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Case Report

Surgical management of severe bruxism and masseteric hypertrophy in the patient with repeated implant failures: A case report



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ABSTRACT

Dental implants have become a significant aspect of modern prosthodontic treatment. Complications and failures may occasionally occur despite successful dental implantation. In general, the majority of dental implant failures appear to be associated with occlusal trauma overload such as bruxism and clenching. However, the management of occlusal trauma overload due to bruxism has proven clinically challenging. Herein, we report a rare case of severe bruxism and masseteric hypertrophy associated with repeated implant loss. We performed occlusal rehabilitation prior to repeated dental implant placement and demonstrate the successful management of masseteric hypertrophy while avoiding subsequent implant loss. We describe a surgical technique that represents an important alternative in the management of severe bruxism and masseteric hypertrophy.

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1. Introduction

Dental implants have become a significant aspect of modern prosthodontic treatment. Complications and failures may occasionally occur despite successful dental implantation. In general, the majority of dental implant failures appear to be associated with occlusal trauma overload in cases where peri-implants are maintained in good oral health conditions [1–3]. In particular, occlusal trauma overload due to bruxism has been demonstrated as important risk factor for dental implant loss and their associated suprastructures [4]. Moreover, it has been posited that bruxism may represent a cause of masseter hypertrophy.

Masseteric hypertrophy is a relatively uncommon condition that may present as unilateral or bilateral masseter muscle enlargement [5–7]. Patients with masseteric hypertrophy frequently exhibit an increase in the volume and height of the mandibular ramus,

resulting in well-defined mandibular angles. In bilateral cases, patients exhibit a brachycephalic facial pattern frequently associated with deep Class II bite malocclusion [6,7]. Muscular pain and limited mouth opening are common features of masseteric hypertrophy. Treatment typically involves surgical resection of a portion of the masseter muscle, with or without removal of mandibular exostoses, using intraoral or extraoral approaches [8]. The occlusal force is expected to decrease after surgery.

However, studies evaluating occlusal force following surgical treatment of masseter hypertrophy have yet to be reported. Conventional methods for the evaluation of occlusion include the use of articulating paper and impression wax [4]. The main limitation of these methods is the inability to quantify occlusal force. Digital analysis provides information on occlusal contact patterns, including force quantification and contact sequence [6,7]. Occlusal evaluation using digital methods provides accurate information on factors responsible for occlusion.

The aim of the present report was to describe the surgical management of severe masseteric hypertrophy with repeated implant failures with a view to decreasing excessive occlusal force using digital methods.

2. Case report

In October 2004, a 57-year-old Japanese male who complained of multiple tooth loss and functional deficits was referred to a

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general dental practitioner. At the clinic, he agreed to have occlusal rehabilitation with dental implants because he felt uncomfortable using dentures; in addition, he was diagnosed with bruxism. Dental implants were placed into the canine, first premolar, second premolar, and second molar positions on the left side of the maxilla in December 2004. The osseointegration of all dental implants was well confirmed and followed by successful integration of the definite prosthesis following provisional restoration with good self-care peri-implant management and regular follow-ups. However, the second premolar and second molar implants were spontaneously lost in February 2007. After peri-alveolar tissue healing, the dental implants were reinserted into the designated positions by a general dental practitioner in August 2007, and the definite prosthesis was put in place 9 months after implant replacement with clinical confirmation of good peri-implant status. However, the implants inserted in 2009 were again lost; and therefore, reinsertion and reprosthesis of the right maxilla was performed. Despite successful osseointegration, regular maintenance, peri-implant management by a general dental practitioner, and the patient wearing a night guard every night, implants were lost for the third time in 2012. This time, the patient was referred to our hospital for occlusal force management and oral rehabilitation treatment with dental implants.

The patient's past medical history included severe bruxism and hypertension for which he was receiving medication. There were

