

## **Trigeminal Neuralgia and Local/Peripheral Therapeutic Options: A Mini-Review**

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### **ABSTRACT**

Although many therapeutic options including medications and various surgical procedures are available, the management of TN still remains a significant challenge for many clinicians. This review is concerned with the local/peripheral therapeutic options that can be provided to TN patients in case of noncompliance with the medical treatment or contraindication to/failure of surgery.

**Keywords:** trigeminal neuralgia; orofacial pain; peripheral therapy

### **INTRODUCTION**

Although many therapeutic options are available, the management of TN still remains a significant challenge for many clinicians. Medical treatment is usually the first option used, providing effective pain control in many patients; however, in 30% of cases, drugs fail to relieve the pain and at the same time cause severe side effects. <sup>(1)</sup>

Different surgical options are also available, <sup>(2)</sup> but each technique has its own positive and negative aspects. The main goal in TN management is the alleviation of pain with its consequences which are negatively affecting the patient's quality of life. This should be associated with preservation of normal facial sensations.

This review is concerned with the local/peripheral therapeutic options that can be provided to TN patients in case of noncompliance with the medical treatment or contraindication to/failure of surgery.

#### **Local anesthetic blocks:**

Injections are usually performed to block the peripheral branches of the

trigeminal nerve that supply the painful site. Local anesthetic agents with or without steroid agents are used in the injection. Several studies have investigated the efficacy of such anesthetic blocks in alleviation of pain in TN.

Radwan et al (2001) <sup>(3)</sup> have reported the safety and usefulness of high concentration tetracaine injection for management of TN especially in older and medically compromised patients.

Some studies in the last century have also investigated the use of combined streptomycin/lidocaine injections in the treatment of long-lasting idiopathic trigeminal neuralgia to evaluate their effect in pain relief and their effect on the sensory function of the injected nerves. Streptomycin has been accidentally discovered to efficiently treat painful conditions when it was topically used for the treatment of tuberculous laryngitis with skin necrosis, so its use started in the management of facial pain. These studies concluded that combined S/L injections are initially effective in the treatment of TN. However, on the long term, their effects are similar to the effects of lidocaine alone. <sup>(4,5)</sup>

#### **Sphenopalatine ganglion block:**

Since the sphenopalatine ganglion (an extracranial ganglion) is considered to be involved in unilateral headaches and neuralgias, SPG block can be used for management of TN. This can be done through a transnasal or intraoral routes. In the intraoral technique, a 27-gauge dental needle is 60° tilted and inserted 1 cm anterior and 1 cm medial to the third molar area. Needle is then passed through the

greater palatine foramen and advanced in a superior-posterior direction for an average distance of 2 cm. Usually this is done under fluoroscopic guidance and when the needle reaches the SPG, a mixture of long lasting anesthetic as Bupivacaine and steroid (sometimes an opioid as Fentanyl can be added too) is injected. <sup>(6)</sup>

#### **Peripheral alcohol injection:**

Peripheral alcohol injection has been introduced in the beginning of the last century for management of pain in TN. It has been extensively used since then; however, many patients have reported alcohol-related complications. <sup>(7)</sup>

Nevertheless, a study in 2007 has retrospectively assessed the effectiveness of peripheral alcohol injections and showed that these injections still have a role in management of pain in refractory TN cases and those who are contraindicated/unwilling to undergo surgery. <sup>(8)</sup>

#### **Peripheral glycerol injection:**

Peripheral glycerol injections have been used for management of trigeminal neuralgic pain with good results. It is usually simple, and easy to perform in an outpatient clinic. Before the glycerol injection, the nerve is carefully anesthetized. Ten minutes after local anesthesia, pure glycerol, which has been sterilized for 1 hour at 150°C, is injected through a short 22-gauge needle. Injection volumes are 0.5, 1, and 1.5 mL for infraorbital, mental, and mandibular nerve injections, respectively. <sup>(9)</sup>

