PriMera Scientific Surgical
Research and Practice
Volume 2 Issue 5 Noember 2023
DOI: 10.56831/PSSRP-02-069
ISSN: 2836-0028

Incomplete Sagittal Split Osteotomy for the Extraction of a Fully Impacted Lower Third Molar: A Case Report

Type: Case Report
Received: October 20, 2023
Published: October 28, 2023

Citation:
Andrei Krasovsky., et al. "Incomplete Sagittal Split Osteotomy for the Extraction of a Fully Impacted Lower Third Molar: A Case Report". PriMera Scientific Surgical Research and Practice 2.5 (2023): 31-37.

Ori Blanc[1]*, Andrei Krasovsky[3]*, Dekel Shilo[1,2], Tal Capucha[3], Chaim Ohayon[3] and Adi Rachmiel[2,4]

[1]Senior Doctor, Department of Oral and Maxillofacial Surgery, Rambam Medical Care Center, Haifa, Israel

[2]Ruth & Bruce Rappaport Faculty of Medicine at the Technion-Israel Institute of Technology, Haifa, Israel

[3]Resident Doctor, Department of Oral and Maxillofacial Surgery, Rambam Medical Care Center, Haifa, Israel

[4]Department Head, Department of Oral and Maxillofacial Surgery, Rambam Medical Care Center, Haifa, Israel

***Corresponding Author:** Andrei Krasovsky, Resident Doctor, Department of Oral and Maxillofacial Surgery, Rambam Medical Care Center, Haifa, Israel.

Abstract

Background: The sagittal split osteotomy method for extraction of the mandibular third molars can be used in cases of deeply seated teeth, positioned in proximity to the mandibular canal, jeopardizing the integrity of the inferior alveolar nerve and the mandible itself. The classic sagittal split osteotomy approach, adopted from orthognathic surgery, may increase the risk of postoperative malocclusion and Temporomandibular joint dysfunction. For this reason, we would like to purpose a modified technique of sagittal split osteotomy that can be used for extractions.

Methods: This study presents a case of using a modified incomplete sagittal split osteotomy approach for the extraction of a deeply impacted right mandibular third molar in a 43-year-old man under general anesthesia.

Results: Only the superior border of the mandibular cortex was separated for approaching the impacted tooth while leaving the inferior cortex intact. After the surgery no inferior alveolar nerve sensory deficit was observed and the incomplete fracture was reduced back to the original anatomical position.

Conclusions: We suggest using the incomplete sagittal split osteotomy technique in deeply impacted third molars which pose a high risk when extracted. It allows for superior healing with perfect alignment of the segments.

Keywords: Sagittal split osteotomy; Third molars; Extraction; Wisdom teeth; Impacted

Introduction

Management of impacted mandibular third molars is one of the most common practices for an oral & maxillofacial surgeon [1, 2]. In deeply impacted teeth, the clinician may encounter a dilemma between retention versus extraction for a given patient. While removing asymptomatic impacted third molars is disputable [1], in cases where symptoms or adjacent pathology are present, a surgical solution is preferred [2]. Several surgical approaches may be considered. The intraoral routes include conventional ostectomy, buccal/lingual corticotomy, and coronectomy [3, 4]. Alternatively, reaching the impacted third molar through the submandibular space may be performed via an extraoral route [5]. The above techniques have limitations such as "iatrogenic" mandibular fracture, damage to adjacent teeth, IAN injury, and lingual nerve injury. The extraoral approach may result in facial nerve injury and a hypertrophic scar secondary to the surgical skin wound [6].

Sagittal split osteotomy (SSO) is another approach to consider in cases exhibiting a close relationship between third molars and the IAN or in cases removal of the deeply positioned tooth may risk the integrity of the bone [7, 8]. SSO is one of the most commonly used procedures in orthognathic surgery. This procedure involves three distinct bone cuts; a cut through the lateral cortex in the area of the second molar directed inferiorly, a horizontal cut through the medial cortex superior to the lingula, and a sagittal osteotomy between the latter, through the ramus. Although SSO is used in orthognathic surgical procedures, it provides excellent access to teeth impacted in the ascending ramus, while avoiding excessive bone removal [9]. To our knowledge, the largest case series reported to use the SSO method, included 21 impacted mandibular teeth and was published by Catherine et al [6]. This report provided a detailed analysis referring to indications, pitfalls, and outcomes. This report stressed the benefit of using the SSO method in removing deeply impacted third molar teeth. The disadvantages of the classic SSO technique include the potential complications associated with this procedure, such as disturbance of the IAN, TMJ disorders, condylar resorption, nonunion or malunion fractures, malocclusion, and bad splits [6]. Abu-El Naaj et al [10] developed a Third Molar Classification (TMC) used for selecting an appropriate treatment plan for different types of impacted mandibular third molars. According to this classification, the SSO approach is highly recommended when third molars are impacted with more than a third of their root below the mandibular canal.

