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Case

Inward fragmentation and socket preservation in complex mandibular third molar surgery - a case report.

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Abstract: Open extraction sockets following inward fragmentation of partially erupted mandibular third molars may compromise the hard tissue regeneration and lead to postoperative complications. In the case report, we present socket preservation to seal the open alveolous without flap displacement. A female patient aged 22, presented for removal of a partially erupted M3M was operated on via occlusal inward fragmentation under magnifying endoscopic vision. Critical nerve structures were identified and protected before socket preservation with resorbable in situ hardening TCP particles was performed. The alveolar bone site healed uneventful, panoramic and cross-sectional conebeam reformats confirmed an complete hard tissue maintanence. Endoscopically assisted inward fragmentation combined with socket preservation leads to the maintenance of adjacent hard tissues without need for flap transposition in complex anatomical sites.

Keywords: Mandibular impacted third molars; endoscope; inward fragmentation; socket preservation; CBCT.

INTRODUCTION.

Recently, low invasive surgical strategies to reduce the morbidity of third molar surgery have been described.[1] Coronectomy of impacted mandibular third molars may be performed instead of total extraction in patients presenting radiological characteristics of root proximity to the inferior alveolar nerve.[2] The inward fragmentation technique (IFT) with an occlusal approach has been reported as a low traumatic access to partially erupted M3M.[3,4] Following IFT, similar as following simple extraction, an occlusally open socket situation is left, however this may lead to postoperative complications like prolonged secondary healing, incomplete bone regeneration and periodontal defects at the second molar.[4] Due to the widespread use of conventional osteotomy in third molar surgery, quantification of bone loss in the past has not been of mayor scientific interest, as far as the stability of the mandible was not affected. With the advent of precise minimally invasive surgery, these paradigms begin to change.

As Delgado Ruiz *et al.,*[5] pointed out, socket preservation in grafted sockets may show up to 3mm gain of bony contour, provided adequate condensation is applied. Therefore socket preservation also might be helpful to support tissue regeneration at the M3M extraction site, although there is no evidence in the literature at present. Periodontitis

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of the second molar following M3M removal also represents a clinical challenge and several treatment strategies to decrease the risk of developing or worsening M2M periodontal disease as variation in flap design, root scaling, suture variation and GTR have been proposed in the literature.[6]

The case presented here shall provide first data on hard tissue maintenance when combining IFT and socket preservtion with an in situ hardening bone substitute.

CASE REPORT.

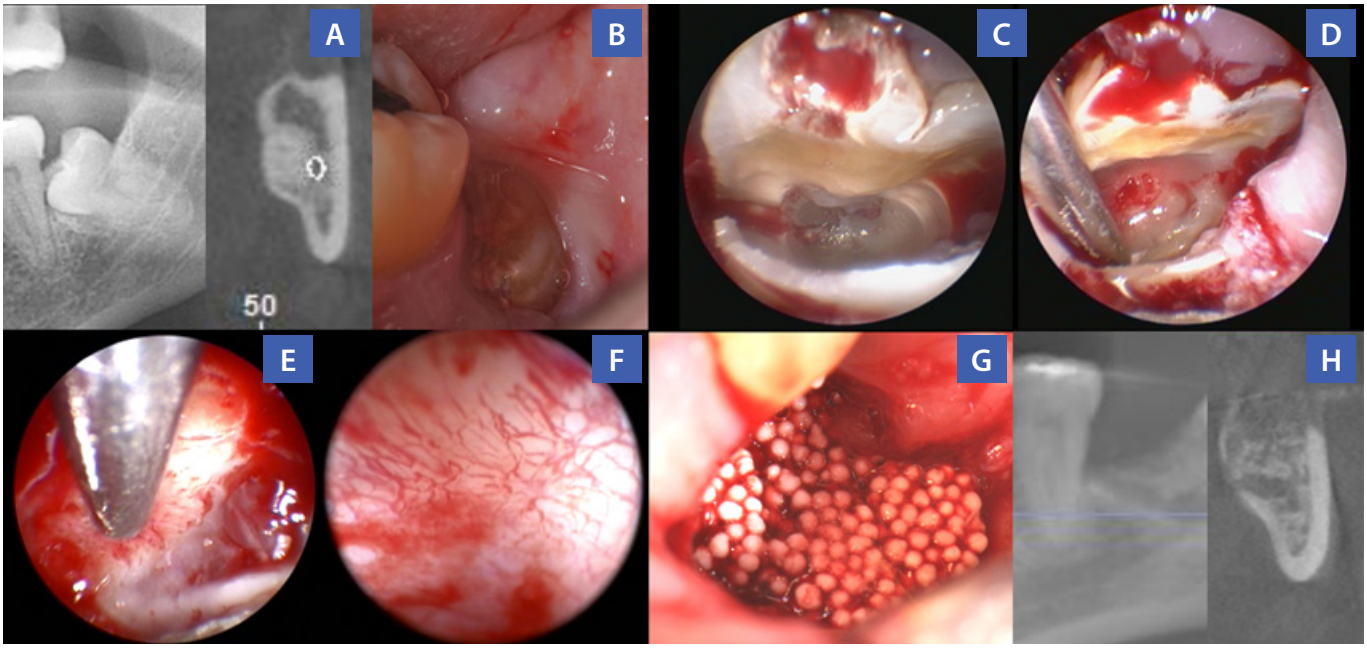
A female patient aged 22 years, presented at UFRO with partially erupted M3M requiring surgical removal for chronic periodontitis. The patients had a CBCT taken before surgery. Flapless minimally invasive surgery was performed under local anesthesia and endoscopic visualisation via a microsurgical occlusal exposure and subsequent inward fragmentation. Surgery was performed under local anesthesia (4% articaine with 1:100,000 epinephrine). The surgeon worked in a 12 o'clock position observing the site on a video screen via a Storz Hopkins support endoscope (30 view angle, 2.7mm or 4mm diameter, Karl Storz, Tuttlingen, Germany). The support endoscope was placed posterior to the surgical site and the surgical procedure did not take more than 25 minutes.

