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Case Report

Management of Iatrogenic Peripheral Painful Traumatic Trigeminal Neuropathy Using Topical Medication-A Case Report

Abrar Majed Sabeh[1]* and Iffat Mirza Ahmed[2]

[1]*Rutgers School of Dental Medicine, University in Newark, New Jersey, USA*

[2]*Alfarabi College of Dentistry, Jeddah, Saudi Arabia*

***Corresponding Author:** Abrar Majed Sabeh, Rutgers School of Dental Medicine, University in Newark, New Jersey, USA.

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Abstract

Introduction: Peripheral painful traumatic trigeminal neuropathy (PPTTN) is a disabling condition that follows peripheral nerve trauma (i.e., extraction, bone graft, implant placement, etc). Implant neuropathy occurs due to nerve violations to any of the branches of the fifth cranial nerve during dental implant placement. This article presents an unusual extraoral clinical presentation of this relatively rare condition (i.e. dermatomal distribution of a traumatized long buccal nerve) and a unique method for achieving treatment through topical medication.

Case Presentation: A 40-year-old male presented with "occasional burning pain on his left cheek" after a traumatic surgical extraction, followed by bone graft and implant placement four months before his visit to an orofacial pain clinic.

Conclusion: Early treatment is critical following nerve injury. In the present case, topical medication alone proved successful as a treatment choice for implant neuropathy.

Keywords: *Nerve Dysfunction; Neuropathy; Peripheral Nerve Disease; Traumatic Neuropathy; Trigeminal Nerve Disease; Trigeminal Neuropathy*

Introduction

Neuropathic pain results from lesions or diseases of the somatosensory system that centrally affect the central neurons and peripherally affect large myelinated A-beta fibers (Aβ), thin myelinated A-delta fibers (Aδ), and unmyelinated fibers (C) [1,2]. During routine practice, oral and maxillofacial surgeons and dentists frequently encounter neuropathic pain disorders and other complex chronic pain disorders in the orofacial region, which are often sources of confusion for dentists due to the complex and atypical clinical pictures of these diseases [3]. Some patients who present with dental pain without any identifiable dental etiology are classified under the category of "atypical facial pain". Peripheral painful traumatic trigeminal neuropathy (PPTTN) is one such complex chronic pain disorder in the orofacial region that is poorly understood. While PPTTN has previously been referred to as atypical facial pain or atypical odontalgia, these terms are no longer used. Benoliel., *et al.* introduced the term PPTTN when they reviewed the clinical, pathophysiological, and therapeutic aspects of the disease in 2011 [5]. They also reported that pain is unilateral and may be precisely located to the dermatome of the affected nerve with demonstrable sensory dysfunction, particularly if a major nerve branch has been injured. Hyperalgesia and other sensory changes may be found in PTTN patients in sites other than the trigeminal nerve. This suggests that more extensive changes are taking place within central somatosensory processing [4].

Implant neuropathy is a nerve neuropathy related to iatrogenic implants that results from faulty bone drilling or implant compression techniques during implant placement. While implant neuropathy reports of inferior alveolar and lingual branches of the mandibular division of the trigeminal nerve are relatively frequent, reports of such neuropathies in the long buccal branch of the trigeminal nerve, which was the case for our patient, are relatively rare. Early treatment after nerve injury (e.g. acute neuropathy after implant placement) is critical and typically involves the removal of the offending implant and the prescription of steroids (oral prednisone, 10 milligrams, three times per day for seven days). Anti-inflammatory analgesics can be prescribed if additional pain control is needed. Although intervention for the current case was delayed since the patient presented to the orofacial pain clinic four months after their nerve injury, we were successful in eliminating the pain completely. Management of these types of cases is complex. In addition, due to the presence of systemic adverse effects, topical applications are preferred as the first line of treatment over systemic medications. In the present case, a topical application proved to be the best treatment choice for implant neuropathy since it was successful in completely eliminating the patient's pain.