In this case report we would like to describe a modified technique: Incomplete SSO. This technique includes the advantages of the SSO method, while at the same time minimizing the risk of bad split complications, allowing for a superior healing process with perfect alignment of the segments and subsequently reducing the potential negative effects on the occlusion and the TMJ complex.

Case Description and Results

A modified incomplete SSO is performed under general anesthesia. A mucoperiosteal flap is raised using a vestibular incision starting from the first molar and extending to the mandibular ramus. The mental nerve and ante-linguale are identified. Above the lingula, a medial osteotomy is performed using a piezoelectric bone saw. Next, a vertical osteotomy of the buccal cortex next to the second molar is performed. The vertical cut is continued to the lower border, while sparing the inferior cortex, as opposed to the classic SSO technique. A sagittal cut is then performed to connect the latter, taking care to stay above the lower cortex (Fig 1A). Osteotomes are used midlength to allow for the position of a spreader. Next, a spreader is introduced and the segments are separated at the superior border, taking advantage of the elasticity of the medulla (Fig 1B), allowing for the identification and removal of the third molar (Fig 1C). For removing the impacted tooth, the maximal spreading gap is desired at the most superior border of the medial osteotomy line, thus the spreader is not driven to the inferior border, but rather applies the splitting forces superficially and distally to the impacted tooth, as can be observed in Fig 1B and 1C. By doing so, the separating distance is minimized at the relatively distant inferior end of the vertical osteotomy, thus reducing the possibility of a fracture or bad split in that area. After exposure, splitting of the impacted tooth may be considered to enable a lesser degree of bone spreading, thus decreasing the risk of a bad split. A virtual illustration of the modified SSO split is presented in Fig 2. Osteosyntethis is performed with a 1.5 mm titanium plate and fixated using 4 monocortical screws.

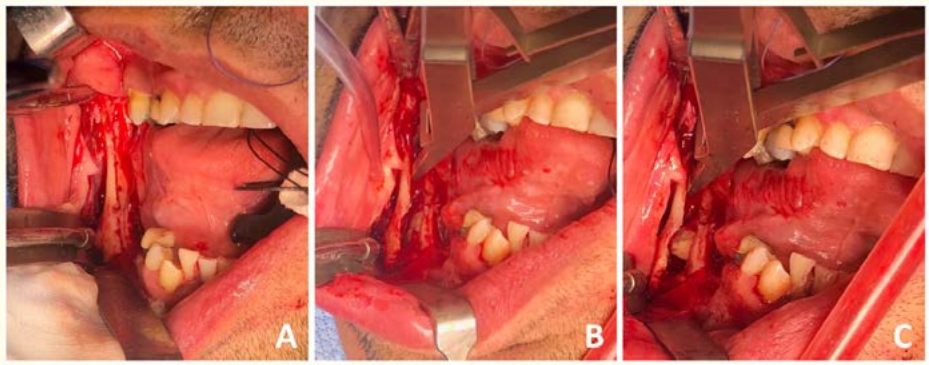

Figure 1: Intraoperative view. (A) Sagittal cut connecting the medial osteotomy above the lingula with the vertical osteotomy of the buccal cortex next to the second molar. (B) A spreader is used to separate the segments at the superior border. (C) Exposure of the third molar.

