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Neurosensory function of the inferior alveolar nerve after bilateral sagittal ramus osteotomy: a retrospective study of 68 patients

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Abstract. The aim of the present study was to report the incidence of neurosensory dysfunction in the lower lip and chin after bilateral sagittal split osteotomy at four postoperative time points, and the relation of impairment to factors connected with the operation.

Sixty-eight patients who had undergone the procedure (at 136 operated sites) were reviewed, and neurosensory recovery was studied at 2, 6, 18 and finally 30 months postoperatively. A change in neurosensory recovery was seen over this period of time. Two months postoperatively, 84 sites had reduced sensitivity (62%). The incidence of disorder decreased to 52 sites (38%) at 6 months, 43 sites (32%) at 1.5 years and 32 sites (24%) at the final 2.5-year check up. The patient age at the time of surgery, the type of osteosynthesis and the perioperative position of the inferior alveolar nerve were variables that influenced the neurosensory outcome.

In conclusion, this retrospective study shows that the most important factors influencing postoperative nerve function are patient age, fixation method and the perioperative position of the inferior alveolar nerve.

Key words: neurosensory function; sagittal split osteotomy; orthognatic surgery.

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Impaired postoperative function of the inferior alveolar nerve is the main disadvantage of the sagittal ramus osteotomy or bilateral sagittal split osteotomy (BSSO)[2,3,20]. This operation is otherwise a well-documented, safe and standardized procedure. Numbness or altered function of the nerve has been reported to occur at between 9% and 85% of operated sites[1]. The cause of the dysfunction is probably related to several steps during the operation, such as the soft tissue dissection on the medial ramus[16], compression of the nerve during the horizontal cut on the medial ramus, the split itself, and finally the possible compression of the nerve during fixation[14]. Inter-individual surgical skills as well as patient age have been pointed out as general factors influencing postoperative nerve function[8]. Irrespective of the cause of the dysfunction and where along the nerve the damage has occurred, a sensation of numbness in the lower lip and chin is the most common

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symptom. Most studies on the outcome of sensory function after BSSO have used the final follow-up for evaluation (2–2.5 years). The purpose of the present study was to evaluate the incidence of neurosensory dysfunction (NSD) in the lower lip and chin after sagittal split osteotomy at four different time points postoperatively, and the relation of impairment to factors connected with the operation.

Material and methods

The Department of Oral and Maxillofacial Surgery at the Sahlgrenska Academy, Göteborg University treats between 70 and 80 dentofacial anomalies every year, and the whole scope of maxillofacial osteotomies are used. Mandibular corrections are mainly of four types: genioplastics, segmental osteotomies, oblique ramus osteotomies and sagittal ramus osteotomies. Mandibular set-back and correction of asymmetries, e.g., hemifacial microsomia, are performed using oblique ramus osteotomy. BSSO, also referred to as the 'Obwegeser sagittal split osteotomy' is performed only for mandibular advancements. In the present report a consecutive series of BSSOs from 1984 to 2000 were studied. The study comprises 68 patients, 24 male and 44 female (a total of 136 operated sites). The average age at the time of operation was 28 years, with a range from 15 to 49 years. Only BSSO cases without additional genioplasty were included in the study. All patients were examined 2, 6, 18 and 30 months postoperatively and at the time of the study all patients had passed the final 2.5-year check up. The follow-up examination at the clinic is well-standardized and included assessment of the neurosensory function of the lower lip and chin on a two-degree scale: normal sensitivity or any sensory reduction. The basis of this evaluation was only a questionnaire and a sharp–blunt discrimination, which was done by touching the skin with cotton swabs and with sharp and blunt ends of a probe. This procedure obviously requires the cooperation of the patient; no objective method was used.

Other variables studied were age, the degree of mandibular advancement in millimetres, the perioperative position of the nerve, i.e., whether the inferior alveolar nerve was found in the lateral or medial fragments, and type of fixation material used. The fixation methods varied over time due to evolution of the available instrumentation. There were three types of osteosynthesis using (in chronological order) wires, bicortical lag screws or fixation with monocortical miniplates.

The surgical team invariably consisted of one experienced surgeon and one surgeon in training. Over the time period studied, eight surgeons were involved.

Statistics

Statistical calculations using the χ^2-test were performed and probabilities of 0.05 or less were accepted as significant.

Results

The material comprised 136 operated sites. Two months postoperatively 52 sites (38%) were found to have normal sensitivity and 84 sites reduced sensitivity (62%). The incidence of disorder decreased to 52 sites (38%) at 6 months, 43 sites (32%) at 1.5 years and 32 sites (24%) at the final 2.5-year check up (Fig. 1).

The patients' gender did not influence the sensitivity score: nine sites (19%) of the male and 23 sites (26%) of the female patients had reduced sensitivity at the final check up (not significant).

A correlation was found between the patient's age at the time of surgery and the occurrence of neurosensory deficit. Patients younger than 30 years at the time of surgery had fewer neurosensory problems during the follow-up than patients aged 30 years or older. The correlation between age and neurosensory dysfunction is shown in Table 1.

Forty-six operated sites were stabilized with miniplates, 68 sites with screw fixation and 16 sites with wires. An additional six sites were treated with both screw and wire fixation. The incidence of inferior alveolar nerve dysfunction 2.5 years postoperatively was 15% in sites treated with miniplates, 34% in sites with screw fixation and 0% in sites with (only) wire fixation (Fig. 2). NSD correlated to age and type of fixation is shown in Table 2.

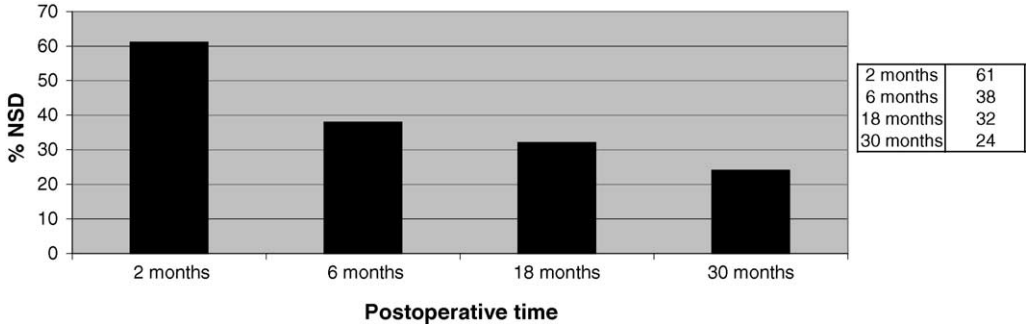

Fig. 1. Incidence of NSD at 136 operated sites in postoperative follow-up.

Table 1. The correlation between age and NSD after BSSO

Age (years)	Total number of operated sites	NSD 2 months postoperation	NSD 6 months postoperation	NSD 18 months postoperation	NSD 30 months postoperation
15–20	30	18 (60%)	4 (13%)	4 (13%)	3 (10%)
21–30	56	33 (59%)	23 (41%)	14 (25%)	12 (21%)
31–40	42	25 (60%)	20 (48%)	20 (48%)	15 (36%)
41–49	8	6 (75%)	5 (62%)	5 (62%)	2 (25%)
15–30	86	32**(37%)	27*(31%)	17**(21%)	15*(17%)
31–49	50	31 (62%)	25 (50%)	25 (50%)	17 (34%)

* $P < 0.05$.
** $P < 0.01$.