Case Presentation

A 40-year-old Caucasian male teacher presented to the orofacial pain clinic with the chief complaint of "occasional burning pain on his left cheek over the past few months". Onset started four months prior to the orofacial pain clinic visit following a traumatic surgical extraction, bone graft, and implants replacing missing teeth #36 and #37. The pain extended extra-orally from the facial midline to the left angle of the mandible, along the dermatomal distribution of the long buccal nerve opposite the traumatized area (of missing teeth #36 and #37), and with an intensity of 3 to 4 in severity on a visual analog scale (VAS) of 10. Episodes of burning pain usually lasted three to four hours with constant background dysesthesia and numbness. Pain was intermittent, presented once or twice a day, and was triggered by cold air, stress, and anger. The patient previously sought neurological consultation from a neurologist. The neurologist performed magnetic resonance imaging (MRI) of the brain, ruling out pathologies of the trigeminal nerve root (neurovascular compression) and intracranial lesions of any kind. The patient was prescribed Neurobion (Vitamin B complex) two tabs/day, which improved symptoms but did not completely alleviate the pain. Review of the systems revealed that the patient was healthy and showed no significant signs of any pathology. Upon examination, the patient had a blood pressure of 125/80 mm Hg and a pulse rate of 73/min. He also had no known drug allergies.

Panoramic radiographic OPG showed that teeth #17, #16, #14, #24, #35, #44, #45, #46, and #47 had been treated with root canals. Zirconia crowns had been placed on teeth #17, #35, #44, #45, #46, and #47. A three-unit bridge FPD (#14 - #16) was used to replace tooth #15, and a four-unit bridge FPD (#24 - #27) was used to replace teeth #25 and #26. Implants were used to replace missing teeth #36 and #37. The patient reported a history of bad oral hygiene. A cranial nerve examination with a Q-tip revealed hyperesthesia in the left mandibular branch of the trigeminal nerve V3 (testing Aδ fibers). A diagnosis of PPTTN was reached since the medical history (i.e., onset, location, duration, etc.) was consistent with PPTTN. The diagnosis was further confirmed by a clinical examination of the trigeminal nerve and diagnostic tests. The present case of PPTTN appeared to be due to localized trauma to the trigeminal nerve (the long buccal branch) with an autonomic component (sympathetically maintained pain) during a dental procedure (extraction and/or graft placement, followed by implant) in the area of teeth #36 and #37.

The first drugs of choice for treating patients with PPTTN are typically centrally-acting medications, such as tricyclic anti-depressants (TCAs) (e.g. amitriptyline 10 mg), since they can produce analgesia and significantly relieve symptoms [6]. For neuropathic pain condi-

tions with sympathetic involvement, blocking α adrenergic receptors can provide significant relief to pain. In the present case, because the patient was concerned about the side effects of TCAs (weight gain) and refused systemic medication, only topical medication was prescribed. Topical applications of compound drugs, such as analgesics, anti-anxiety agents, N-Methyl-D-aspartate NMDA receptor antagonists, Nonsteroidal anti-inflammatory drugs NSAIDs, and α2 agonists, were prescribed to treat chronic pain conditions in the orofacial region. Twice-daily applications of these compounded topical agents proved effective in alleviating the symptoms after a month (pain went down to 1 of 10 on a VAS). On follow-up at three and six months after the initial visit, pain was successfully eliminated at 0 of 10 on a VAS. No further treatment was required.

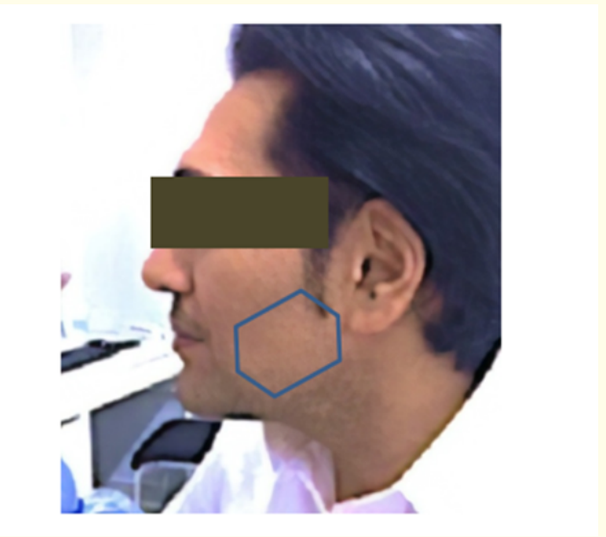

Figure 1: *Lateral view of the patient presenting a dermatomal distribution (skin supplied by the long buccal nerve) opposite the traumatized area (of missing teeth #36 and #37).*

