

## Traumatic Neuropathic Pain

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### Article Information

Submitted : 22 December 2021

Accepted : 03 January 2022

Online Publish : 20 January 2022

### Abstract

*Peripheral neuromas caused by trauma or injury and surgical procedures can cause traumatic neuropathic pain, functional impairment and psychological distress, which can lead to decreased quality of life. Traumatic neuropathic pain can cause the patient to feel a burning, stabbing, stinging and nauseating sensation. Based on studies, the incidence of neuropathic pain due to peripheral nerve injury varies from 2.8 to 5% in the population. Estimates of the incidence of chronic postoperative neuropathic pain vary depending on the type of surgery and surgical technique. Various techniques for the prevention and treatment of traumatic neuromas have been recommended, including massage therapy, electrical stimulation, lipofilling, methods of transposition of nerve endings into muscle, bone or vein, and confining the injured nerve with synthetic or biological materials. The challenge in the treatment of traumatic neuromas today is that patients are resistant to analgesics, so standardized treatment is needed. Conclusion : The current challenge in the treatment of traumatic neuromas is that patients are resistant to analgesics, so standardized treatment is needed.*

**Keywords : Neuropathic Pain; Traumatic Neuropathic Pain; Surgery;**

## **Traumatic Neuropathic Pain**

### **Introduction**

Peripheral neuromas caused by trauma or injury and surgical procedures can cause traumatic neuropathic pain, functional impairment, and psychological distress, which can lead to decreased quality of life. A traumatic neuroma is a collection of nerve fibers and connective tissue that develops after a nerve injury. It usually appears as a firm, oval, white nodule that grows gradually, palpable and painful, measuring less than 2 cm. Traumatic neuropathic pain can cause patients to feel burning, stabbing, stinging, and nausea (Yao et al. 2017).

Various techniques for the prevention and treatment of traumatic neuromas have been recommended, including massage therapy, electrical stimulation, lipofilling, methods of transposition of nerve endings into muscle, bone, or vein, and confining the injured nerve with synthetic or biological materials. Various treatments have been carried out, but the clinical prognosis is still not good and the current treatment failure rate is still high. The challenge in the treatment of traumatic neuromas today is that patients are resistant to analgesics, so standardized treatment is needed (Yao et al. 2017).

The purpose of this paper is to summarize the latest knowledge regarding traumatic neuropathic pain and find out therapeutic strategies for this difficult clinical challenge so that it is hoped that it can provide useful guidelines in choosing the right modality in the treatment of various types of traumatic neuropathic pain.

### **Method**

The method used in writing this literature review is literature review, using literature searching. Library search using website-based search tools, namely Google, Google Scholar and PubMed using the keywords Neuropathic pain and traumatic neuropathic pain. Publications in English and Indonesia free full text. The total number of journals selected in this literature review is 6 journals.

### **Results and Discussion**

#### **a. Definition**

Peripheral neuromas caused by injury and surgical procedures can cause traumatic neuropathic pain, functional impairment and psychological distress, which can lead to decreased quality of life. A traumatic neuroma is a collection of nerve fibers and connective tissue that develops after a nerve injury. It usually appears as a firm, oval, white, slowly growing nodule that is palpable and painful, less than 2 cm. Traumatic neuropathic pain can cause patients to feel a burning, stabbing, stinging sensation and a sensation of nausea (Yao et al. 2017).

#### **b. Etiology**

Neuropathic pain is caused by spinal cord injury, syringomyelia and demyelinating diseases, such as multiple sclerosis, transverse myelitis and neuromyelitis optica as well as post-surgical procedural errors (Colloca et al. 2017).

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### **c. Epidemiology**

Based on studies, the incidence of neuropathic pain due to peripheral nerve injury varies from 2.8 to 5% in the population. Estimates of the incidence of chronic postoperative neuropathic pain vary depending on the type of surgery and surgical technique. The incidence after limb amputation is 50-85%; after thoracotomy 30-50%; after mastectomy 20-50%; after inguinal hernia repair 11.5-47%; after hysterectomy 32%; after hip arthroplasty 28%; after cholecystectomy 3-56%; after colectomy 28%; after vasectomy 15%; after caesarean section 6-18% and after vaginal delivery 4-10% (Fonseca, Gatto, and Tondato 2016).

A recent review showed that chronic postoperative neuropathic pain is experienced by 10-50% of people after classical surgery, and can worsen in about 5 to 10% of these patients. The incidence of neuropathic pain is between 6% and 68%, depending on the type of surgery. Another systematic database review evaluating 281 studies examining persistent postoperative pain after 11 types of surgery, has concluded that the prevalence of neuropathic pain may or may be high in patients with persistent pain after thoracotomy (66%), mastectomy (68%), hernia repair inguinal (31%), hip and knee arthroplasty (6%) (Fonseca, Gatto, and Tondato 2016).

