

Painful Traumatic Trigeminal Neuropathy



Rafael Benoliel, BDS (Hons)^{a,*}, Sorin Teich, DMD, MBA^b, Eli Eliav, DMD, PhD^c

KEYWORDS

• Neuropathic pain • Trauma • Implants • Root canal therapy • Extractions

KEY POINTS

- Painful traumatic trigeminal neuropathy (PTTN) may result from a wide variety of nerve injuries, ranging from mild to severe.
- These include external trauma (altercations, road traffic accidents) and iatrogenic injuries, such as root canal therapies, extractions, dental implants, orthognathic surgery, and other invasive procedures.
- Early diagnosis and treatment are essential, because once chronic pain is established the condition is hard to treat.

INTRODUCTION

Neuropathic pain (NP) has been recently redefined as “pain arising as a direct consequence of any lesion or disease affecting the somatosensory system.”¹ NP may result from active or past systemic or local diseases.² Neuropathic orofacial (or craniofacial) pain³ is an umbrella term that includes a group of entities that are included in the article (see [Edens MH, Khaled Y, Napeñas JJ: Intraoral Pain Disorders](#), in this issue) the most recent classification of the International Headache Society.⁴ This excellent resource details inclusion criteria for all painful head and neck neuropathies, and is essential for all clinicians treating painful neuropathies and indeed any craniofacial pain (freely available at <http://www.ihs-headache.org>). There are, however, some very important nonpainful neuropathies, beyond the scope of this article, but interested readers should consult.⁵

This article presents the clinical features and pathophysiology of painful traumatic trigeminal neuropathy (PTTN). Use of the International

Headache Society’s classification⁴ for details on inclusion criteria for all head and neck neuropathies is essential (freely available at <http://www.ihs-headache.org>). Description of nonpainful neuropathies is also available.⁵

PAINFUL TRAUMATIC TRIGEMINAL NEUROPATHY

PTTN may occur following major craniofacial or oral trauma^{6,7} but may also be induced by relatively minor dental interventions.⁸ This entity has been termed phantom tooth pain, atypical odontalgia or atypical facial pain, anesthesia dolorosa, and orofacial complex regional pain syndrome.

Neural damage can induce pain originating in a peripheral nerve (peripheral neuropathy), in a ganglion (ganglionopathy), in a dorsal root (radiculopathy), or from the central nervous system (central NP). The focus here is on pain resulting from injury to the peripheral branch of the trigeminal neuron. Pain arising as a consequence of damage to the cell soma at the level of the trigeminal ganglion or the dorsal root is usually a result of

^a Department of Diagnostic Sciences, Center for Orofacial Pain and Temporomandibular Disorders, Rutgers School of Dental Medicine, Rutgers, The State University of New Jersey, Room D741, 110 Bergen Street, Newark, NJ 07101, USA; ^b Department of Comprehensive Care, CWRU School of Dental Medicine, 2124 Cornell Road, Cleveland, OH 44106, USA; ^c Eastman Institute for Oral Health, University of Rochester Medical Center, 625 Elmwood Avenue, Box 683, Rochester, NY 14620, USA

* Corresponding author.

E-mail address: rafael.benoliel@rutgers.edu

neurosurgery. Although injury at the level of the peripheral branch of the neuron may leave the cell soma and its central branch (nerve root) intact, damage at the level of the trigeminal ganglion may potentially kill the afferent completely thus deafferenting the area. Injury to the dorsal root is also different, potentially cutting all peripheral input to the central nervous system. Clearly each of these injuries needs to be examined individually, but is beyond the scope of this article.

HOW COMMON IS PAINFUL TRAUMATIC TRIGEMINAL NEUROPATHY?

It is important to stress that traumatic injuries to the trigeminal nerve largely result in either no residual deficit or in a nonpainful neuropathy. A minority, as discussed later, develop a painful neuropathy. Following identical injuries, the onset of PTTN and its characteristics vary from patient to patient. Such variability is probably caused by a combination of environmental, psychosocial, and genetic factors. A further consideration is that, relative to spinal nerves, the trigeminal nerve may show subtle differences in the pathophysiologic events that may lead to pain.^{9,10}

MACROTRAUMA

In patients with zygomatic complex fractures residual, mild hypoesthesia of the infraorbital nerve is common but chronic NP developed in only 1 out of 30 patients (3.3%) followed up for 6 months.⁶ This compares with about 5% to 17% in other body regions.^{11,12}

IMPLANTS

Dental implants pose the risk of neuropathy secondary to direct or indirect neuronal trauma. A common neuronal complication following implant insertion is damage to adjacent nerves, altered sensory perception, and possibly pain.¹³⁻¹⁵

The incidence of nonpainful neurosensory disturbance ranges from 0.6% to 36%.¹⁶⁻²¹ This large range suggests that both transient and permanent changes were included. The incidence of postimplant PTTN is unclear, but some studies suggest around 8%.

Postimplant PTTN is divided into four interrelated groups. (1) Clear and documented injury to a nerve, usually the inferior alveolar nerve, during the osteotomy or implant placement. These patients usually complain of immediate postoperative and significant sensory dysfunction in the target organ of innervation (eg, the lower lip). (2) Persistent pain associated with implants not in the vicinity of a large nerve trunk, as in most

implants placed in the maxilla. In these cases there is often no clinical complaint of sensory dysfunction. Theoretically these cases may be caused by direct injury to small nerve branches and, as in all traumatic neuropathies, inflammation is involved. (3) In patients with no history of intraoperative injury and no evidence of the implant itself causing damage, but where there is proximity between the implant and a large nerve trunk. (4) Patients with apparent, implant-related complications and characterized by a good postoperative course. However, on implant-loading the patients complain of ongoing pain and "sensitivity" to mechanical (chewing, brushing) and often thermal stimuli. Radiographs usually show good osseointegration. In some of these patients, pain appears on implant loading and disappears when unloaded, or a temporary restoration is in place. In others, loading seems to trigger pain that then continues regardless of loading or type of restoration.

MANDIBULAR THIRD MOLARS

Mandibular third molar extractions are often associated with transient hypoesthesia.²² Disturbed sensation may persist in the lingual or inferior alveolar nerve for varying episodes and has been found in 0.3% to 1% of cases.²³ Inferior alveolar nerve injuries are more common than lingual nerve damage²⁴⁻²⁶ but the latter may commonly occur in certain extraction techniques, involving nerve retraction (up to 4%).¹⁰ Large case series have failed to identify any NP cases.^{27,28} However, complaints of tongue dysesthesia after injury may remain in a small group of patients (0.5%).

ROOT CANAL THERAPY

Nonpainful sensory changes related to endodontics are probably common and underreported. Nerve injury may be a result of apical infection or inflammation,^{29,30} accidental injection of hypochlorite,³¹⁻³³ and extrusion of filling materials^{34,35} that may cause chemical injury in addition to the physical insult.

Persistent pain after successful endodontics was found to occur in 3% to 13% of cases.^{8,36,37} In surgical endodontics chronic NP may reach 5% of cases.³⁸

Factors significantly associated with persistent pain were long duration of preoperative pain, marked symptomatology from the tooth, previous chronic pain problems or a history of painful treatment in the orofacial region, and female gender.^{39,40} Recently we have found that these patients have a reduced endogenous ability to

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