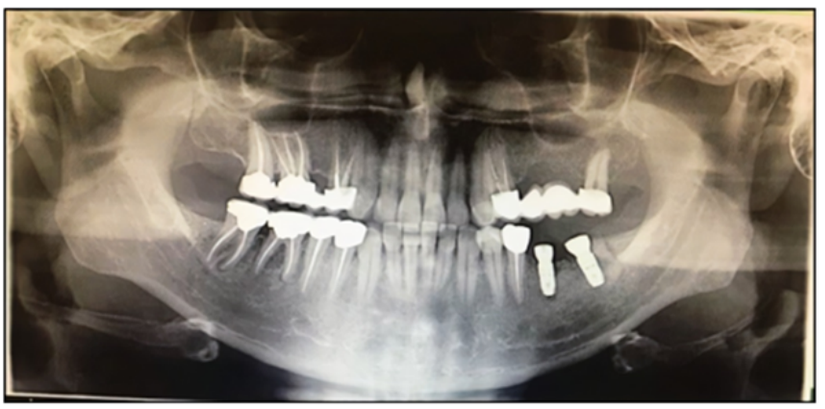

Figure 1: *Panoramic radiographic OPG showing root canal treated teeth #17, #16, #14, #24, #35, #44, #45, #46, and #47. Zirconia crowns placed on teeth #17, #35, #44, #45, #46, and #47. A three-unit bridge FPD (# 14–# 16) replacing tooth #15 and a four-unit bridge FPD (# 24–# 27) replacing teeth #25 and #26. Implants replacing missing teeth #36 and #37.*

Discussion

Persistent and chronic orofacial pain is common in the head and neck region, and dentists are likely to encounter these rather complex cases in their practices. According to the International Association for the Study of Pain, atypical odontalgia is a "severe throbbing pain in the tooth without major pathology" and "persistent (chronic) continuous pain symptom located in the dento-alveolar region which cannot be explained within the context of other diseases or disorders" [6]. According to the International Headache Classification, it is believed to be a subtype of persistent idiopathic facial pain, and it is defined as a persistent facial and/or oral pain with variable presentations that recurs daily for more than two hours per day for more than three months in the absence of clinical neurological deficits [7]. Studies have recently reported that the peripheral and central sensitization of the trigeminal pathways is involved in the condition [8]. They have also highlighted the relationship between chronic pain and central sensitization [9,10]. In regards to treatment, antidepressants, such as amitriptyline, have been reported to be effective [11-13]. Although antidepressants activate serotonin and noradrenaline in the nervous system and affect the descending pain inhibitory system of the neurotransmission pathway, not all patients respond adequately to antidepressants. Topical agents, such as capsaicin, have shown varying degrees of success when used in the management of neuropathic pain conditions. It decreases pain by inhibiting the biosynthesis and axonal transport of substance P at the C-fiber primary afferents. This leads to capsaicin depletion in the central and peripheral nervous system, thereby reducing peripheral noxious input to previously sensitized central second-order neurons [14,15].

In managing our patient's PPTTN, a combination of topical medication and Orabase was formulated into an ointment. A compound formula of 2% Xylocaine (lidocaine), 2.5% of the NSAID Orudis (ketoprofen), 2% of the NMDA receptor antagonist Ketalar (ketamine), 6% of the gamma-aminobutyric acid GABA analog Neurontin (gabapentin), 3% of the sodium channel blocker Tegretol (carbamazepine), 0.1 - 0.2% of the alpha 2 adrenergic agonist Catapres (clonidine), and 0.025 - 0.250% Capsagel (capsaicin) were prescribed for daily application [16]. Most patients initially complain of a burning sensation that subsides within one - two days. Combining these topical medications with a local anesthetic can reduce this initial discomfort. To achieve maximum benefit, it is important to apply this medication consistently. The current patient's pain was successfully eliminated using these combined topical medications.

Conclusion

Our patient's presentation of PPTTN was unusual due to its extraoral location at the long buccal branch of the trigeminal nerve. This location is rare, as cases of lingual nerve implant neuropathy usually affect the inferior alveolar nerve. Topical application of a compound medication was successful in completely eliminating pain that had arisen from the implant neuropathy.

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