



Peripheral trigeminal neuralgia associated with multiple dental procedures: Case report

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Abstract

The peripheral trigeminal neuralgia mainly serves as a pain originated from the central nervous system, and the mechanism of the central pain that related to dental implant surgery is still unclear. However, persistent, and uncontrollable neuropathic pain following dental implant placement is uncommon. This case illustrates Neuropathic Orofacial Pain (NOP) arising after the endodontic treatment of a maxillary canine in a 38-year-old woman. The pain subsided a few months following the extraction of the related tooth. Restoration of the missing tooth by surgical placement of dental implant was selected, resulting in an uneventful recovery. Nonetheless, severe and continuous pain, unresponsive to non-steroidal anti-inflammatory medications, developed during the impression of the implant that was four months after the dental implant surgery. The pain persisted afterward, the clinical and radiologic imaging examination excluded any odontogenic source of pain and that concludes the diagnoses of NOP. The non-surgical approach represented by the pharmacological treatment was unsuccessful in resolving the pain. Exploratory apical implant surgery was performed but failed to relieve the pain, however, the pain completely subsided after the removal of the implant.

Case presentation

A 38-year-old woman obtained treatment at a private dental practice to replace missing left maxillary canine, which had been extracted two years earlier. Her medical history indicated overall good health. Though, her past dental history showed that there was an unsuccessful root canal therapy for the previously extracted tooth. The patient reported severe dental pain following endodontic therapy, ending with the tooth's extraction. Post-extraction, the pain persisted for several months, characterized by its intensity, particularly in a trigger zone just beneath the ala of the nose. To get rid of this pain, the patient consulted a neurology specialist, who suspected that the pain could be Neuropathic Orofacial Pain (NOP) secondary to the surgical extraction. The specialist prescribed pregabalin (Lyrica) to manage the pain.

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Two years after the extraction, at the time of implant placement, the area showed no signs of tissue pain or inflammation. A periapical radiograph and clinical examination revealed limited space (4.5 mm) between teeth 22 and 24. Consequently, a slight enameloplasty of these teeth was performed to create the necessary space for a dental implant. A tooth-supported surgical drilling guide was utilized, and a 4 mm diameter, 11.5 length tissue-level implant (Bionnovation-Brazil) was successfully placed (Figure 1). The patient experienced mild postoperative pain lasting five days, managed with Paracetamol 500 mg four times daily. Nevertheless, four months after the healing process, the patient started to experience pain, specifically when connecting the implant's impression coping. This pain evolved into continuous moderate-intensity episodes, occasionally intensifying during the day, and affecting the patient's



sleep. The replacement of the abutment with the implant-supported crown did not alleviate the pain (Figure 1D). The patient described the pain as deep, extreme, and radiating from the left maxillary canine position to the orbit and frontal area, around the eye, and occasionally to the lower jaw.

The clinical examination revealed a trigger area in the deep vestibule at the base of the nose, provoking severe pain radiating to the left eye. The implant shown no pain, no mobility and no radiographic radiolucency thus is considered successful according Albrektsson criteria for implant success [1]. The pain did not respond to anti-inflammatory pain killer (Ibuprofen 600 mg three times daily). Despite no signs of infection around the implant, the pain persisted for two months. After excluding all other pathological conditions that might cause pain the area, the most likely diagnosis suggested injury to the peripheral sensory nerve supplying the upper canine area, contributing to the neuropathic pain which controlled partially by Pregabalin. The patient experienced sever daytime drowsiness and lack of focus during the daytime which affect the patient performance at work. A surgical attempt to amputate the apex of the implant with the peripheral nerve endings in the trigger zone. A semilunar incision was made at the apex of the implant in the area of tooth number 23 and the full thickness of the flap was raised; the apex of the implant was cropped with a carbide bur under copious water irrigation to clean the soft tissue and the bony cavity from metal debris and to avoid heat generation that might cause collateral tissue damage (Figure 2). The wound was washed with saline solution, the cavity covered with a resorbable collagen membrane, and the flap was repositioned with simple interrupted sutures 5.0 (monofilament polyamide 5-0 Resorba). The pain remains the same then the decision made to remove the implant. The pain relieved within a week after implant removal with no other action taken.

Discussion/conclusion

Neuropathic orofacial pain is recognized as a challenging diagnostic perplexity in orofacial pain conditions that is usually faced by healthcare practitioners. To differentiate between numerous kinds of head neck pain deep understanding of different pathological behavior in the musculoskeletal and nervous systems with systematic approach is usually recommended. The prominent characteristic of NOP is the unresponsiveness to anti-inflammatory painkillers and the presence of non-stopping widespread of pain with trigger zone. Implant-related nerve damage can be manifested as numbness, allodynia, paresthesia, or dysesthesia either to be temporary or permanent in nature, depending on the extent and the severity of the injury. Renton and Van Der (2023) reported a prevalence of 0.8%, with 8 out of 1012 patients developing persistence post-traumatic neuropathy following implant placement [2].

