



# The Diagnosis and Treatment of a Rare Case of Supraclavicular Neuropathy Following Thoracic Decompression Surgery

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## Abstract

The supraclavicular nerve is rarely of clinical significance for many medical providers and even less so for most pain physicians. The following is a case of supraclavicular neuropathy following thoracic outlet decompression to treat Paget-Schroetter syndrome, a venous thrombosis etiology of thoracic outlet syndrome (TOS). A 38-year-old female was referred to our pain management clinic by her vascular surgeon for a new onset of severe right-sided superior chest wall and peri-clavicular pain that began after surgery to address her TOS. She described constant tingling, burning, and numbness which was distinct from the painless swelling and mottling of her right arm prior to her TOS diagnosis. Narcotics and muscle relaxants had provided minimal relief for these new post-operative symptoms. Multiple subsequent ultrasound exams were negative for recurrent venous thrombosis. After 6 weeks of treatment in the pain clinic, which included the initiation of gabapentin, desensitization therapy, repeated local lidocaine injections, and electroacupuncture, she reported 70% improvement in pain. She also endorsed improved functional outcomes, specifically an increased ability to perform overhead activities, wear upper body clothing without severe pain, and improved sleep. This patient represents a rare case of supraclavicular neuropathy following surgery to address a venous etiology of TOS, Paget-Schroetter syndrome. The purpose of this report is to bring awareness of this surgical complication to pain physicians in order to lead to early diagnosis and treatment, and to prevent the development of chronic pain.

**Keywords:** Supraclavicular Neuropathy, Paget-Schroetter Syndrome, Thoracic Outlet Syndrome, Peripheral Nerve Block, Acupuncture, Desensitization Therapy, Physical Therapy, Neuromodulators

## Introduction

The supraclavicular nerve emerges from the C3-4 nerve roots, and its branches provide sensory innervation to the skin overlying the pectoralis major, clavicle, anterior shoulder, and upper trapezius. The nerve has very little mentioning in the literature. Its clinical significance is generally limited to clavicle fractures and surgical management thereof [1-3]. The following is a rare case of a patient who was referred to a pain management clinic to address post-operative burning, numbness, and severe allodynia in the distribution of the supraclavicular nerve following first rib resection for the treatment of thoracic outlet syndrome (TOS).

## Case Report

The patient was a 35-year-old female with a past medical history of Type 2 Diabetes Mellitus, hyperlipidemia, obesity, and asthma who had initially presented to an emergency department 9 months prior for acute swelling and discoloration of her right forearm and hand. CT angiogram of her right upper extremity showed occlusive thrombi in the right brachiocephalic and subclavian veins, as well as non-occlusive thrombi in the right axillary, central brachial, basilic, and cephalic veins. She was diagnosed with Paget-Schroetter Syndrome, or venous TOS, and underwent urgent venous thrombolysis with resolution of

symptoms. She was treated with therapeutic anticoagulants over the following 3 months and underwent a full hypercoagulable work up with the Hematology Department, which was negative. During the interim period between initial presentation and surgery, she denied any numbness or tingling, pain, swelling, or discoloration in her right upper extremity.

Four months following her initial presentation and diagnosis, she underwent surgical treatment for Paget-Schroetter Syndrome, which included right 1<sup>st</sup> rib, anterior scalene, and subclavius muscle resection. This was done with a supraclavicular approach. There were no identified post-operative complications in the chart, and she was discharged 2 days later. The patient herself stated she felt new burning and tingling around her right clavicle immediately following surgery, but it was less severe while she was on a post-operative narcotic regimen. Per protocol, a repeated right upper extremity venogram was performed 2 weeks after surgery, which showed a patent venous system. Subsequent follow-up clinic notes for several months state that the patient reported constant paresthesia, pain, intermittent numbness, and allodynia in the area of her right clavicle and upper chest wall that was not responding to trials of narcotics and muscle relaxants. The patient herself reported an inability to wear sweaters or work shirts due to severe allodynia for months. Three ultrasound assessments of her right upper extremity venous system during this time all showed patent vessels. After minimal improvement with 8 weeks of physical therapy, she was then referred to our pain management clinic.

