Implanted peripheral nerve stimulator – Another weapon for managing pain

To the Editor,

Percutaneous nerve stimulation (PNS) is a neuromodulation technique which has been used successfully in managing acute postoperative pain and chronic pain due to varied etiologies. There has been significant research done in the field of pharmacology for treating chronic pain. Several drugs targeting specific receptors have been developed and used. However, pain continues to be perplexing as a syndrome for clinicians. Drugs specific for certain subset of receptors or having unique mechanism of action have not been successfully used in managing complex chronic pain syndromes.[1]

Several difficult-to-treat chronic pain situations such as trigeminal neuralgia, complex regional pain syndromes, postamputation pain, posthemiplegia pain, peripheral nerve dysfunctions, fibromyalgia, and several other conditions where oral medications, physical activity, and transcutaneous electrical nerve stimulation (TENS) have failed to treat symptoms have been successfully treated with PNS. The possible mechanism of action of PNS is the gate control theory. On stimulation, large-diameter fibres that transmit sensory impulses close the "gates" owing to the nociceptive input which is transmitted by the small-diameter fibers. Other

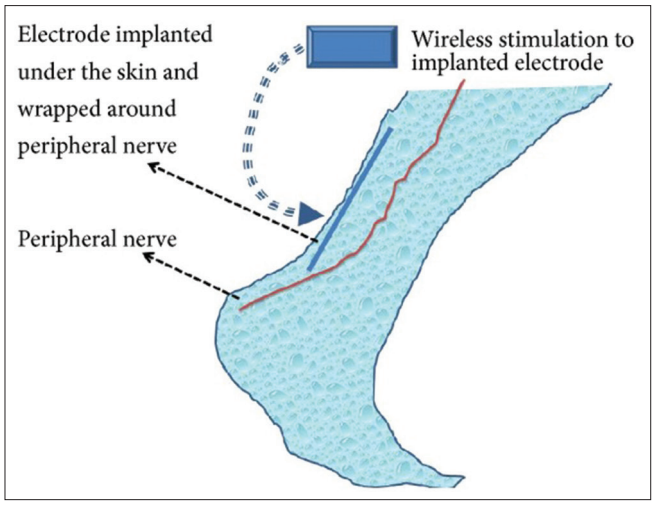

Figure 1: An implanted peipheral nerve stimulator placed around a nerve. (Image source: Nayak R, Banik RK. Current innovations in peripheral nerve stimulation. Pain Res Treat. 2018; 2018:9091216. Permission obtained from corresponding author: Ratan K. Banik)

possible mechanisms are direct modulation of wide-dynamic range neurons, by modulating activity in cortical and subcortical brain regions and by activation of descending inhibitory pathways.[2]

The stimulating electrode can be placed in or around the muscle/nerve, usually 1–3 cm from the target surgically/percutaneously or using ultrasound. There are two stages involved in the implantation of stimulating electrode. Initially, the electrodes can be tested by placing it at the desired site using an epidural needle. Once the efficacy is established, the electrodes can then be connected to an external battery source (implanted) to generate current for stimulation [Figure 1]. The advantages of this modality are that a continuous supply of local aesthetic is not required, it is opioid-free, can be kept for a longer duration, and does not come out on its own accidentally like the peripheral nerve catheters.[3] US Food and Drug Administration (US-FDA) has cleared the use of this neuromodulation technique which involves placement of a lead percutaneously and a stimulator for managing intractable chronic pain, posttraumatic pain, and postoperative pain for up to 60 days. The stimulator is marketed by SPRINT® PNS System.[4]

Before considering PNS, the patient should be thoroughly investigated to confirm the diagnosis and rule out reversible causes such as entrapment neuropathies. Patients who are considered for PNS are those in whom the pain is confined to sensory distribution of a single peripheral nerve, a diagnostic peripheral nerve block was positive, no nerve entrapment, and a patient who does not have any major psychological or psychiatric disease. Patients with underlying coagulopathies, surgical site infections, and unproven by peripheral nerve block should not be considered for PNS.[5]

Right now, the literature supporting long-term efficacy of using implanted PNS in chronic pain is limited. Presently, data are available in the form of case reports and case series which have attested its efficacy and safety. Till date, the implantable PNS has been used for managing postoperative pain (hallux osteotomy, knee arthroplasty), hemiplegic shoulder pain, traumatic shoulder pain, and chronic pain of peripheral nerve origin.

To conclude, PNS with stimulating electrode appears to be an effective and safe modality to treat meticulously selected acute and chronic pain which could not be managed with all approved medications and therapies. Patients should be thoroughly screened and evaluated prior to considering for a PNS with implantable electrode. In the era of opioid-free or opioid-sparing multimodal analgesia strategies, implanted PNS is a new weapon in the armamentarium which needs to be evaluated in well-designed, prospective studies.

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Conflicts of interest
There are no conflicts of interest.

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