The mechanism of action of glycerol can be explained by one of two modes: the first is that it interferes with the stability of nerve membrane potential through osmotic effect and so prevents the spontaneous discharge through the nerve fibers. The second is alteration of the A $\delta$  and C fibers through degeneration or reduction of their excitability. <sup>(10,11)</sup>

#### **Botulinum toxin a injection:**

Botulinum toxin A is a neurotoxin derived from *Clostridium botulinum*, which functions by inhibition of acetyl choline release at the neuromuscular junction. <sup>(12)</sup> This neurotoxin was found to be effective in

pain management when used through various routes of injection; subcutaneous, intramuscular and intra-articular routes; however, the exact effective dose has not yet been determined. <sup>(13)</sup> It has been used effectively in patients with chronic migraine <sup>(14)</sup> and is now established as a licensed treatment for migraine approved by the FDA. A recent systematic review has shown that Botulinum toxin type A can also be considered as an alternative treatment option with promising results for refractory TN cases. <sup>(15)</sup>

#### **Peripheral cryotherapy:**

A cryoprobe is used for freezing the peripheral trigeminal branches at the infraorbital and mandibular foramina without exposure of the nerve or damaging the surrounding tissues. In a study by Pradel et al (2002), <sup>(16)</sup> this treatment has provided pain relief for a period of about 6 months but recurrence of pain was likely after that, necessitating repeating of the procedure. Zakrzeweska <sup>(17)</sup> has highlighted that repeated cryotherapy of the mental and long buccal nerves (but not of infra-orbital nerves) gave more prolonged pain relief than initial cryotherapy.

#### **Peripheral nerve field stimulation:**

This is a minimally invasive technique which has been used for neuro modulation of chronic pain refractory to conventional treatment. <sup>(18,19)</sup> Peripheral nerve field stimulation involves the subcutaneous implantation of one or several electrodes in the painful region followed by electrical stimulation. Electrodes provide weak electrical stimulation of the affected nerve leading to a tingling sensation. This procedure usually is done in two stages where a trial electrode is initially inserted until the patient can determine the level of the current providing effective pain relief. Then a second stage follows by placement of the permanent electrode with an internal battery pack to provide long term pain relief. <sup>(20)</sup>

Klein et al; <sup>(21)</sup> in their retrospective analysis, have described the marked improvement of pain in five patients with

TN (in whom surgery has previously failed to provide long term relief or was contraindicated for medical problems) through the use of peripheral nerve field stimulation.

#### **TENS (Transcutaneous electronic nerve stimulation):**

This is a non-invasive device providing electronic stimulation of nerves by delivering an electrical current through an intact skin surface. Singla et al (2011) <sup>(22)</sup> have shown the efficiency of this technique in management of TN patients who did not respond to medical treatment. Patients were subjected to continuous bursts of current for 20 minutes for a period of 20-40 days. Effective pain relief was obtained at 1 and 3 months after the procedure with no side effects.

#### **Acupuncture:**

This is a Chinese medical technique that has been in use for over 2000 years ago. It involves the insertion and manipulation of fine filiform needles into specific points of the body for control of pain and other therapeutic purposes. The main idea is to make use of endogenous neurotransmitters and neuropeptides, such as endorphins, to suppress pain and interrupt the vicious cycle of pain mechanisms with little aversive side effects. Acupuncture helps to increase the production and release of opioid peptides and also enhance the availability of the opioid receptors in certain regions of the CNS. <sup>(23,24)</sup> Acupuncture has been used effectively for relief of pain in various painful conditions as low back pain, diabetic neuropathic pain, knee osteoarthritis, fibromyalgia and migraine. <sup>(25-29)</sup> Electro acupuncture with deep needling to reach and stimulate the sphenopalatine ganglion has been shown to reduce the frequency of attacks and intensity of Trigeminal Neuralgia. <sup>(30)</sup>

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