

# #708 Case Series of Peripheral Nerve Stimulation of the Brachial Plexus

**Sheila Black, MB ChB**

The Leeds Teaching Hospitals NHS Trust, Anaesthesia and Pain department, Leeds, United Kingdom

## Introduction

PNS is approved neuromodulation for chronic pain of peripheral nerve origin<sup>1-3</sup>. Less has been described on stimulation of plexus of nerves, and how its mode of action may differ both peripherally and centrally.

Epidural fibrosis may preclude placement of cervical electrode, or the patient may not want or be fit to undergo SCS.

The author describes 5 cases of brachial plexus PNS in neuropathic pain from cancer and trauma.

## Materials / Methods

All patients received diagnostic interscalene brachial plexus block, assessed by pain proforma, prior to PNS implant.

## Results

### Case 1

- ◆ Radiation-induced brachial plexus neuropathy, patient suffered tongue base SCC treated with radical neck dissection and radiotherapy.
- ◆ Not fit for SCS, so PNS to brachial plexus covered satisfactorily neuropathic pain left arm.

### Case 2

- ◆ Fibromatosis left deltoid, allodynia and hyperalgesia over deltoid, initial PNS implant migrated out of brachial plexus sheath, requiring revision/replacement.
- ◆ Considerable improvement in QoL.
- ◆ Fibromatosis surveillance ultrasound/MRI alternately.

### Case 3

- ◆ Intramedullary cervical ependymoma, surgical debulking C6-T1 laminectomy, leaving significant residual ependymoma and fibrosis/scarring, 9-monthly MRI surveillance.
- ◆ Neuropathic pain left C5-T1, though unsuitable for percutaneous or surgical paddle SCS.
- ◆ PNS implanted with coverage whole arm, NRS 8/10 down to 3/10.

### Case 4

- ◆ Post-traumatic above elbow amputation, persistent neuropathic stump pain, worsened by cramping/spasms.
- ◆ PNS procedure complicated by arm/trunk spasm and difficulty in identifying paraesthesia due to constant severe pain.
- ◆ Experiences overstimulation on slight movements of head/neck worsening spasms.

### Case 5

- ◆ Post-traumatic C5 neuropathy.
- ◆ Neck fusion and shoulder reconstruction following trauma.
- ◆ Neuropathic pain C5 wasting deltoid.
- ◆ Months of opioid reduction, PNS implant provided excellent coverage immediately.

## Discussion

PNS has been shown to exhibit neuromodulatory effect both peripherally and centrally<sup>4</sup>. Cases described above demonstrate neuromodulation of pain from pathology/fibrosis arising within spinal space, treated by peripherally placed PNS.

Similar principles underlie posterior tibial PNS which can treat pain from sacral nerve roots<sup>5-7</sup>, another example of peripheral neuromodulation with proximal effects. This concept provides opportunities for therapeutic options in patients who do not want or are not fit to undergo SCS.

## Conclusions

**PNS can deliver neuromodulation in patients who do not want, or are unfit for SCS. PNS can provide an option for patients who would be denied SCS on grounds of epidural fibrosis and scarring, even where pathology exists more proximally in spine, thereby implicating a central mode of action.**

## References

1. Deer T. et al *Neuromodulation* 2016 Jan;19(1):91-100. Prospective, Multicenter, Randomized, Double-Blinded, Partial Crossover Study to Assess the Safety and Efficacy of the Novel Neuromodulation System in the Treatment of Patients With Chronic Pain of Peripheral Nerve Origin
2. Oswald J. et al *Pain Management* 2019 Nov;9(6):551-558. Prospective case series on the use of peripheral nerve stimulation for focal mononeuropathy treatment
3. Lin et al *Mechanism of peripheral nerves stimulation in chronic pain Pain medicine* Vol 21, issue supplement 1, August 2020 Pges 56-512
4. Finazzi-Agrò E, Rocchi C, Pachatz C, et al. Percutaneous tibial nerve stimulation produces effects on brain activity: Study on the modifications of the long latency somatosensory evoked potentials. *NeuroUrol Urodyn.* 2009;28(4):320-324. doi:10.1002/nau.20651
5. Gaj F, Andreuccetti J, Speziali F, Trecca A, Crispino P. [Chronic pelvic pain treatment with posterior tibial nerve stimulation]. *Clin Ter.* 2011;162(4).
6. van Balken MR, Vandoninck V, Messelink BJ, et al. Percutaneous Tibial Nerve Stimulation as Neuromodulative Treatment of Chronic Pelvic Pain. *Eur Urol.* 2003;43(2):158-163. doi:10.1016/S0302-2838(02)00552-3
7. Tirlapur SA, Vlismas A, Ball E, Khan KS. Nerve stimulation for chronic pelvic pain and bladder pain syndrome: a systematic review. *Acta Obstet Gynecol Scand.* 2013;92(8):881-887. doi:10.1111/aogs.12184

