REV ESP CIR ORAL MAXILOFAC. 2017;xxx(xx):xxx–xxx

Revista Española de Cirugía Oral y Maxilofacial

www.elsevier.es/recom

Original article

Laser therapy for neurosensory recovery after saggital split ramus oseotomy

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ARTICLE INFO

Article history:
Received 28 August 2015
Accepted 20 June 2017
Available online xxx

Keywords:
Laser therapy
Paraesthesia
Orthognathic surgery
Inferior alveolar nerve
Dentofacial deformity

ABSTRACT

Dental-skeletal anomalies are treated by combining orthodontic treatment with orthognathic surgery. This mainly involves performing sagittal osteotomy of the mandibular branch. This technique offers many advantages, but its main disadvantage is paraesthesia of the inferior alveolar nerve. There are several treatments focused on promoting neurological recovery, one of which is low intensity laser. The aim of this study was to make a clinical evaluation of the efficacy of low intensity laser therapy in the neurosensory recovery of tissues after sagittal osteotomy of the mandible.

A group of twelve patients with the need of surgical correction of their dental-skeletal anomaly underwent orthognathic surgery with bilateral mandibular sagittal osteotomy. Patients were treated unilaterally and blinded with a low intensity infrared GaAlAs laser of 808 nm, and compared with the contralateral site as a control group, following the course of the inferior dental nerve. The parameters used were of 100 mW of power, irradiation of 3.6 W/cm^2, 2.8 J of energy per point, an energy density of 100 J/cm^2, to 28 s in each point with a distance of 1 cm between points. The treatment included two sessions per week with a minimum of 10 sessions, starting 48 h after surgery. Mechanical and thermal evaluations were performed in the first, fourth, seventh and tenth sessions. A significant improvement was observed in the subjective response of the patients on the treated side. The treatment of neurosensory disorders with low-intensity infrared laser has been shown to be effective in accelerating recovery, providing greater patient comfort, and presenting advantages over other existing methods.

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http://dx.doi.org/10.1016/j.maxilo.2017.06.003

Please cite this article in press as: Buysse Temprano AV, et al. Laser therapy for neurosensory recovery after saggital split ramus oseotomy. Rev Esp Cir Oral Maxilofac. 2017. http://dx.doi.org/10.1016/j.maxilo.2017.06.003

Terapia con láser para la recuperación neurosensorial después de la osteotomía de la rama dividida sagital

Palabras clave:
Terapia láser
Parestesia
Cirugía ortognática
Nervio dentario inferior
Deformidad dentofacial

RESUMEN

Las anomalías dentoesqueléticas son tratadas combinando el tratamiento de ortodoncia con la cirugía ortognática, principalmente, mediante la osteotomía sagital de rama mandibular. Esta técnica ofrece muchas ventajas, pero dentro de sus principales desventajas se encuentra la parestesia del nervio dentario inferior. Existen varios tratamientos enfocados a promover la recuperación neurológica y uno de ellos es el tratamiento con láser de baja intensidad. Esta investigación tuvo como objetivo hacer una evaluación clínica de la eficacia de la terapia con láser de baja intensidad en la recuperación neurosensorial de los tejidos tras la osteotomía sagital de la mandíbula.

Un grupo de 12 pacientes con necesidad de corrección de su anomalía dentoesquelética fueron intervenidos con cirugía ortognática mediante la osteotomía sagital de rama mandibular bilateral. Los pacientes fueron tratados en el postoperatorio de manera unilateral y ciega con láser infrarrojo de baja intensidad de 808 nm, medio activo de gaaias, y comparados con el lado contralateral como control, siguiendo el recorrido del nervio dentario inferior. Los parámetros utilizados fueron de 100 mW de potencia, irradiación de 3,6 W/cm^2, 2,8 J de energía por punto, una densidad de energía de 100 J/cm^2, a 28 s en cada punto con una distancia de 1 cm entre puntos, 2 sesiones por semana, con un mínimo de 10 sesiones a partir de las 48 horas después de la cirugía. Se realizaron evaluaciones mecánicas y térmicas en la primera, cuarta, séptima y décima sesión. Se observó una mejora significativa en la respuesta subjetiva de los pacientes en el lado tratado. El tratamiento de los trastornos neurosensoriales con el láser de baja intensidad de infrarrojos ha demostrado ser eficaz en la aceleración de la recuperación, proporciona una mayor comodidad al paciente y presenta ventajas sobre otros métodos existentes.

Introduction

Dentofacial deformities result from deficiencies in the craniofacial complex's growth and development, in the maxilla, the mandible or both. In each case, deformities can be symmetric or asymmetric, passed down genetically or acquired. Orthognathic surgery is an alternative in the correction of maxillomandibular deformities. This treatment is performed after an initial orthodontic treatment, aiming for a better position between the dental elements and the alveolar ridge. Then, the surgery is thoroughly planned based on esthetics and functionality, and carried out by osteotomies.[1]

The most common mandibular surgery technique is the Sagittal Split Osteotomy (SSO), which is used in prognathic, retrognathic treatments for mandibular asymmetry. Schuchardt started the studies on Sagittal Split Osteotomy in 1942, then Obwergeser and Trauner in 1957, Dal Pont in 1961, Hunsuck in 1968 and Epker in 1977, which made it a secure procedure, stale and versatile. Among its advantages are the advancement of mandibular retraction, correcting asymmetries, intraoral access with little or no external scaring, and allowing vertical rotations.[2,3]

One of the most common SSO complications is neurosensory disturbances, resulting from manipulating the neurovascular bundle, usually a temporary disturbance of the mental and the inferior alveolar nerve. Regardless of the lesion being in the mandibular foramen, the length of the inferior alveolar nerve or the mental foramen, the symptoms of a neural lesion are observed through different degrees of sensibility loss in the lower lip area, chin, labial mucosa, and skin of the mandibular area and that of the lower teeth.[4–9]

Trauma to the peripheral nerve may result in deficiency that varies from complete sensibility loss to a subtle change in tactile sensibility, which may continue for days, weeks, or even become permanent. The spontaneous reversion depends mainly on the injury degree, location, and individual capacity of recovery.[1]

There are several therapies that accelerate nerve lesion recovery, reducing the sensibility recovery time, such as administering systemic medications, local physiotherapy, electric stimulation, nerve repair surgery, low intensity laser treatment, and other therapies such as homeopathy and acupuncture.[1,10–12]

The use of low intensity lasers has been mentioned in literature due to its special characteristics, which provide important therapeutic effects, bio-modulators, analgesia, lymphatic drainage, bone regeneration, tissue and neurosensitive fiber repair.[11–14]

Low intensity laser helps in neural repair, increasing the neurons' metabolism and improving the ability to produce myelin, inducing the spread of Schwann cells and reducing the synthesis of inflammation mediators.[12,14,15] This treatment is being considered promising due to its non-invasive nature and its ability to regenerate wounded nerves without

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