CASE REPORT

Complete Spinal Accessory Nerve Palsy From Carrying Climbing Gear

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We report an unusual case of spinal accessory nerve palsy sustained while transporting climbing gear. Spinal accessory nerve injury is commonly a result of iatrogenic surgical trauma during lymph node excision. This particular nerve is less frequently injured by blunt trauma. The case reported here results from compression of the spinal accessory nerve for a sustained period—that is, carrying a load over the shoulder using a single nylon rope for 2.5 hours. This highlights the importance of using proper load-carrying equipment to distribute weight over a greater surface area to avoid nerve compression in the posterior triangle of the neck. The signs and symptoms of spinal accessory nerve palsy and its etiology are discussed. This report is particularly relevant to individuals involved in mountaineering and rock climbing but can be extended to anyone carrying a load with a strap over one shoulder and across the body.

Key words: spinal accessory nerve trauma, spinal accessory nerve injury, cranial nerve XI injury, trapezius dysfunction, scapular dyskinesis, rock climbing

Introduction

Spinal accessory nerve (SAN) injury occurs most frequently as a result of surgical trauma within the posterior triangle of the neck—typically during lymph node biopsy or excision.^{1–3} Other cases of iatrogenic SAN injuries have been associated with carotid endarterectomy surgery.^{1–3} Noniatrogenic injury to the SAN has also been described from blunt trauma such as automobile accidents, traumatic laceration, and stretch injuries.^{1,2} We report a case of SAN palsy as a result of sustained compression from carrying 20 pounds (9 kg) of climbing gear over the shoulder with a sling made of 9-mm rope.

Case Report

A 31-year-old male rock climber spent the day climbing outdoors with a partner. They hiked to the base of the climb carrying their gear in backpacks. After a day of climbing they hurried to return to their vehicle because of the imminent loss of daylight. He carried his climbing gear slung over his shoulder by a single (9 mm in diameter) rope sling in an effort to move quickly. As he

was approaching the trailhead he noted some soreness in his right neck area. After hiking 2.5 hours back to his vehicle, while carrying approximately 20 pounds (9 kg) of gear in this manner, he realized he was unable to shrug his right shoulder. He reports being incapable of contracting his trapezius or being able to fully elevate the affected arm for the following 3 days. As there was no improvement, he sought medical advice.

A SAN injury was diagnosed with decreased trapezius function and lateral scapular winging ([Figures 1 and 2](#)). We recommended rest, restriction from lifting more than 5 pounds (2.3 kg) with the affected side, and no hiking with a backpack or climbing for the next 6 weeks. After 7 weeks from the time of injury, he was reevaluated. Full active range of motion was observed. Slight lateral winging and nearly normal muscle tone were demonstrated ([Figures 3 and 4](#)). Limited climbing was permitted, and he was allowed to lift up to 50 pounds (23 kg). Recovery continued gradually until the patient's right trapezius returned to full strength by 4 months after the injury. At 6 months after the injury, the patient was climbing at the same level as before the injury and had no notable strength deficit.

Figure 1. The patient with spinal accessory nerve palsy 2 weeks after injury displays right lateral scapular winging and decreased tone in the trapezius.

Discussion

The SAN is a cranial nerve that descends from the jugular foramen to innervate the sternocleidomastoid muscle. It continues through the posterior triangle of the neck and into the anterior border of the trapezius muscle.^{1,2} The posterior triangle of the neck is the region enclosed by the posterior border of the sternocleidomastoid, anterior border of the trapezius, and superior border of the clavicle. The SAN supplies both muscles with motor but not sensory innervation.² This nerve is vulnerable to injury because it lies subcutaneously as it passes through the posterior triangle of the neck.^{1,3} Injury to the SAN may present as motor loss in the sternocleidomastoid and trapezius muscles.¹⁻³ The upper third of the trapezius is solely innervated by the SAN,

Figure 2. The patient with spinal accessory nerve palsy 2 weeks after injury demonstrates decreased elevation as a result of dysfunction of the right trapezius.

Figure 3. The patient 7 weeks after injury displays decreased right lateral scapular winging with a more symmetrical appearance.

whereas cervical motor roots may also innervate the lower two thirds.^{2,3} The muscle's primary role is to stabilize and position the scapula during movement of the glenohumeral articulation. A stable scapula moves in a coordinated fashion with the humerus so that the center of rotation remains between the humeral head and glenoid fossa throughout the full range of motion.⁴

Paresis or palsy of the trapezius consequently results in scapular dyskinesis—a loss of coordinated scapular movement and positioning.^{2,4} This trapezius dysfunction is observed clinically as atrophy, depression of the shoulder girdle, and scapular drooping, with lateral translation (or winging) of the scapula.¹⁻³ No significant atrophy of the right trapezius was noticed because of the relatively short duration that the nerve was compressed. The patient exhibited right-sided depression of the shoulder girdle and lateral scapular winging ([Figure 1](#)). Depression or drooping of the shoulder girdle occurs

Figure 4. The patient 7 weeks after injury shows nearly normal trapezius function and tone.

when the trapezius no longer functions as a static support to oppose the downward force caused by the weight of the upper extremity.^{2,3} Decreased muscle activation of the right trapezius was noticeable (Figure 2) when comparing the left and right sides. The dysfunctional trapezius can no longer elevate the scapula, which in turn affects active range of motion of the shoulder. When the scapula can no longer be properly elevated, it restricts flexion and abduction of the arm to approximately 90°. ¹⁻³ Another sign of SAN palsy is a positive scapular flip sign.² The test is positive if the medial scapular border lifts (or flips) from the thoracic cage during resisted external rotation of the shoulder.² With complete SAN damage, minimal shrugging of the shoulder can still be seen as the levator scapulae, a smaller and less robust muscle, contributes to this motion.^{2,3} Finally, the patient experienced the described loss of motor function but no loss of sensation; this is congruent with the neuroanatomy of the SAN and trapezius.³

Much of the literature reporting on SAN injury focuses primarily on injury after surgical dissection or traumatic stretch injury.^{1,2} With iatrogenic or penetrating trauma, operative treatment is commonly recommended, whereas conservative treatment is the first choice for SAN palsy resulting from traction or blunt injury.^{1,3} There is limited literature describing the presentation and diagnosis of SAN palsy caused by noniatrogenic mechanisms and even fewer cases describe compression injuries occurring gradually. One case reported by Rothner et al⁵ describes a nerve palsy from carrying a heavy pack with poor weight distribution during a weeklong hiking expedition, resulting in a brachial plexopathy. The case described here has a similar etiology to the case described by Rothner et al, but resulted in injury to the peripheral portion of the SAN rather than the brachial plexus. What separates this case

from previous reports is the mode of injury: a load of climbing gear was carried with a narrow nylon rope over the shoulder and across the body while hiking. This resulted in injury to the SAN and concomitant trapezius dysfunction. Conservative treatment was recommended and resulted in full recovery.

Conclusions

This injury initially draws attention to the danger of using unpadded or narrow slings used by rock climbers to carry loads that can exert excessive pressure on structures within the posterior triangle. However, the implications extend beyond just climbers and gear slings to any weight-bearing activity in which a narrow strap is worn around the neck and across the body for a sustained period, such as a bike messenger bag or even a heavy bike lock. This case emphasizes the importance of carrying weight ergonomically and using well-padded equipment.

References

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