JOURNAL OF ORAL BIOLOGY AND CRANIOFACIAL RESEARCH 5 (2015) 65–68

Available online at www.sciencedirect.com

ScienceDirect

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

Original Article

Neurosensory disturbance after bilateral sagittal split osteotomy: A retrospective study

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ARTICLE INFO

Article history:
Received 25 April 2015
Accepted 28 April 2015
Available online 30 June 2015

Keywords:
Inferior alveolar nerve
Nerve injury
Osteotomy

ABSTRACT

Aim: To retrospectively evaluate neurosensory disturbance (NSD) after bilateral sagittal split osteotomy (BSSO).

Material and methods: A retrospective review was carried out to assess inferior alveolar nerve function in patients treated by BSSO from 2010 to 2013. All patients included in the study were assessed using objective (cotton swabs and pin prick testing) and subjective testing (questionnaire) for inferior alveolar nerve function after a minimum of 1 year of follow-up. Medical records of the patients were used to assess the incidence of NSD in the immediate post-operative period.

Results: 15 patients (30 sides) had undergone BSSO during the specified time period. On subjective testing, NSD was reported in 22 operated sides (73.3%) in the immediate post-operative period, while 4 operated sides (13.3%) reported persistent NSD. On objective testing, immediate post-operative NSD was seen in 20 operated sides (66.7%). After a minimum of 1 year follow-up, recovery was seen in 18 operated sides while persistent NSD was seen in 2 operated sides (6.7%).

Conclusion: NSD of the inferior alveolar nerve is a common complication after BSSO in the immediate post-operative period. However in a long term, nerve function usually recovers.

1. Introduction

Of the numerous osteotomies for correction of mandibular deformities, the bilateral sagittal split osteotomy (BSSO) and vertical ramus osteotomy are the most preferred. Since the introduction of BSSO by Schuchardt in 1942 with subsequent modifications by Obwegeser and Trauner, DalPont, Hunsuck and Epker, it has become the workhorse for the management of mandibular deformities.[1–4] Majority of the patients undergoing this procedure are young with high expectations of

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http://dx.doi.org/10.1016/j.jobcr.2015.04.006

function and aesthetics. Despite being a safe and versatile procedure, BSSO does have a few common complications. Neurosensory disturbance (NSD) of the inferior alveolar nerve is one such common complication.[5] With a wide variation of technique of BSSO with different surgeons, variation in methods and timing of subjective and objective evaluation, and the method of fixation, the incidence of NSD with BSSO reported in literature varies from 9 to 85%.[6,7] The purpose of this study was to evaluate the incidence of NSD following BSSO in the immediate post-operative period and after a minimum follow-up of 1 year using both subjective and objective testing.

2. Materials and methods

A retrospective review was carried out in order to assess inferior alveolar nerve function in patients treated by BSSO from 2010 to 2013. Being a retrospective observational study it was exempted from institutional ethical approval. All patients included in the study were assessed using objective and subjective testing for inferior alveolar nerve function after a minimum of 1 year of follow-up. Subjective evaluation was carried out using the questionnaire described by Al-Bishri et al.[7] Patients were queried about the perceived neurosensory changes along the distribution of inferior alveolar nerve. A visual analogue scale (VAS) graded from 0 (no discomfort) to 10 (intolerable discomfort) was included for evaluation. To evaluate the effect of the neurosensory disturbance, the grades of the VAS were interpreted as follows: 0–2 mild discomfort, 2–4 mild to moderate discomfort, 4–6 moderate discomfort, 6–8 moderate to severe discomfort, and 8–10 severe discomfort. Objective testing was done using cotton swabs and pin prick testing. The chin and lip region was tested on either side and a positive response in at least 3 of 4 applied stimuli was considered normal. None of the patients had sensory disturbance prior to surgery. However, objective testing was not carried out prior to the surgical procedure. Medical records of the patients were used to assess the incidence of neurosensory disturbance in the immediate post-operative period.

2.1. *Surgical procedure*

BSSO was performed as described by Trauner, Obwegeser[1] as modified by Hunsuck[3] and Dal Pont.[2] Lignocaine with adrenaline (1:2,00,000) was infiltrated in the buccal mucosa, an incision was made, and a mucoperiosteal flap was raised to expose the buccal and lingual aspects of the mandibular ramus and body in the region of the planned osteotomy. After identification of the lingula, the neurovascular bundle was protected by placing a periosteal elevator above the lingula. The medial horizontal osteotomy cut was made parallel to the occlusal plane and just above the lingula. The periosteal elevator was then removed and a channel retractor placed. The buccal and oblique osteotomy cut was completed. The fragments were then separated using chisels and splitting forceps. The same procedure was repeated at the opposite site. An acrylic occlusal splint was used to position the distal segment. Intermaxillary fixation was carried out. The fragments were then stabilized using titanium miniplate with 4–5 screws on either side.

3. Results

15 patients had undergone BSSO during the specified time period, thus a total of 30 sides were evaluated for NSD. There were 8 male (53.3%) and 7 female (46.7%) patients with a mean age of 22.4 ± 3 years. 13 (86.7%) had undergone bi-jaw surgery while 2 (13.3%) had undergone only BSSO. 14 patients (93.3%) had undergone mandibular setback while 1 (6.7%) had undergone mandibular advancement.

3.1. *Subjective testing*

Immediate post-operative NSD was reported in 22 operated sides (73.3%). However after a minimum of 1 year of follow-up, only 4 operated sides had persistent NSD (13.3%). Of the patients experiencing NSD, 6 (60%) experienced mild to moderate discomfort, 3 (30%) had moderate discomfort while 1 (10%) reported it to be moderate to severe (Fig. 1).

3.2. *Objective testing*

On reviewing medical records, immediate post-operative NSD was seen in 20 operated sides (66.7%). After a minimum of 1 year follow-up, recovery was seen in 18 operated sides while persistent NSD was seen in 2 operated sides (6.7%).

4. Discussion

NSD of the inferior alveolar nerve during BSSO is closely related to its position in the mandibular body ramus region where it is in close proximity to the osteotomy cuts. A number of factors have been reported to increase the incidence of nerve injury with BSSO namely: older age, large mandibular advancements, lateral course of the inferior alveolar nerve, long mandibular angle and manipulation of the nerve during surgery.[8] Ylikontiola et al.[9] while evaluating subjective NSD after BSSO found statistically significant positive correlation between NSD and patient's age, magnitude of movement and degree of manipulation of the nerve. Nerve injury can be associated with multiple steps of the surgical procedure. Nerve manipulation during medial ramal dissection and retraction for the medial osteotomy cut, the actual splitting procedure, excessive stretching of the nerve during segment manipulation and compression of the nerve during fixation are some of them. NSD can also occur due to direct injury by saw, drill and chisel used for the osteotomy or due to indirect injury by hematoma or oedema in the nerve canal.[10] The nerve is either completely or partially transected, compressed or crushed resulting in ischemia.[11] The resultant injury can thus be classified as either neuropraxia, axonotmesis or neurotemesis.[12] Clinically, various combination of nerve damage occurs resulting in a variety of sensory dysfunction.[11] The NSD is usually temporary but may be permanent in some cases. The duration of recovery however varies from patient to patient.