The initial physical examination revealed a well-healed scar in the right supraclavicular fossa. There was mild, diffuse edema of her right upper extremity and significant allodynia in the right peri-clavicular area associated with patchy numbness to light touch. A neurological exam of her right upper extremity revealed no weakness in any tested muscle groups, symmetric 2+ reflexes, and no other sensory changes distally. Shoulder impingement tests were also negative. A review of systems was negative for feeling lightheaded, shortness of breath, left-sided chest pain, or any recent fevers or chills. She was provided instructions for starting 300mg gabapentin nightly with increasing to twice daily after one week. She was also instructed on twice-daily desensitization treatment with the aid of 5% lidocaine cream. One week later she returned for a diagnostic supraclavicular nerve block with 5cc 2% lidocaine under ultrasound guidance. Of note, no visible neuroma was seen. Following this procedure, the patient reported a total resolution of symptoms for 30 minutes with continued 70% relief when seen one week later. She underwent two more supraclavicular nerve blocks over the next two weeks along with two sessions of electroacupuncture. At her follow-up clinic appointment exactly 6 weeks after her initial appointment, she reported overall 70% pain relief and increased function as demonstrated by the ability to sleep throughout the night without pain, wear upper body clothing

comfortably, and perform overhead activities. At that time, she was satisfied with her results and deferred further intervention.

## Discussion

The supraclavicular nerve and its terminal branches are a rare topic in medical literature in general, and even less so in pain management. Supraclavicular neuropathy or neuralgia has been addressed infrequently in the context of clavicle fracture and surgical treatment thereof. For instance, Labronici et al retrospectively reviewed 255 cases of displaced diaphyseal clavicle fractures in order to report frequency of supraclavicular nerve injury [1]. They reported 5 total subjects (2.0%) experienced associated paresthesia in the anterior aspect of the thorax consistent with supraclavicular nerve injury, and symptoms improved in all 5 patients over the course of 1-3 months. Nathe et al performed a cadaveric study to investigate more closely the location and branching patterns of the supraclavicular nerve, particularly in the context of increased rates of surgery for clavicle shaft fractures [2]. They found that 97% of subjects had medial and lateral supraclavicular branches with an additional 49% also having an intermediate branch. They found a wide variability of branch locations as they crossed the clavicle, but no branch was within 2.7cm of the sternoclavicular joint or within 1.9cm of the acromioclavicular joint. Wang et al performed a retrospective study on 38 subjects who had undergone plate fixation for a clavicle fracture [3]. Twenty-one subjects (55.3%) reported post-operative hypoesthesia in the distribution of the supraclavicular nerve. Pain was most severe within 1 month of surgery, and after 2 years, 66.7% of symptomatic patients endorsed persistent numbness [3].

The patient presented in this report had a rare form of venous TOS, as the literature generally cites neurogenic TOS as representing 95% of all cases [4-6]. There are three approaches to surgical treatment of TOS: a supraclavicular, infraclavicular, and a transaxillary approach [7]. The supraclavicular and transaxillary approaches are most frequently utilized, and both have shown to produce good results. A Cochrane Review assessing various treatments of TOS did, however, find very low evidence to support greater pain relief with the transaxillary approach [8]. The low quality of this evidence was acknowledged repeatedly in the paper. A review of available literature did reveal a retrospective study specifically comparing complications of the transaxillary and supraclavicular approaches (n=102) [9]. They found no significant difference in the prevalence of pneumothorax, hemothorax, vascular injury, or plexus injury between the 2 approaches. They did, however, find a significantly higher rate of persistent pain (>6 months) with the transaxillary approach [9]. While there was no mention of suprascapular neuropathy with either approach, this study did make a rare acknowledgement of identifying and mobilizing the supraclavicular nerves while describing the supraclavicular approach [9]. To our knowledge, post-operative

suprascapular neuropathy has not been mentioned in the literature in the context of TOS and surgical decompression of the thoracic outlet.

### Conclusion

We present a very rare case of supraclavicular neuropathy following thoracic outlet decompression surgery. To our knowledge, this potential complication has not been addressed in previous literature. We believe it is important for other pain medicine providers to be aware of this potential complication in order to facilitate prompt diagnosis and treatment, and to prevent the potential development of chronic pain.

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