TANG HUMANITAS MEDICINE

Brief Communication

Limited mandibular movements after removal of the mandibular third-molar: use of the anterior bite plane and complementary therapies

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ABSTRACT

The traumatic removal of the mandibular third molar may promote post chirurgic consequences such as orofacial pain and limited mandibular movements. The aim of this case report is to describe the use of an anterior bite plane and complementary therapies (low level laser therapy and acupuncture) to treat the muscular dysfunction and the painful symptoms. A 33 year-old male patient who had a severe malocclusion and signs and symptoms of temporomandibular dysfunction was submitted to an initial clinical examination: electromyography of the masticatory muscles and IRM of the temporomandibular joint. After treatments, the results showed reduced pain symptoms and an increase of the mandibular movements and adequated electromiographic activities. The authors concluded that the combination therapies may be used as an alternative treatment because it satisfied the functional requirements of the patient and provided an asymptomatic clinical condition.

Keywords mandibular movements, anterior bite plane, acupuncture, low level laser therapy, electromyography

INTRODUCTION

Temporomandibular disorders (TMD) is the term used to refer to dysfunctions characterized by pain in the region of the temporomandibular joints, muscles of mastication, and periauricular area, limitations and deviations in the mandibular movements, joint noises and an altered occlusal relation (Dworkin et.al, 1990).

The etiology of TMD has multifactorial factors related to the development of TMD including the loss of posterior occlusal support with a consequent alteration in the vertical dimensions of occlusion, muscular hyperactivity and adjacent structures, postural changes, occlusal relation, emotional stress, and oral habits (LeResche et al., 1997; Hotta et al., 2003). The third molar surgery also could contribute to the number of patients with chronic orofacial pain (Juhl et al., 2009) and has been associated with a risk of TMD (Plesh et al., 1999; Huang et al., 2002; Huang et al., 2006; Huang et al., 2008) although this surgery is the most common procedure performed by oral surgeons (Amarillas-Escobar et al., 2010).

Treatment of TMD is basically odontologic and may involve anterior splints (Torii and Chiwata, 2010) occlusal splints, splints with posterior occlusal support, occlusal adjustment, removable therapeutic partial prostheses (Hotta et al., 1997), oral rehabilitation or orthodontic treatment, although therapeutic support regimens in the areas of psychology, phonoaudiology, and physical therapy may be associated depending on the needs of each patient (Hotta et al., 2003). Acupuncture (Cho and Whang, 2010; Hotta et al., 2010) and low level laser therapy (Mazzetto et al., 2010) have been used to treat limited mandibular movements and particularly painful symptoms of the masticatory muscles and temporomandibular joint.

Acupuncture is a therapeutic method based on Traditional Chinese Medicine, which consists of the insertion of small, solid needles, usually made of stainless steel, into specific body points in order to improve health or modify painful states. This therapy was shown to be effective in patients with chronic pain and has been used to prevent and treat several disorders, having become a treatment option in dentistry by promoting antiinflammatory and analgesic actions (Smith et al., 2007; Rancan et al., 2009).

Electromyographical analysis of the masseter and temporalis muscles may be used to compare the muscular activities during several mandibular positions and clinical conditions (Hotta et al., 2010).

This article reports a clinical case in which a combination of physical therapy and odontologic resources were used to treat limited mandibular movements and painful symptoms after third molar surgical removal.

METHODS AND RESULTS

This clinical case was conducted after the approval of the Ethics Committee (process number 2006 1971.58.5). Before signing the informed consent, the subject was informed of the study procedures by the investigators. The study was conducted at the School of Dentistry of Ribeirão Preto, University of São Paulo, Brazil.

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Fig. 1. Linguoversion of the right posterior mandibular teeth.

Fig. 2. Anterior bite plane.

Fig. 3. Low level laser intensity.

Fig. 4. Session of acupuncture.

A 33-year-old man was presented for dental treatment, complaining of difficulty in opening his mouth after extraction of his inferior right third-molar.

Clinical examination showed complete natural dentition with linguoversion of the right posterior mandibular teeth, elongated face, retrognatism (Fig. 1), reduced opening (5 mm, from edge to edge) and masticatory muscle pain. Given the clinical findings, the patient was submitted to electromyography analysis of the masticatory muscles (rest and maximum voluntary contraction positions), before and after treatments (Table 1). These analyses were performed using a MyoSystem- Br1 (São Paulo, Brazil) electromyographer with differential active electrodes (silver bars 10 mm apart, 10 mm long, 2 mm wide, 20 gain, input impedance 10 GX and 130 dB at 60 Hz common mode rejection ratio). Impedance is a function of two components (vectors): the resistance of the tissues themselves, and the additional opposition (reactance) due to the capacitance of membranes, tissue interfaces, and nonionic tissues. The measured resistance is approx- imately equivalent to that of muscle tissue.

