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Introduction

Peripheral nerve stimulation (PNS) is a minimally invasive procedure in which an electrical impulse is delivered to a peripheral nerve through a percutaneously implanted electrode which interferes with the pain signals¹.

Case Description

We present the case of a 63-year-old, 142 lb African American male, employed as a financial planner, with medical history of spinocerebellar ataxia leading to recurrent falls and prior left rotator cuff tear. He has been experiencing progressively worsening chronic bilateral shoulder pain and limited range of motion, attributed to bilateral humeral head dysplasia. Due to his recurrent falls, the patient was not considered a candidate for surgical intervention. His pain has remained refractory to conservative orthopaedic treatments. The patient's pain was rated 8/10, significantly impairing his ability to perform overhead movements essential for activities of daily living. This prompted him to seek physiatric pain management. On initial physical examination, bilateral active shoulder abduction was limited to 80 degrees due to pain. Muscle strength was measured at 2/5 for shoulder abduction, internal rotation, and external rotation, all of which were restricted by pain. The patient underwent ultrasound-guided placement of a left axillary PNS programmed for a daily 12-hour usage.

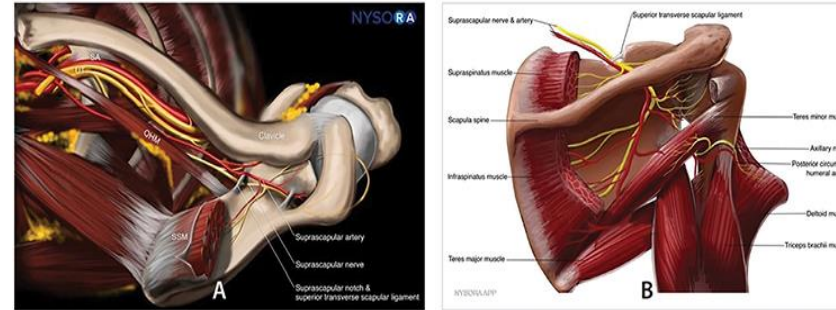


Figure 1. Anatomy of the shoulder

Fluoroscopy		Ultrasound	
Patient Positioning			
Suprascapular	Axillary	Suprascapular	Axillary
Prone with head turned away from access location. Arms adducted. Bump under affected shoulder.	Prone with arms adducted. Bump under affected shoulder.	Sitting, prone, or lateral decubitus.	Prone with arms adducted. Bump under affected shoulder.
Imaging			
Tilt fluoroscope 10-20 degrees cranial to visualize the medial & lateral borders of the scapular and suprascapular notch.	AP fluoroscopy visualizing the head and neck of the humerus.	Place transducer in a coronal oblique orientation over the shoulder, parallel to the lateral 1/3 of the scapular spine to locate the suprascapular notch.	Place transducer in a sagittal plane over humeral head and neck. In cross section, the infraspinatus is seen cranially, and the teres minor seen caudally. The axillary nerve & circumflex artery are visualized at the inferior border of the teres minor.
Approach			
Insert needle at the upper medial border of the scapula. With a shallow angle, walk needle along the spine of scapula towards suprascapular notch.	Insert needle with either a medial or lateral approach. With a shallow angle, walk needle just distal to the junction of the head and neck of the humerus.	Insert needle in a shallow in-plane orientation, advancing medial to lateral until needle tip makes boney contact with the floor of the suprascapular fossa. Visualize the suprascapular nerve and artery.	Insert needle from caudal to cranial, lateral to medial, or medial to lateral approach in either in-plane or out-of-plane.
Final Lead Placement			
PNS lead placed in the suprascapular fossa in a perpendicular orientation to the suprascapular nerve.	PNS lead placed parallel to the junction of the head & neck of the humerus.	PNS lead placed in the suprascapular fossa in a perpendicular orientation to the suprascapular nerve.	PNS lead placed at the junction of the head & neck of the humerus, in a parallel orientation to the axillary nerve.

Figure 2. Procedural considerations for peripheral nerve stimulation of the suprascapular and axillary nerves

Discussion

At follow-up, the patient reported a 95% reduction in pain, accompanied by an increase in range of motion to 120 degrees of abduction. After 60 days, the lead was removed, and a right axillary PNS was placed. At the follow-up visit, the patient noted a 90% improvement in right shoulder pain. Following another 60-day period, the right lead was also removed. At this point, the patient experienced a 90% improvement in the right shoulder and 60% in the left shoulder.

Conclusion

Axillary PNS through peripheral nerve neuromodulation may provide lasting relief for patients with chronic pain who have not responded to conservative treatments or are not suitable candidates for surgery.

References

- Arulkumar, S et al. Peripheral Nerve Stimulation of the Shoulder: A Technical Primer. Journal of Pain Research, Volume 2024:17. Pages 1725-1733. May 10th, 2024.