### **d. Pathophysiology**

Several pathophysiological mechanisms have been suggested to explain this neuropathic pain state, but the key factor is the onset of spontaneous or ectopic activity in the injured sensory neurons. Most of these conditions develop within 20 hours of peripheral nerve injury, usually being detected in type A myelin fibers. Ectopic discharge may originate in the area of the axonal segment of the injured nerve, but most appear to originate from sensory neurons found in the dorsal nerve ganglion. Among the many factors involved, ion channels are prime targets for their role in the control of neural excitability, such as sodium channels, which appear to have an important role in ectopic activity and the trauma-regulated subtype of potassium channels (Fonseca, Gatto, and Tondato 2016).

Postoperative neuropathic pain occurs after injury to the nerves or spinal cord and the sensory transmission system of the brain, its main characteristic being a combination of sensory loss and hypersensitivity. Nerve injury is the initial cause of abnormal changes in nerve function, and loss of sensory abilities that can lead to responses such as spontaneous pain, dysesthesia, hypersensitivity, and allodynia (Fonseca, Gatto, and Tondato 2016).

### **e. Clinical Manifestations**

Symptoms of neuropathic pain may vary from person to person, but common symptoms that can occur (Holland, 2020):

- a. A stabbing pain sensation to burning.
- b. Tingling and numbness.
- c. Pain that occurs spontaneously, or pain that occurs without a trigger.

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- d. Pain, which is caused by activities that are usually painless, such as being in cold temperatures, or combing hair.
- e. Uncomfortable feeling.
- f. Trouble sleeping or resting.
- g. Emotional problems due to chronic pain, lack of sleep.

**f. Management**

**1. Classical Surgical Procedure**

Classic surgical treatments for traumatic neuropathic pain include neuroma resection, neurorrhaphy, and implantation of nerve endings into muscle, bone, and veins. The goal of this treatment is to relieve external pressure so as to prevent the concomitant proliferation of nerves and fibrous connective tissue and maintain a dynamic balance around the injured nerve. The combination of neuroma resection with implantation of the palmar cutaneous branch (PCB) into the pronator quadratus muscle, allows the nerve to be protected from wrist movement and skin damage. Classical surgery is widely used in clinical practice and can indeed provide certain treatment benefits. All of these treatment modalities have their own limitations in practice, for example, the method of transposition of nerves into a vein needs to pay attention to the appropriate position of the vein. Techniques such as interdigital neurorrhaphy involve connected technically sometimes nerves that cannot be (Yao et al. 2017).

**2. New Surgical Procedures**

In recent years, several new surgical methods have been investigated for the treatment of traumatic neuroma pain. A study conducted by Marcol showed that Microcrystalline Chitosan was effective in preventing traumatic neuropathic pain when tested on rats. A study conducted by Peterson also showed good results in the treatment of traumatic neuropathic pain in the wrist using the treatment Delmar Acellular Matrix. The goal of this treatment is to cover or protect the injured nerve endings from physical and chemical stimuli, thereby eliminating external stimuli and keeping the injured nerve endings in a relatively stable environment. Likewise, the study conducted by Gennady, in that study recommended invasive neurectomy treatment to treat pain in medial neuromas, this treatment caused little damage to the surrounding tissue and provided a good prognosis (Yao et al. 2017).

**3. Treatment**

Known as conservative treatment which is the initial choice for patients with traumatic nerve pain. Carbamazepine, which is part of the sodium channel blockers, is effective in anesthetic action in the area of the ilioinguinal nerve. In addition, pregabalin, also clinically in the treatment of neuromas with good results. Glucocorticoids have been used for many years. A researcher used injections of methylprednisolone for the treatment of Morton's neuroma, which is thought to be a kind of traumatic neuroma. However, local steroid injections can cause tissue atrophy and the long-term results of this treatment need

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to be investigated further. Meanwhile, local anesthetics are also a common choice for traumatic nerve pain with the results of the examination found that 5% lidocaine cocaine has good benefits on pain from traumatic nerve injuries (Yao et al. 2017).

### **Conclusion**

Traumatic neuropathic pain is a burning, nauseating, or stabbing sensation caused by spinal cord injury, syringomyelia, and demyelinating diseases, such as multiple sclerosis, transverse myelitis, and neuromyelitis optica and post-surgical procedures errors. Based on studies, the incidence of neuropathic pain due to peripheral nerve injury varies from 2.8 to 5% in the population. The pathophysiological mechanism is the onset of spontaneous or ectopic activity in injured sensory neurons. For the management of traumatic neuropathic pain, surgical and medical therapy can be used.

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Mahfuzzahroni (2022)

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