Journal of Oral and Maxillofacial Surgery, Medicine, and Pathology 28 (2016) 397–400

Contents lists available at ScienceDirect

Journal of Oral and Maxillofacial Surgery, Medicine, and Pathology

journal homepage: www.elsevier.com/locate/jomsmp

Technical Note

Relieving neuropathic pain of the mental nerve by vertical bone augmentation between the mental foramina: A novel technique in place of conventional inferior alveolar nerve transposition

Masaaki Watanabe, Takahiro Kanno, Joji Sekine*

Department of Oral and Maxillofacial Surgery, Shimane University Faculty of Medicine, Izumo, Shimane, Japan

ARTICLE INFO

Article history:
Received 3 December 2015
Received in revised form 11 May 2016
Accepted 13 June 2016
Available online 15 July 2016

Keywords:
Neuropathic pain
Atrophic edentulous mandible
Bone augmentation
Coronoid process
Bioresorbable plate

ABSTRACT

Objective: Neuropathic pain of the mental nerve is associated with extensive bone resorption in the atrophic edentulous mandible. One of the treatment options is inferior alveolar nerve transposition, which repositions the nerve canal deeper in the alveolar bone, but it carries a high risk of nerve damage, especially in cases of severe alveolar resorption. Here, we report a novel technique for relief of neuropathic pain of the mental nerve in an elderly edentulous patient with severe alveolar resorption who became unable to wear a complete denture.

Methods: This procedure was performed under general anesthesia. Bone was harvested from both coronoid processes, and bone augmentation was performed between the mental foramina via the extraoral approach to preserve the surrounding periosteum on the lowered mandibular bodies and around the mental nerves. The grafted bone was trimmed and fixed with bioresorbable plates and screws after decortications of the residual cortical bone.

Results: The procedure provided sufficient height between the foramina and the alveolar crests. Complete relief of neuropathic pain was achieved postoperatively and following adjustment of the patient's complete denture during oral rehabilitation.

Conclusions: This novel method enabled repositioning of the alveolar nerve canal and may be a feasible alternative to IAN transposition in patients with severe alveolar resorption.

1. Introduction

Neuropathic pain of the mental nerve that is associated with extensive alveolar resorption caused by wearing a complete denture has been well described in clinical practice [1,2]. Options for pain relief include denture adjustment, drug therapy, mental nerve block, and inferior alveolar nerve (IAN) transposition [3–5].

Drug therapy remains an important modality for the treatment of neuropathic pain in general [3]. Carbamazepine, a commonly prescribed anticonvulsant medication that affects various levels of the nervous system, is used to treat trigeminal neuralgia and manic depressive disorders. Adverse effects are not common, but most frequently include dizziness, drowsiness, nausea, and skin rashes in elderly patients [4]. Gabapentin is an acetylcholinesterase inhibitor that is used to treat severe neuropathic pain [5]. Incisive/mental nerve block was reported by Batista da Silva et al. to provide effective anesthesia for the first and second premolars and canine in more than 50% of cases, with greater success for the premolars [6].

IAN transposition is an optional preprosthetic procedure that is effective for patients with hyperesthesia caused by pressure exerted by a dental prosthesis on the alveolar crest [7,8,2]. This treatment can reposition the alveolar nerve canal deeper in the alveolar bone but carries a risk of damaging the IAN, resulting in neurosensory disturbance of the nerve. Here, we achieved to relieve neuropathic pain of bilateral mental foramina by bone augmentation between both mental foramina that secured sufficient height between the foramina and alveolar crests instead of INA transposition.

2. Case report

A 75-year-old edentulous woman was referred to our Department of Oral and Maxillofacial Surgery with the chief complaint of

☆ Asian AOMS: Asian Association of Oral and Maxillofacial Surgeons; ASOMP: Asian Society of Oral and Maxillofacial Pathology; JSOP: Japanese Society of Oral Pathology; JSOMS: Japanese Society of Oral and Maxillofacial Surgeons; JSOM: Japanese Society of Oral Medicine; JAMI: Japanese Academy of Maxillofacial Implants.

* Corresponding author at: Department of Oral and Maxillofacial Surgery, Shimane University Faculty of Medicine, 89-1 Enya-cho, Izumo, Shimane 693-8501, Japan. Tel.: +81 853 20 2301; fax: +81 853 20 2299.
E-mail address: georges@med.shimane-u.ac.jp (J. Sekine).

http://dx.doi.org/10.1016/j.ajoms.2016.06.003
2212-5558/

pain in her mandible. In her clinical history, she fell and bruised her mental region in September 2007. The clinical diagnosis was bilateral mandibular body fractures in the atrophic edentulous mandible. Because of her severe osteoporosis, surgical treatments for bone fractures were not performed at that time. Conservative treatment with closed reduction was performed by using circumferential wiring with her complete removable denture used as a splint without the need for surgical intervention. With this treatment, the bone fracture was healed and bone union was confirmed, but the mental segment showed clockwise rotation with malunion (Figs. 1 and 2). Then, she had neuropathic pain in her mandible while wearing a complete denture, and the pain worsened each year. In August 2012, she was referred to our department with the chief complaint of severe neuropathic pain in the mandible while wearing a complete denture. Upon referral to us, she could no longer wear the denture due to tenderness and worsening neuralgic pain upon mastication, despite her dental practitioner having remade and adjusted her denture several times.