Surface differential active electrodes were placed on the skin, previously cleaned with alcohol, bilaterally on both masseter muscles and temporalis. A ground electrode was also used and fixed on the skin over the frontal region. EMG signals were analogically amplified with a gain of 1000, filtered by a pass-band of 0.01 – 1.5 kHz and sampled by a 12 bit A/D converter with a 2 kHz sampling rate. The signals were digitally filtered by a passband filter of 10 – 500 Hz for data processing (Land and Peregrina, 2003; Cecilio et al., 2010).

After this, the patient was referred to urgency therapy with an anterior bite plane, low level laser intensity and acupuncture procedures. The use of the anterior bite plane was indicated by two days, uninterrupted (Fig. 2) (Lievens, 1988). The laser apparatus was the GaAlAs laser Twin Laser (MM Optics, São Carlos – SP, Brazil) that operates with a continuous laser beam (780 nm wavelength; 70 mW power output, 60 J/cm^2, 10 sessions) (Fig. 3) (Cetiner et al., 2006). Finally, the patient was submitted to 5 sessions of acupuncture point applications: Hn3, Ig4 (bi), F3 (bi), E7 (bi), E6 (bi), SJ17 (bi), Vb20 (bi), P7, C7, Vb14 (bi), Id18 (bi), E36 (bi), R3 e Bp6 (bi). The depths of needles insertion were just tissue level (Fig. 4)

Complementary exams were requested and magnetic resonance imaging of the temporomandibular joints was obtained in both closed and open mouth positions. The results showed that the articular disks were well positioned in the mandibular fossae.

The results of the urgency approach showed an increased mouth opening (5 mm to 40 mm), reduction of the dolorous symptoms and reestablishment of the normal stomathognatic system functions such mastication, speech and deglutition.

DISCUSSION

Surgical removal of the third-molar is the most common procedure performed by oral surgeons (Amarillas-Escobar et al., 2010). Some surgeons, even with the existence of risks, often advocate third molar removal during the teenage years (Huang et al., 2008), citing advantages such as incompletely formed roots, better healing, and less morbidity (Phillips et al., 2003).

According to Battista et al. (2007) the surgical trauma of this procedure causes postoperative pain, swelling and trismus.

Table 1. Mean values of electromyographic activities (microvolts/second) of masseter and anterior temporalis muscles during rest position and habitual occlusion, before (1) and after (2) treatments

Muscles	Rest Position				Habitual Oclusion			
	1		2		1		2	
	Right	Left	Right	Left	Right	Left	Right	Left
Masseter	6,31	13,62	5,84	10,96	9,19	25,1	25,56	44,89
Temporalis	8,28	11,84	6,77	8,03	14,97	45,08	27,18	68,19

In the present clinical report, a severe limited open mouth occurred after the surgical removal of right maxillary third-molar in an adult patient and persisted for 56 days.

As the use of low level laser therapy (LLLT) for the treatment of musculoskeletal pain syndromes has become common (Kulekcioglu et al., 2003; Grossi et al., 2007; Mazzetto et al., 2007) and the lasertherapy promotes cellular bio-stimulation, accelerates tissue regeneration and wound healing and decreases pain and swelling (Coluzzi and Convissar, 2004), the authors of the present study selected this therapy to be applied in association with an anterior bite plane (occlusal deprogramming) and acupuncture applications, looking for better results.

Besides the remission of the dolorous symptoms and a significant increase in the open mouth, the subject also noted a reduction in his anxiety symptoms. This result also was shown in an earlier study (Hotta et al., 2010) probably due the acupuncture point IG4.

With reference to electromyographic activities, the results showed that the mean values were changed by the combination therapies and these results were better than those presented by the patient in the initial phase of the treatment in both mandibular positions, rest and habitual occlusion.

In the initial phase, probably due the dolorous symptoms and also the linguoversion of the right posterior mandibular teeth, in habitual occlusion, the electromyographical activities of the masticatory muscles were smaller on this side. After the reduction of the symptoms, the electromyographical activities became stronger, mainly due to the anti-inflammatory action of the laser (Siéssere et al., 2011). On the other hand, in the resting position, the results showed a decreasing of the electromyographical activities as expected (Table 1).

Thus, the authors concluded that, in this case report, the combination of selected therapies was efficient to promote the satisfactory clinical result.

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CONFLICT OF INTEREST

The authors have no conflicting financial interests.

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