Low risk of neurosensory dysfunction after mandibular third molar surgery in patients less than 30 years of age. A prospective study following removal of 1220 mandibular third molars

Gry Karina Kjølle, DDS,[a] and Tore Bjørnland, DDS, Dr odont[b]
University of Oslo, Oslo, Norway

Objective. The study aims were to estimate the prevalence of neurosensory dysfunction (NSD) and identify risk factors for NSD after mandibular third molar (M3) removal.
Study design. In this prospective cohort study 864 patients had their M3 removed. Age, gender, surgeon's experience, and radiographic findings were recorded and the outcome variables were NSD and data analyses.
Results. In 884 patients, 1220 M3 were removed. Fourteen patients reported NSD postoperatively; 10 inferior alveolar nerve (IAN) injury, 3 lingual nerve (LN) and 1 had injury to both. After 5 years the number of patients with NSD of the IAN had decreased to 5, but no change in the LN.
Conclusion. Age and cortical line interruption were significantly associated with the risk of developing sensory dysfunction. All patients younger than 30, and 3 of 8 patients older than 30, had full recovery of the IAN injury. NSD of the LN persisted in all patients. (Oral Surg Oral Med Oral Pathol Oral Radiol 2013;116:411-417)

Removal of impacted or erupted third molars is one of the most frequently performed dentoalveolar surgical procedures, and it is associated with various postoperative sequelae.[1] Many studies describe unwanted complications such as paresthesia or anesthesia of the inferior alveolar nerve (IAN) or lingual nerve (LN).[2] There are well-established indications for removal of impacted third molars,[3] and controversies about prophylactic removal of asymptomatic mandibular third molars are based on evaluating costs and risks of removal against the consequences of non-removal. Data on the frequency of severe complications in the management of asymptomatic, impacted mandibular wisdom teeth[4] are lacking. Prophylactic removal of impacted third molars is widely practiced, especially in Europe and the United States, and it is estimated that 18%-51% of the population[5] endure this procedure. Reasons for prophylactic surgery include the need to minimize the risk of disease (cysts and tumors), reduction of the risk of mandibular angle fracture, increased difficulty of surgery with age, and that third molars may be of less importance for mastication. The therapeutic indications for removal of mandibular third molars have been established as recurrent pericoronitis, cyst development and unrestorable caries or periodontal disease.[3]

Previous studies have shown that IAN and LN paresthesia occur widely, from 0.4%[6] to 8.4%[5] and none[7] to 23.0%[8] of cases, respectively. Permanent dysesthesia of the IAN persisted in 0.91%, and of the LN in 0.37% of patients.[9] Most trigeminal nerve injuries undergo spontaneous recovery; 96% of IAN and 87% of LN injuries recover within 4-8 weeks after surgery,[10] and the recovery rates are not influenced by gender, and only slightly by age.[11]

Some injuries may be permanent, lasting longer than 1 year, with varying outcomes, ranging from mild hypesthesia to complete anesthesia and neuropathic responses resulting in chronic pain.[12] This depends on the type of injury (i.e., stretch, crush, section) and the presence of severe inflammation. Following injury, the nerve will remain in position and regenerate in a relatively short time unless displaced into the socket.[13] Thus, after injury to the IAN, good recovery is generally expected[14] but the more proximal lesions have worse prognoses.[15]

The most common cause of IAN and LN injury is traumatic third molar surgery, shown to account for 52% of injuries,[16] and risk factors included the patient's age (more than 30 years), horizontally impacted teeth, close radiographic proximity to the inferior alveolar canal (IAC)[17] and treatment by inexperienced graduate or postgraduate students.[11]

Statement of Clinical Relevance

Inferior nerve damage may appear after 3rd molar surgery. This present investigation shows that nerve damage is infrequent and often temporary in patients less than 30 years of age. In older patients, nerve damage seems to be more permanent.

[a]Senior Resident, Faculty of Dentistry, University of Oslo.
[b]Professor and Chairman, Department of Oral Surgery and Oral Medicine, Faculty of Dentistry, University of Oslo.
Received for publication Jan 25, 2013; returned for revision Mar 21, 2013; accepted for publication Jun 16, 2013.

