The removal of deeply impacted lower third molars by means of the bone lid technique with piezoelectric instruments

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KEYWORDS
Complications, Impacted third molars, Inferior alveolar nerve, Surgical procedure, Piezosurgery.

ABSTRACT
Aim. To report the clinical outcome of the removal of deeply impacted lower third molars in direct relationship with the inferior alveolar nerve through a lateral approach (the so-called bone lid technique).

Methods. From 2007 and 2011 six patients with symptomatic deeply impacted lower third molars in close relationship with the inferior alveolar nerve and therefore requiring surgical removal of the impacted teeth, were treated by means of the “bone lid” technique with piezoelectric instruments.

Results. Post-operative recovery was uneventful in all patients. Three patients reported a transient paresthesia in the area innervated by the inferior alveolar nerve which lasted from 7 to 30 days. No patients suffered permanent neural disturbances.

Conclusion. This approach allows direct control of the surgical field with a relevant reduction of possible damages to the inferior alveolar nerve during the removal of deeply impacted lower third molars, as compared to the standard approach.

Introduction
The removal of impacted lower third molars is one of the most frequent procedures in oral surgery because of the high prevalence of impaction (20% in developed countries) (1,2), and due to the high incidence of pathologies related to inferior third molar impaction, such as pericoronitis, cysts, periodontal damage and/or decay of adjacent teeth, neurologic symptoms and, finally, the occurrence of odontogenic tumors such as ameloblastomas (2 – 9).

Surgery can present various degrees of complexity, depending on the position and depth of the impacted tooth, in particular when in direct contact with the inferior alveolar nerve (10). In these cases, it is mandatory to perform a computed tomography of the mandible to evaluate the position and morphology of the tooth and its relationship with the nerve (8, 11-13). Despite the CT data, the surgical removal of deeply impacted lower third molars may be difficult if a standard approach (i.e. crestal approach with
removal of bone from the retromolar region) is used (2,10) because of the potentially limited access and visibility of the surgical field, the few angles allowed for management of surgical instruments (1). Due to the above mentioned aspects, this approach may require the removal of a relevant amount of bone, which may cause periodontal damage to the second molar and may leave a residual bone defect. The limited visibility, instead, may cause a lengthening of the operating time and a higher risk of damaging the inferior alveolar nerve, with increased postoperative morbidity (2, 8, 14). Therefore, in case of deep

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Table 1 - Patients details
impaction, a different surgical approach, proposed in 1993 by Alling and Alling (15), and consisting of the removal of a “bone lid” from the buccal side to expose the impacted tooth (15,16) may be indicated. This approach can provide better access and visibility of the impacted tooth and the possibility, once the impacted tooth has been removed, to reposition the bone lid in its original position, with practically no loss of bone (15). The aim of this paper is to present the results obtained by the authors using a similar approach on a sample of 6 patients.

Materials and methods
Six patients (Table 1) with symptomatic deeply impacted lower third molars in direct relationship with the inferior alveolar nerve were treated (Unit of Oral Surgery, University of Milan) by means of the “bone lid” technique performed with piezoelectric instruments. Each patient performed a panoramic radiograph and mandibular computed tomography before surgery. One patient was treated under local anesthesia and five under general anesthesia with naso-tracheal intubation. Antibiotic prophylaxis (Amoxicillin + Clavulanate 2 g) were administered to all patients one hour before surgery. Piezoelectric instruments (Mectron Piezosurgery®) were used in all cases for the preparation of the bone lid and the inferior alveolar nerve isolation, while traditional rotary instruments were used only for sectioning the tooth, if indicated.

Surgical procedure
The surgical procedure consisted of the elevation of a mucoperiosteal flap further extended towards the coronoid process and towards the buccal vestibule, similar to the one used in the traditional approach. The vestibular side of the flap was retracted to improve the access and visibility of the surgical field and to protect the soft tissue and important anatomical structures such as the facial artery.

By means of piezoelectric instruments, four osteotomic paths were outlined to isolate a bone block...
of adequate dimensions in the area of tooth impaction and removed with the aid of a surgical chisel; the bone lid was preserved in sterile saline to be fixed in its position after the removal of the tooth.

The impacted tooth was then sectioned according to surgical needs and removed, maintaining the inferior alveolar nerve under direct control and protection. After tooth removal, the bone lid was repositioned in its original place and fixed with titanium microscrews (in four cases).

In one case, in which the nerve was buccal to the impacted tooth and it was associated with an odontogenic tumour the bone lid was not repositioned. In one case, in which the nerve was very buccal to the tooth, the bone lid was not repositioned due to a high risk of nerve compression. Finally, the surgical flaps were sutured.

To reduce post-operative swelling, dexamethasone (8 mg) was administered perioperatively via intravenous injection. Antibiotic therapy with amoxicillin and clavulanate was prescribed to all patients (1 g every 12 hours for 6 days) in association with non-steroidal anti-inflammatory drugs. The patients followed a liquid and cold diet for 24 hours after surgery. Chlorexidine mouthwashes were prescribed in association to the usual oral hygiene for 10 days.

Results
Post-operative recovery was uneventful in 3 patients with no neurologic sequelae. Three patients reported paresthesia in the innervation area of the inferior alveolar nerve for a period ranging from one to four weeks, but no one of them had permanent neurological sequelae.

Post-operative radiographic controls were performed 6 and 12 months after the surgical procedure: all patients showed a complete healing of the surgical wound and the spontaneous re-ossification of the post-extraction alveolus. A case is presented in Figure 1.

Discussion
Surgical removal of impacted mandibular third molars is one of the most frequent oral surgery interventions (2, 17). In case of deep impaction and proximity of the impacted tooth with the inferior alveolar nerve, the risk of nerve damage is not negligible, as demonstrated by several studies, which report neural complications rates ranging from 0,4% to 25% (11,13-15,18-20). In all these publications, a conventional crestal approach was used. The approach proposed in this study, although more invasive and, for this reason, limited to the most complex cases, allows a better control of the surgical field and permits to identify and protect the inferior alveolar nerve in an easier way (15). Therefore, a significant reduction of intraoperative lesions of the inferior alveolar nerve can be obtained and permanent postoperative neurologic sequelae can be avoided (0% in this case series). Furthermore, the use of piezoelectric instruments allows to avoid damages to the surrounding soft tissues and of the inferior alveolar nerve during the bone lid preparation (21-26).

Conclusion
The bone lid technique for the removal of deeply impacted mandibular third molars demonstrated to be a safe and reliable technique, that can significantly simplify the surgical intervention and reduce the risk of neural damages.

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References
2. Chiapasco M, De Cicco L, Marrone G. Side effects and