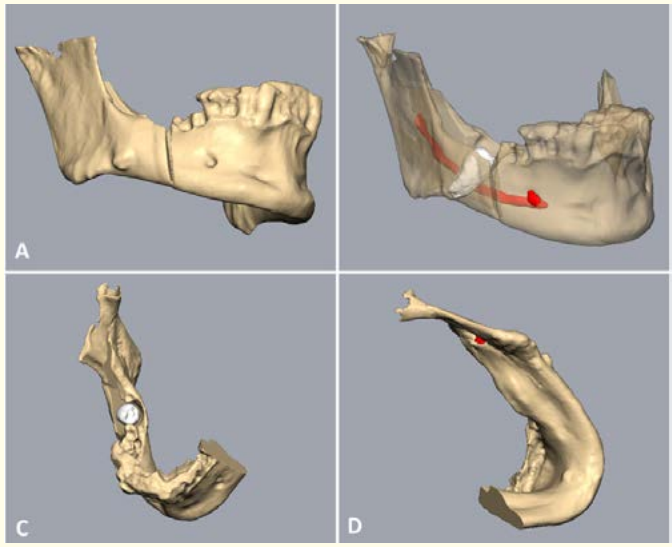

Figure 2: Virtual illustration of the modified SSO technique. (A) Buccal view of the mandible presenting a vertical cut to the lower border without removing the inferior cortex. (B) Transparent view of the mandible demonstrating the relationship between the impacted third molar and the IAN after completing the modified SSO. (C) Superior view of the mandible presenting the anterior-posterior span of the split and the created route for extraction. (D) Postero-inferior view demonstrates the intact posterior and inferior borders of the mandible.

A 43-year-old man was referred to our department suffering from dental pain and difficulty with eating. The patient also suffered from cognitive impairment secondary to the removal of a benign brain tumor 20 years ago, with no history of chemo-or radiotherapy. On physical examination, he did not exhibit signs of acute infection. No intra or extraoral swelling was present. Normal mouth opening was observed and no enlarged or tender lymph nodes were palpated. Mandibular third molars were not exposed to the oral cavity. A panoramic radiograph showed all lower molar teeth were indicated for removal due to extensive caries and periodontal damage. In addition, deeply impacted mandibular third molars, partially surrounded by radiolucent lesions, were observed (Fig 3). A Cone Beam

Computed Tomography (CBCT) confirmed the proximity of the right mandibular third molar roots to the IAN and revealed the thin adjoining buccal cortex as well as the minimal residual bone in the inferior border (Fig 4A). CBCT of the left mandibular third molar demonstrated a thick buccal plate with a superior position of the roots relative to the IAN and a thicker bone in the inferior border (Fig 4B).

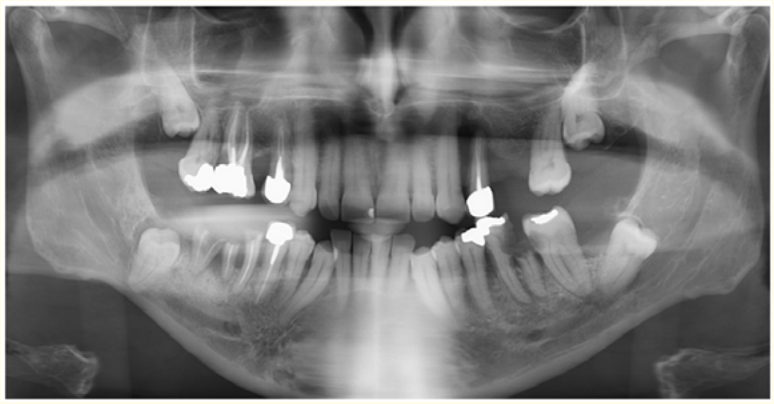

Figure 3: Preoperative panoramic radiograph showing extensive dental damage and the high-risk relation between the right third molar and the IAN. In addition, the right third molar occupies all the vertical aspect of the mandibular angle, thus increasing the risk for a mandibular fracture when removed.

