorum communis with large polyphasic motor unit action potentials and a discrete (reduced) recruitment and interference pattern, there were no fibrillation potentials or positive sharp waves. This was suggestive of upper trunk involvement the right brachial plexus. He was managed with electrical muscle stimulation for deltoid muscle having a muscle power of 0/5 and strengthening exercises for scapular muscles and biceps. He was advised not to lift heavy weights. NSAIDs were prescribed for pain relief, carbamazapine for the neuropathic pains along with vit B12. The pain and numbness gradually improved, and over a period of 6 weeks he made significant recovery in his muscle strength (Fig 3).

**Discussion:**

Back pack, is a bag carried on the back, and the weight is transmitted to the shoulders through the straps around the axilla. It also transmits some of the weight to the back and hips and hence is ideal to carry weights for long distances comfortably. Incorrect strapping, over weight backpacks, poor fitness and posture, congenital anomalies, uneven hilly terrain and prolonged wearing time put the individual at greater risk of injury. It has been reported all around the globe especially in young recruits and soldiers who have to carry heavy backpacks in hilly terrains for long time. The permissible weight to prevent backpack palsy varies from individual to individual depending on age, weight, physical build and fitness level. It is roughly between 25% to 35% of body weight. In our case, cause of palsy was heavy weight, 30kg, around 40% of his body weight and prolonged duration (10 hours) of carrying heavy backpack in a mountainous terrain.

Back pack palsy denotes a variety of neurological disorders originating due to wearing heavy back packs
for prolonged period of time. It usually present as weakness in elbow flexors, extensors and scapular muscles after carrying heavy weights. Numbness if present is more marked in the axillary region followed by lateral arm and forearm. Significant atrophy can develop over a period of time in severe cases. It can result in injury to the individual named nerves like suprascapular nerve, axillary nerve, median nerve, long thoracic nerve or musculocutaneous nerve. It can also involve the posterior cord and upper trunk of brachial plexus, rarely lateral cord or complete plexus can be damaged. The damage is usually unilateral but occasionally bilateral. The severity of the injury varies from pain, weakness and numbness in the involved region to complete paralysis. The causative factors include the weight of the back pack, duration of wearing, quality of the back pack, type of terrain, physical fitness of the individual and congenital anomalies of the neuromuscular systems in susceptible individuals. Back pack palsy can be diagnosed using electrodiagnostic evaluations apart from clinical examination. Nerve conduction studies and electromyography can confirm diagnosis as well as the exact site and severity of the injury that will help in prediction of prognosis. In our study, CRP, ALT, RFTs and LFTs were done as baseline routine investigations and to rule out other associated causes of weakness. CRP was done to rule out polymyalgia rheumatica or other acute inflammatory causes. Electrodiagnostic studies were done in our case to confirm our clinical diagnosis.

The prognosis is good with almost complete recovery in 80% of the patients, two-thirds within two to five months of injury, however recovery keeps coming up to two years in certain individuals. A small number have incomplete recovery and residual significant disability. The standard treatment protocol depends upon the severity of injury, usually conservative management including physical modalities, therapeutic exercises, weight lifting restrictions and symptomatic medications lead to complete recovery.

In a follow-up study carried out over a mean period of 4.5 years after the injury. Nylund et al found that there was complete recovery in 79% of the cases in a mean time of 3.2 months, more severe injury was observed in cases whom lifted heavy weights (>30 kg average).

Back packs without waist support increases the risk of nerve compression while pack frames have been reported to decrease the occurrence of compression neuropathy. Bessen et al reported a reduction in occurrence in compression neuropathy among basic trainees using pack frames compared to those whom did not use it.

Similar case of backpack palsy was also reported from India with involvement of complete brachial plexus and subsequent complete recovery in 10 weeks in a military recruit.

**Conclusion:**

Despite good prognosis for recovery, brachial plexus injuries due to backpacks should be kept in mind while training and treating people involved in carrying heavy back packs to prevent a disabling injury. It should include standardisation of back pack weights, duration of wearing, hilly terrain adjustments and physical fitness and most importantly end user education.

**References:**