The Spinal Accessory Nerve Injuries

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ABSTRACT

The Spinal accessory nerve, (SAN) the 11th cranial nerve is the main nerve supply to the trapezius muscle. During surgical dissections, i.e. Radical and Modified Radical neck dissections, for cancer of the head and neck or during lymph node biopsies or other neck injuries, this nerve can be damaged in part or whole. As a result disabling shoulder syndrome can occur. Frequently it can be misdiagnosed as frozen shoulder, impingement or rotator cuff syndrome. This article reviews anatomic variations of SAN, identification of injury, signs and symptoms, Rehabilitation and other surgical treatment options available to reduce the disability and improve functional outcomes.

KEYWORDS

Case; A 68 year old male, presented to the Rehab Clinic with a chief complaint of right shoulder pain for 4 months. The pain is deep-seated in the shoulder worse on movement and is constant. He is unable to perform overhead activities. The pain is a 5/10 on a VAS scale. The pain temporarily improves with analgesics. Pain does not radiate to elbow or wrist. No history of tingling or numbness in his upper extremity. No inciting incidents reported. No history of fever.

Past medical history: On further questioning patient reported that he had a lymph node biopsy 3 months ago on the right side. The results are positive for submandibular gland squamous cell carcinoma. Patient will be receiving chemotherapy soon. There is no other medical history.

Social history: Patient is a smoker 2 PPD since his teens and works as a plumber.

Examination; Reveals a WD, WN, WM in moderate distress. He has atrophy of right shoulder upper quadrant. Range of motion (ROM) of the shoulder is decreased by 30° in abduction/ and forward flexion. Elevation of the shoulder above the head is also painful and incomplete. No deficits found in rotation. No Horner’s. MMT 3/5 power in shoulder abduction/forward flexion. Additionally, weakness of shoulder shrug on right side in the 3/5 range. Sensory exam was intact to LT and PP. Reflexes – 2+ symmetrical biceps, BR triceps. A small healing biopsy scar in the right posterior triangle next to SCM muscle was present. Neer’s impingement test, Hitch hiker test, and Hawkins tests were negative.

Discussion: The Spinal accessory nerve, (SAN) or eleventh cranial nerve is composed of two distinct parts. (Fig 1). The Cranial part, or the accessory portion (ramus internus), is the smaller of the two, and is accessory to the vagus. It arises from the cells of nucleus ambiguous and the dorsal efferent nuclei of the two, and is accessory to the vagus. It arises from the cells of nucleus ambiguous and the dorsal efferent nuclei. The major portion of the eleventh nerve is the spinal portion (ramus externus). Several rootlets unite to form a single trunk, which enters the skull through the jugular foramen. The major portion of the eleventh nerve is the spinal portion. NCV studies are helpful for diagnosis.

The patient underwent an MRI of the shoulder which was negative for RTC tears, glenoid/labral tears or Glenohumeral joint DJD.

An EMG (Electromyography) was positive for spinal accessory nerve damage.

This case is an example of spinal accessory nerve injury, commonly seen after procedures as cervical lymph node biopsy for head and neck cancers.
the internal jugular vein and behind the digastricus and stylohyoid to the upper part of the sternocleidomastoid (SCM) which it supplies and then descends to end in the deep surface of the trapezius. (Ref 1).

The trapezius is a large muscle consisting of 3 distinct parts: upper, middle and lower. Each part serves complementary, yet different roles. The simultaneous actions of the upper and lower parts exert a rotational action of the scapula. (Ref 4, 5). This upward rotation of the scapula accompanies abduction of the arm at the gleno-humeral joint and produces elevation of the arm above shoulder level. (Ref 6, 7)

Lesions of the SAN; Cranial nerves unlike peripheral nerves, lack of epineurium and are unable to stretch, they also have less collagen and therefore are more vulnerable to injury. (Ref 8, 9) The accessory nerve can be damaged intra cranially at the skull base, or at the jugular foramen or in the neck. (Ref 3). According to Donner and Kline. (Ref 10) 71% are iatrogenic and 24% traumatic. The most common iatrogenic cause is the lymph node biopsy in the posterior triangle of the neck, next to the posterior boarder of SCM. A compound muscle action potential (CMAP) is obtained. Two parameters are studied. 1) Latency which is the time taken from stimulation to the onset of CMAP. Any delays in conduction latency indicate demyelination, which can be temporary due to traction or compression of the nerve. 2) Amplitude which is a measure of intact axons as evidenced by peak to baseline measurement of the CMAP. Needle electromyography is done by inserting thin monopolar needle electrodes into the muscles. Presence of denervation potentials such as positive sharp waves and fibrillation potentials and any drop out of motor units indicates more severe axonal damage. (Ref 18)

Rehabilitation Interventions: Rehabilitation Interventions aim at 1) reduction of pain by using deep heating modalities as therapeutic ultrasound, and electrical stimulation 2) proximal scapular stabilization exercises, shoulder strengthening exercises with elastic stretch bands, and supine shoulder rotation exercises 3) neuromuscular education using the principles of proprioceptive neuromuscular facilitation (PNF), neuromuscular electrical stimulation (NMES).4) Strengthening of rotator cuff using active exercises and progressing to resistive exercises. (Ref 19)

Orthotic interventions: A shoulder bracing techniques to stabilize the shoulder and prevent the effects of winging have been attempted with limited success.

Surgical interventions: In performing surgical dissections one should avoid removing any nerve, including cervical plexus nerves each of which may have sensory as well as motor function. In unavoidable circumstances and severe nerve injuries surgical re anastomosis techniques such as cable grafting, end to end anastomosis may be useful.

In Conclusion: We present a case of a 68 y/o male who has had a recent lymph node biopsy as a diagnostic procedure. A few months later he presented with classical signs and symptoms of Spinal accessory nerve damage. This is a rarely encountered situation in routine clinical work. Accessory nerve palsies lead to shoulder dysfunction which can be a debilitating and painful condition. This can result from neck dissection surgeries and other procedures as lymph node biopsies. It is important to recognize this condition so that proper interventions can be applied to reduce morbidity.

Figure Legends: Fig 1 Anatomy of the Spinal accessory nerve

EM foramen magnum.C.1 Cranial nerve one.C.2 Cranial nerve two.C.3 Cranial nerve three.C.4 Cranial nerve four.S.M Sternocleidomastoid muscle.T.M Trapezius Muscle ,V-a- vagus, R, ganglion of the root; T, ganglion of the trunk

Table: Causes of Spinal Accessory nerve injury

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<th>Traumatic</th>
<th>Non traumatic</th>
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<tr>
<td>Lymph node Biopsy</td>
<td>Vernet's syndrome</td>
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<td>Radical Neck Dissection</td>
<td>Brachial Neuritis</td>
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<tr>
<td>Parotidectomy</td>
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<td>Herpes Zoster</td>
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<td>Blunt/penetrating injuries</td>
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