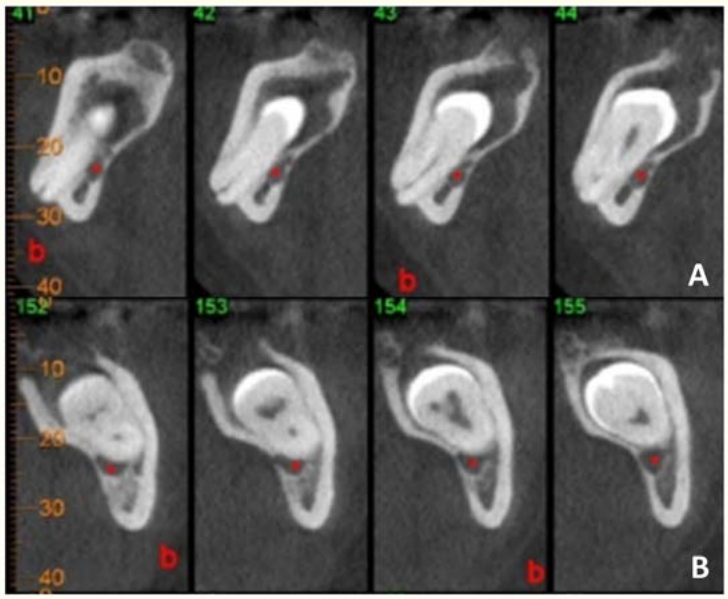

Figure 4: CBCT shows (A) a high-risk relationship between the right mandibular third molar and the IAN (indicated by a red dot), a thin buccal plate, and a thin residual inferior border. These increase the risk of mandibular fracture during conventional extraction methods. (B) Deeply impacted left mandibular third molar, thick buccal plate, and an IAN position below the root. These do not interfere with the classic extraction method.

Due to the risk of harming the integrity of the nerve and continuity of the mandible in the region of the right mandibular third molar, the classic methods were excluded. Therefore, the SSO approach was planned for accessing the right mandibular third molar, whereas the left mandibular third molar was planned to be removed by conventional ostectomy. Other teeth indicated for removal were extracted earlier under local anesthesia in a separate session at the outpatient clinic.

The molar and the lesion enclosing the crown were removed and submitted to pathology, using the modified SSO approach, as described above. The perfect alignment of the segments is evident (Fig 5). The postoperative course was uneventful, with no changes in the function of the IAN. Finally, the histopathological features of the sample were consistent with an inflamed dentigerous cyst. At the 4-month follow-up visit, the patient had no complaints and no signs of infection, healing impairment, sensory deficit, or occlusal alterations. A normal healing course was also observed on a panoramic radiograph (Fig 6).

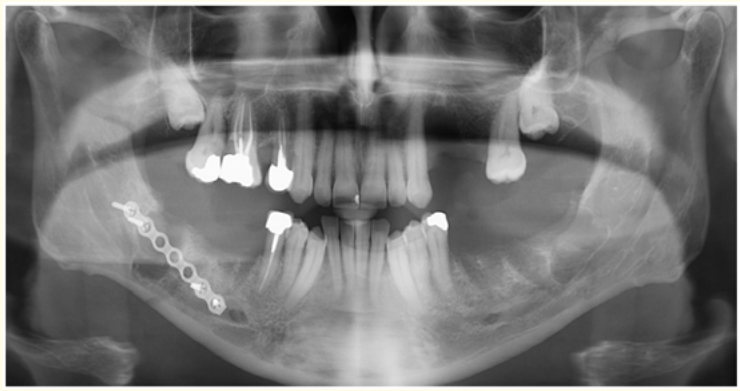

Figure 5: Postoperative panoramic radiograph showing the fixation of the segments using a 1.5 mm titanium plate. Sockets of the molars, as well as the rest of the extracted teeth, are evident.

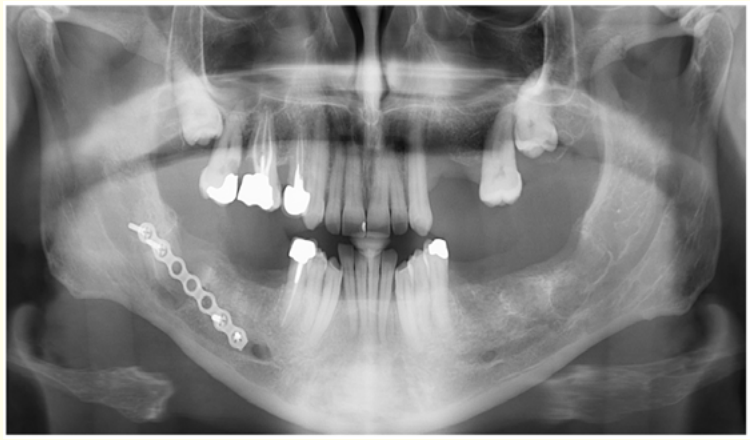

Figure 6: Panoramic radiograph 4 months following the Rt. modified incomplete SSO and teeth removal demonstrating new bone formation in the socket area.

Discussion

The use of the SSO method for the removal of deeply impacted third molars was previously reported in the literature. In this report, we suggest using an incomplete SSO technique. This approach results in superior healing while reducing the probability of complications such as malocclusion and TMJ disorders resulting from condylar sag and/or resorption following the complete separation of the segments and improper fixation [11-13]. The superior borders of the medial osteotomy can be dramatically separated before completing a full vertical osteotomy at the inferior border, without the risk of a bad split, leaving enough space to remove the impacted tooth.