The case is shown in figure 1: The preoperative situation in panoramic and crossectional views is shown in figure 1A: A partially erupted complex tooth 38 with direct contact to the inferior alveolar nerve (IAN) is displayed (Figure 1A, 1B). Following transverse separation and inward fragmentation (Figure 1C, 1D), endoscopic evaluation reveals an exposed IAN (Figure 1E), support immersion endoscopy revealed that the lingual aspect of the alveolous was intact (Figure 1F).

The exposed nerve bundle was covered with a collagen sponge and the socket was filled with self hardening bone substitute (GUIDOR easy-graft CLASSIC, Sunstar, Etoy, Switzerland)(Figure 1G).

No primary wound closure was intended. The complete maintenance of hard tissue after 4 months is documented in figure 1H: The CBCT reveals adequate hard tissue recovery, the translucency corresponds to the collagen sponge. Following surgery a mild discharge of TCP particles during the first week of follow–up was noted. No inflammatory complications and no paresthesia were observed.

Figure 1. High risk partially erupted 38 .



1A. Pre-op. OPT and CBCT crossetion. **1B.** Clinical view. **1C - 1D.** Endoscopic views during removal using IFT. **1E.** Endoscopic view of the IAN. **1F.** Endoscopic view (immersion endoscopy) of the lingual aspect of the alveolus. **1G.** Socket preservation. **1H.** Postop CBCT at 4 months with hard tissue formation. Note the translucent area following placement of collagen sponge.

DISCUSSION.

The present case gives evidence, that an occlusal approach under endoscopic visualization with inward fragmentation allows a maintenance of hard tissue at the preoperative level. Using IFT, only a circumscript occlusal bone defect results following the exposure of the occlusal aspect of the crowns, thus a spontaneous fracture risk following surgery can practically be excluded. In the future, similarly to flapless implant surgery, a 3D surgical splint-guided preparation could be applied to obtain precise access to the M3M furcation area.[7]

If required, surgeons with less experience may extend the bone removal from the occlusal to the lateral aspect of the mandible in order to get access for burs mounted in a straight handpiece. Nevertheless the amount of bone removal always can be kept below a critical size with respect to fracture risk.[4]

Coronectomy as an alternative procedure appears to completely avoid alveolar nerve injury, however an eruption of the retained root(s) and in 11.3% a second surgical procedure was required to remove the root remnants.[8] Tabrizi *et al.,*[9] stated that reconstructive procedures as DFDBA with or without lincomycin therapy did not offer predictable benefits compared with a no-treatment protocol in patients younger than 30 years old following conventional third molar surgery.[9]

Socket preservation in 3rd molar surgery only makes sense, if the advantages of

a) 3D surgical planning are used, b) optimized intraoperative visualisation is given to support a precise inward fragmentation and c) principles of flapless technique are applied. Under these conditions, socket preservation with an *in situ* hardening material appears to prevent hard tissue defects as well as postoperativ food impaction within the socket, which might occur in deep sockets with the nerve exposed. However an exposed aleolar nerve should be coverered to avoid direct contact with TCP particles.

As a conclusion, the IFT appears to be an adequately safe procedure with practically no need for secondary surgery and a good recovery of the hard tissue, if used in combination with an in situ hardening bone filler. Using socket preservation with an in situ hardening bone filler, the case report reveals a favourable hard tissue level adjacent to the second molar to prevent periodontal defects.

CONCLUSION.

Socket preservation following M3M removal makes sense, if flapless microsurgical inward fragmentation is applied. The use of an in situ hardening bone filler may prevent the formation of alveolar bone defects.

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