2212-4403/$ - see front matter
http://dx.doi.org/10.1016/j.oooo.2013.06.024

Because of the different anatomic positions of the LN, the surgeon is often not able to identify its location pre-operatively. Studies have described the position of the LN using dissections of cadavers[18] to be above the lingual crest in 10% of the cases and, using ultrasound,[19] the distance of the LN from the alveolar cortex was measured to be 1 mm on average.

To strengthen observational studies like examination of injuries of nerves after operations, one should follow the STROBE Statement in preparing patients-oriented manuscripts.[20]

The purpose of this study was to estimate the prevalence of neurosensory dysfunction (NSD) and identify risk factors for NSD after mandibular third molar (M3) removal. The investigators hypothesize that the prevalence of NSD in our study is comparable with other studies and that NSD is not related to gender and age of the patient. The specific aims of the study were to assess the outcome of IAN and LN injury up to 5 years after surgery and to determine the prevalence, risk factors and prognosis of NSD after surgery of the M3.

MATERIAL AND METHODS

Study design

To address the research purpose, the investigators designed and implemented this nonrandomized prospective clinical study of nerve injuries after removal of mandibular third molars. The study population was composed of all patients older than 18 years, presenting for surgical removal of their M3 between January 1, 2007 and December 31, 2008. To be included in the study sample, patients had to be seen 1 week after surgery for routine follow-up and reviewed for possible nerve injury of the LN or IAN. Patients, who had altered sensation in the distribution of the IAN or LN, were followed for up to 5 years. Patients were excluded as study subjects if they refused to take part in the study or if they were unwilling to come for postoperative evaluation 1 week after surgery. The Regional Medical Ethical Committee, East, Norway (1.2007.1293) approved the study.

Study variables

For each patient, several demographic variables were recorded including age, gender, side of operation, surgeon's experience, indications and radiographic findings on orthopantomograms (OPG) (Table I). Information about the operator was registered: specialist in oral surgery, postgraduate or undergraduate student and duration of operation, relation between the mandibular canal and the removed tooth and complications during or after the intervention. At the same visit, the patients were given written information about the study and signed informed consent forms.

The primary outcome variable was nerve injury (y/n) to the IAN and/or LN immediately after the surgery and at follow-up up to 5 years. Indications for surgical removal of lower third molars were based on the recommendation of the Norwegian Center for the Evaluation of Medical Methods and clinical experience. The secondary outcome variable was a vertical visual analog scale (VAS) from 0 to 100, where 0 indicated "no pain sensation" or "improved taste" and 100 indicated "pain cannot be worse," "no sensation," or "decreased taste." The characteristics of the patients with nerve injury are presented in Table I. The molars were extracted or removed surgically. Local anesthesia (2% Xylocain with 12.5 μg/mL; AstraZeneca UK Limited, Luton, UK) was always used as local tissue infiltration or IAN regional block. Patients less than 18 years of age were excluded from the study.

Data collection methods

All patients who experienced IAN and LN injury were interviewed and examined according to a standardized test method recording subjective and objective neurosensory functions and registered by the same operator. The same procedure was performed 3-4, 6- and 12-months and up to 5 years postoperatively. For each visit, the patients described subjective and objective changes in sensation.

Subjective evaluation was performed by the patients to describe sensation and function of the injured area. Each patient was asked a series of standard questions: whether the affected area gave rise to problems like altered sensation, pain, tingling and problems associated with eating, drinking and chewing, speech, appearance, or interference with daily activities.

In this study, we used 3 different mechanoceptive objective testing methods to evaluate the perioral mechanoceptive skin receptor function that responds to light touch (LT) sensation of the mucosa and the skin.

The Semmes Weinstein monofilaments, von Frey hair, LT (North Coast Medical, San Jose, CA, USA), were used to evaluate the threshold of the slowly adapting fiber/receptor system. We used a monofilament placed perpendicularly to the skin with a pressure of 20 mN (2 g) in the actual area. At this force, the filaments start to bend.

Measurements of 2-points discrimination were performed with the MacKinnon-Dellon Disk-Criminator (North Coast Medical, San Jose, CA, USA) with distances of 5, 10, and 15 mm between the blunt probes. Each probe was 0.8 mm in diameter. The instrument was moved carefully vertically downward over the skin. The minimum separation that was consistently reported as 2 points was recorded as the discrimination threshold.

Sharp and dull discrimination was assessed with the sharp and a dull end of a probe which gently touched