Managing the NOP poses a considerable challenges and multidisciplinary approach involving physical therapy, psychological interventions such as muscle relaxation, biofeedback, and pharmacological treatments usually required. Pharmacological treatment using non-steroidal anti-inflammatory drugs shows a very poor response rate, however, the using of antidepressants and gabapentinoids show meaningful improvements in a long-term follow-up study [3]. Amitriptyline followed by pregabalin and gabapentin are the principal drugs for NOP treatment, however, these drugs have side effects that negatively impact the patient's cognitive effects including difficulty focusing, memory loss, dizziness and somnolence, as well as weight gain as the main side effect. The second line of medications that

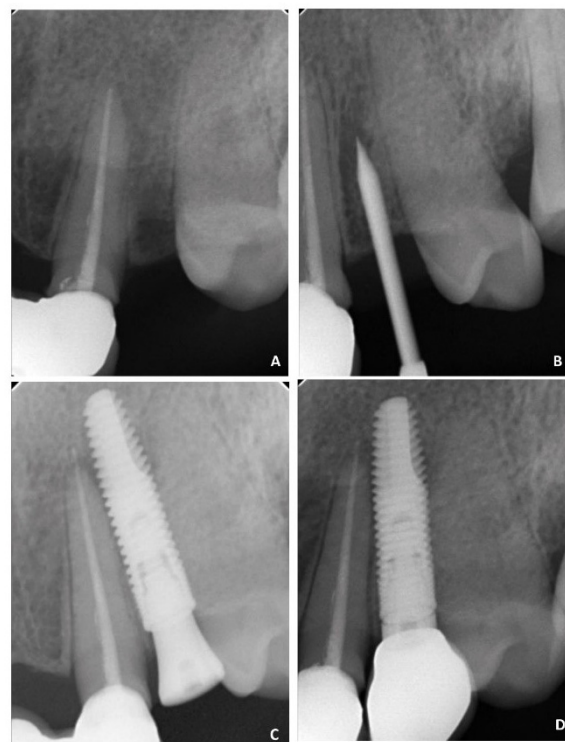


Figure 1: Preoperative implant site showing limited inter-radiolar space (A). Pilot drill to locate the proper position of the implant (B). Implant placement with healing abutment take immediately after implant surgery (C). Implant restoration at month 4, after implant surgery (D).

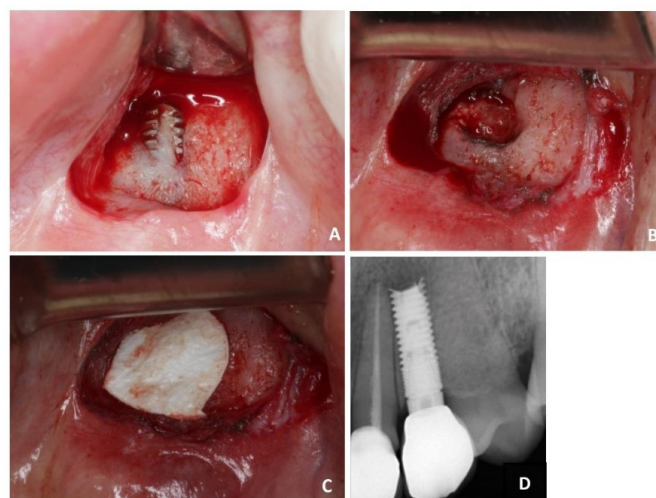


Figure 2: Implant apical surgery around the trigger zone. Semilunar incision to approach the surgical area of interest (Trigger zone) (A). Implant apex cut leaving small bone defect, through cleaning to eliminate residual metal debris (B). Covering the bone hole with resorbable collagen membrane (C). Postoperative radiograph after implant apex removal and closure (D).

can be used in the management of neuropathic pain, including GABA receptor agonists, phenothiazines, beta-blockers, and anticonvulsants [4].

In a study by Politis et al. [5], reported 26 patients with neuropathic pain 17 of them show evidence of direct nerve damage with post traumatic neuralgia, the other 9 out of 26 exhibit no sign of neural damage 2 of them the pain started at the time of loading [5]. Surgery can be used as first line of management in case of obvious clinical or radiographic evidence of nerve injury. Surgical management alone brought relief to two patients,

surgical and pharmacologic management for twelve patients, and pharmacologic management alone for ten patients. The algorithm for pain management in NOP with no obvious nerve trauma typically begins with pharmacologic intervention, monitoring the pain response, and adjusting based on patient acceptance. Surgical removal of the implant or implant apex removal in the area of trigger zone may be considered as the second line of management with or without supplementary pharmacological support. Nevertheless, the management of persistent pain following placement of dental implants should be modified based on the pain type, the causative disease, and psychological aspects [6].

In the presented case report, the area of interest was the upper canine where there is no major neural innervation except terminal branches of anterior superior alveolar nerve. According to the authors' judgment, the case falls within the NOP of unknown origin. The logical stepwise management included pharmacological treatment as a first line of treatment in which the patient responded partially but suffered from enormous side effects, removal of the trigger zone at the implant apex, and ultimately implant removal when complete pain resolution was not achieved. Although the implant was close to the periodontal ligament space of adjacent teeth, the presumed source of pain might be related to pressure on adjacent structures, but neither the implant nor adjacent teeth were tender to percussion, and the trigger zone was superior to the implant apex. Post-implant nerve injury may heighten perceived patient injustice, particularly in elderly patients, potentially prolonging chronic pain, emphasizing the importance of thorough preoperative consultation. Neuropathic orofacial pain due to dental procedures might lead to severe intolerable pain that does not respond to non-steroidal anti-inflammatory agents. The mechanism of action of this pain is poorly understood, however, the algorithm of treatment clearly illustrated and followed in the current case study which ultimately resolved the pain.

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