In this report, the presence of a radiolucent lesion associated with the crown of the unerupted mandibular third molar was strongly suggestive of a pathological process. Thus, surgical treatment was indicated to address the lesions associated with the impacted tooth. A concurrent presence of cystic lesion around an impacted third molar mechanically weakens the angular region of the mandible, hence increasing the risk of fracture during third molar removal [14]. Furthermore, over a third of the root was located below the mandibular canal, thus classifying it as IIb according to the TMC classification [10]. All of the above, along with the successful experience documented in the literature, suggested using the SSO approach for the removal of the right mandibular third molar.

Several previous case reports used intermaxillary fixation (IMF) for a period of 1-2 weeks following the extraction of deeply impacted third molars by the SSO method for initial stabilization and to ensure proper alignment of the segments affecting the occlusion [10, 15]. Because an incomplete SSO was performed, improper occlusion or alignment of the segments was not an issue and thus IMF was not indicated either way.

Conclusions

This report illustrates that, in well-defined indications, SSO can be an appropriate alternative to conventional approaches for the extraction of deeply impacted mandibular third molars with a surrounding pathology and potential damage to the IAN/integrity of the mandible, and that a modified incomplete SSO can overcome the disadvantages and possible complications resulting from the classical SSO approach.

Acknowledgments and Disclosure Statements

We have no conflicts of interest.

References

1. RD Marciani. “Third Molar Removal: An Overview of Indications, Imaging, Evaluation, and Assessment of Risk”. Oral and Maxillofacial Surgery Clinics of North America 19.1 (2007): 1-13.
2. LK Rafetto. “Managing Impacted Third Molars”. Oral and Maxillofacial Surgery Clinics of North America 27.3 (2015): 363-371.
3. YD Kwon., et al. “Separation of the buccal cortical plate for removal of the deeply impacted mandibular molars”. International Journal of Oral and Maxillofacial Surgery 35.2 (2006): 180-182.
4. MA Pogrel, JS Lee and DF Muff. “Coronectomy: A technique to protect the inferior alveolar nerve”. Journal of Oral and Maxillofacial Surgery 62.12 (2004): 1447-1452.
5. N Milner and A Baker. “Extraoral removal of a lower third molar tooth”. British Dental Journal 199.6 (2005): 345-346.
6. Z Catherine and P Scolozzi. “Mandibular Sagittal Split Osteotomy for Removal of Impacted Mandibular Teeth: Indications, Surgical Pitfalls, and Final Outcome”. Journal of Oral and Maxillofacial Surgery 75.5 (2017): 915-923.
7. DS Precious. “Removal of third molars with sagittal split osteotomies: The case for”. Journal of Oral and Maxillofacial Surgery 62.9 (2004): 1144-1146.
8. A Toffanin, A Zupi and A Cicognini. “Sagittal split osteotomy in removal of impacted third molar”. Journal of Oral and Maxillofacial Surgery 61.5 (2003): 638-640.
9. E Cansiz, SC Isler and BA Gultekin. “Removal of deeply impacted mandibular molars by sagittal split osteotomy”. Case Reports in Dentistry (2016).

10. IA El Naaj., et al. "Surgical Approach to Impacted Mandibular Third Molars-Operative Classification". Journal of Oral and Maxillofacial Surgery 68.3 (2010): 628-633.
11. M Friscia., et al. "Complications after orthognathic surgery: our experience on 423 cases". Oral and Maxillofacial Surgery 21.2 (2017): 171-177.
12. MT Robl, BB Farrell and MR Tucker. "Complications in orthognathic surgery a report of 1000 cases". Oral and Maxillofacial Surgery Clinics of North America 26.4 (2014): 599-609.
13. JP Reyneke and C Ferretti. "Intraoperative diagnosis of condylar sag after bilateral sagittal split ramus osteotomy". British Journal of Oral and Maxillofacial Surgery 40.4 (2002): 285-292.
14. GF Bouloux, MB Steed and VJ Perciaccante. "Complications of Third Molar Surgery". Oral and Maxillofacial Surgery Clinics of North America 19.1 (2007): 117-128.
15. M Sencimen., et al. "Extraction of a deeply impacted lower third molar by sagittal split osteotomy". Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology and Endodontology 108.5 (2009).