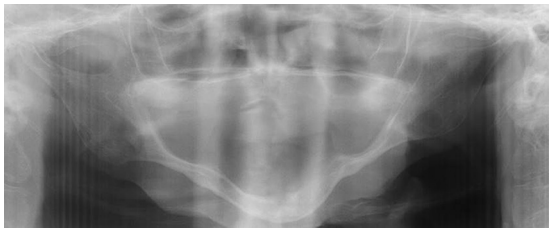

Fig. 1. Preoperative panoramic radiographic examination.

The degree of neuropathic pain was assessed by the visual analog scale (VAS) of 0–10. Score 0 indicated no pain and 10 as severe pain [9,10]. At the initial evaluation, VAS score was 9, and she also suffered this pain when she was not wearing her lower denture. She could not wear the lower denture.

Extraoral examination showed the lower facial vertical dimension was elongated, with her chin rotated clockwise. The range of motion of both temporomandibular joints and facial sensation in the innervating regions of the mental nerves were both normal. Intraoral examination showed notably atrophic alveoli, especially between the mental foramina. Severe neuropathic pain was induced by exerting the pressure on her denture at both mental foramina.

Panoramic X-ray revealed malunion of both mandibular bodies with the distal fractured segment counter-clockwise rotated caudally at the fulcrum in relation to the mental foramina, where the mandible showed severe atrophy, with a cross-sectional height of 10 mm. The preoperative radiographic examination and three-dimensional computed tomography showed the mental foramina opened upward due to alveolar resorption (Figs. 1 and 2). The diagnosis was severe bilateral neuropathic pain of the mental nerve caused by direct pressure on the mental nerves.

Conservative serial treatments including denture adjustment and carbamazepine and gabapentin administration for an initial 3-month period were not effective. A test injection of 2% lidocaine local anesthesia produced a striking effect, but the patient expressed anxiety about harmful side effects of paralysis and surgery was planned.

3. Technique

We planned the procedure harvesting bilateral coronoid processes and grafting onto the clockwise rotated malunited mandible in-between bilateral mandibular bodies including mental foramina to create a relatively vertical difference higher in order to reduce direct occlusal pressure by lower denture because of severe atrophic mandible. The schematic illustration of this operation method and surgical findings are shown in Figs. 3 and 4, respectively. The procedure was performed under general anesthesia via intranasal intubation. First, we harvested both coronoid processes via the intraoral approach using a reciprocating bone saw. The harvested bone was then grafted between the mandibular bodies via a submental extraoral approach. Both mental nerves and vascular bundles were exposed after careful reflection of the subperiosteal flap from the mandible. The grafted bone was trimmed and fixed with bioresorbable mesh plates and screws (SUPERFIXORB MX® and Ostetran OSTEOTRANS MX®, respectively; Takiron Co., Ltd., Osaka, Japan) after several decortications of the residual cortical bone were made using a small round burr. The remaining bone was crushed and further grafted into the gaps (Fig. 4), and watertight closure in each layer was confirmed. The postoperative radiographic examination is shown in Fig. 5. Sufficient bone augmentation volume was achieved with good alveolar shape formation and the oral mucosa preserved intact. An intravenous antibiotic (1.0 g cefazolin sodium/12 h) started on admission was continued until postoperative day (POD) 3. She started a liquid diet on POD 1 that was continued until POD 15, then followed by a soft diet without wearing a denture for the next 4 weeks.

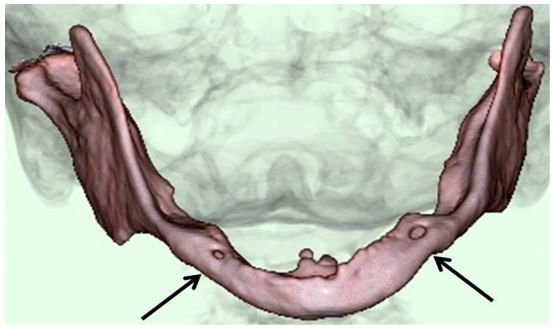

Fig. 2. Preoperative 3D-CT findings in a patient with the chief complaint of severe pain in the mandible from wearing a complete denture. Mental region showed clockwise rotation (shown by black arrows).

The clinical course was uneventful postoperatively. Transient nerve anesthesia was absent after the surgery. Postoperative pain was almost absent, and the spontaneous neuralgic pain

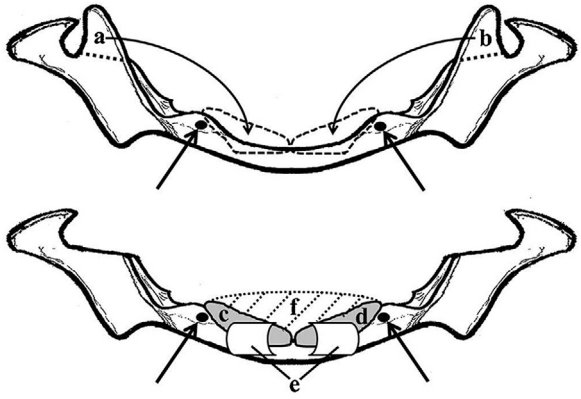

Fig. 3. Schematic illustration of this operation method. Upper and lower illustrations are shown in mandible preoperatively and postoperatively, respectively. The positions of bilateral mental foramina are shown by black arrows. Bilateral coronoid processes were harvested (a: right coronoid process; b: left coronoid process). Harvested bilateral coronoid processes were trimmed and grafted in-between bilateral mandibular bodies including mental foramina (c: grafted right coronoid process; d: grafted left coronoid process). Grafted bilateral coronoid processes were fixed with bioresorbable mesh plates and screws (e: resorbable plates). The remaining bone was particulated and further grafted into the gaps (f: particulated bone graft around the gap).