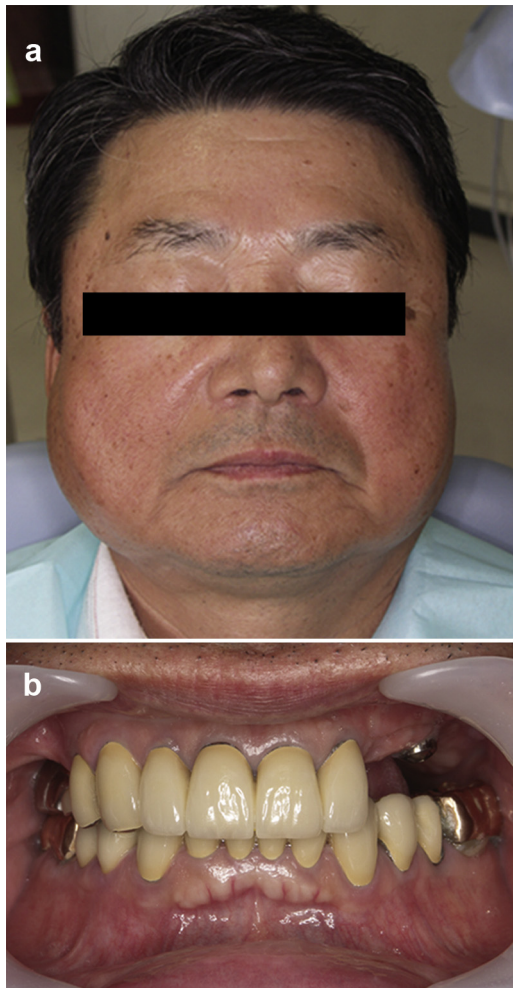


Fig. 1. (a) Frontal aspect showing the square-shaped face on the first visit to our hospital. (b) Intraoral photographs showing the pattern of deep bite malocclusion.

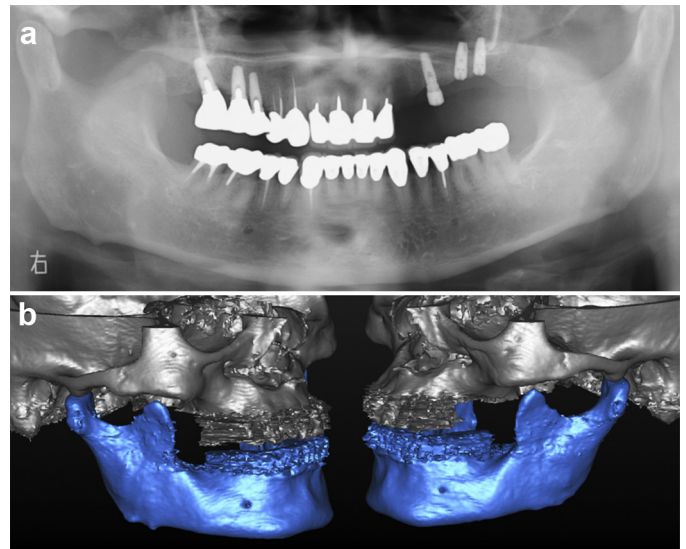


Fig. 2. Panoramic radiograph (a) and 3DCT (b) showing a prominent mandibular angle bilaterally.

no relevant bone lesions, no central nervous system disorders, and no evidence of immunosuppression due to diabetes or steroid therapy.

On clinical examination, bilateral and symmetric expansion was noted in the masseteric regions with enlargement of the masseter muscle, an increase in the volume and height of the mandibular ramus, resulting in well-defined mandibular angles characterized by a deep bite skeletal Class II tendency. The masseteric areas were well notable on palpation, and the patient had a resulting square-shaped face. The malocclusion pattern was typical of a deep bite (Fig. 1). A panoramic radiograph and 3DCT showed a prominent bilateral mandibular angle (Fig. 2). MRI and CT showed homogeneous bilateral masseter muscle enlargement consistent with true hypertrophy (Fig. 3).

Occlusal force was evaluated digitally using T-scan III for Windows (Tekson Inc., Boston, USA). T-scan III includes a digital sensor with an 85 μm thick fork-shaped plastic holder. The patient was placed in the upright position with his body parallel to the floor and his head cradled between the arms. While oral and maxillofacial surgeons guided the patient into the centric relation, the sensor was held vertically by the assistant, and the centric relation and centric occlusion were measured.

Because of the patient's high occlusal force and history of bruxism in the context of masseter hypertrophy, he was diagnosed with severe bilateral secondary masseteric hypertrophy due to bruxism. The repeated implant loss was a result of an excessive load caused by high occlusal force and bruxism. Because the patient wished to retry implant treatment, he agreed to surgical correction of the masseter hypertrophy to adjust occlusal force.

During surgery under general anesthesia, the masseter muscle was completely exposed in its lateral and medial aspects using an intraoral approach. The masseter muscle was divided into deep and superficial portions. The deep muscle portion was resected using the Harmonic Focus[®] (Ethicon Endo-Surgery Inc., Cornelia, GA, USA), a cutting instrument used during surgical procedures to simultaneously cut and coagulate tissue by vibration. Osteotomy of the mandibular angle and coronoid process was performed using a Piezosurgery[®] (Mectron Medical Technology, Carasco, Italy), combined with an oscillating saw (Fig. 4). No complications such as hematoma, infection, or facial nerve injury occurred over the post-operative period.

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