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Comparative Study Between Traditional and Modern Methods for Extraction of Impacted Lower Third Molars

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Abstract

Introduction: Extraction of impacted lower third molars is a common surgical procedure in oral and maxillofacial surgery, often accompanied by postoperative complications such as pain, swelling, and nerve injury. Recent years have witnessed significant advancements in surgical extraction techniques, including the use of lasers in the postoperative phase to reduce pain and swelling. Additionally, endoscopes and surgical microscopes have been employed to increase the precision of the procedure and minimize tissue damage. Furthermore, the use of three-dimensional cone beam computed tomography (CBCT) has improved surgical planning.

Methods: A comparative study was conducted on patients suffering from impacted lower third molars, divided into two groups. The first group underwent extraction using conventional rotary instruments in a collaboration between Cordoba Private University and Al-Razi Hospital in Aleppo Governorate. The second group used modern techniques including surgical planning with CBCT, endoscope-and microscope-assisted surgery, and application of laser treatment after extraction.

Results: The results showed that the group using modern techniques experienced a significant reduction in postoperative pain and swelling, along with faster healing time. Additionally, the incidence of nerve complications was lower compared to the group treated with traditional methods. It was noted that the duration of surgery in the modern group was slightly longer due to the use of assisting devices, but this did not affect the quality of the final outcomes.

Conclusion: This study demonstrates that the use of modern techniques such as three-dimensional cone beam computed tomography (CBCT), surgical endoscopy, microscopy, and laser therapy in the extraction of impacted lower third molars effectively contributes to improving clinical outcomes and reducing

complications. Therefore, it is recommended to adopt these techniques in routine surgical practices to enhance the quality of patient care.

Keywords: Impacted Lower Third Molar Extraction, Laser, Surgical Endoscopy, Microscopy, Three-Dimensional Cone Beam Computed Tomography (CBCT), Surgical Extraction.

Introduction

Impacted lower third molars are among the most common cases requiring surgical intervention in oral and maxillofacial surgery. They are often associated with postoperative complications such as severe pain, swelling, functional limitation, and injury to the inferior alveolar nerve. Although traditional methods for surgical extraction—such as surgical flap creation and the use of rotary instruments for bone removal—are commonly employed, these procedures can cause damage to the surrounding soft tissues and neural structures, especially in cases of deep impaction or proximity to the inferior alveolar canal.

In recent decades, oral surgery has witnessed significant advances in tools and techniques, with the introduction of aids aimed at improving precision and reducing complications. Among these techniques are Three-dimensional cone beam computed tomography (CBCT), which allows for 3D surgical planning that takes into account the anatomical relationship between the root and the nerve. Surgical microscopes and endoscopes that provide magnified and guided visualization, enabling precise incisions and avoidance of nerve damage

Lasers, used in the postoperative phase to reduce pain and swelling and to stimulate healing more effectively compared to traditional methods.

Despite the availability of these technologies, their actual superiority over traditional methods in terms of clinical outcomes and postoperative.

comfort remains a subject of debate. Some studies report clear benefits, while others show no statistically significant differences.

Based on this, the present study aims to compare the clinical outcomes of surgical extraction of impacted lower third molars using traditional methods versus modern techniques relying on CBCT, surgical microscopy or endoscopy, and laser application post-extraction. The comparison focuses on several factors including surgery duration, pain intensity, swelling, healing time, and the incidence of nerve complications.

Materials and Methods

This comparative clinical study was conducted by the University of Cordoba in collaboration with the Oral and Maxillofacial Surgery Department at Al-Razi Hospital in Aleppo Governorate, after obtaining approval from the department supervisor, Dr. Hala kattan The study was designed to include patients aged between 18 and 35 years, all requiring extraction of impacted lower third molars, according to specific criteria.

Inclusion Criteria

1. Presence of lower third molars in partial or full impaction according to the Pell and Gregory classification.
2. Absence of chronic systemic diseases affecting wound healing No acute infections at the time of extraction.

Exclusion Criteria

1. Presence of adjacent cysts or tumors
2. History of nerve injury or surgery in the area
3. Use of anticoagulants or immunosuppressive drugs

Patient Grouping

Group One (Traditional Method): Extraction was performed using the conventional method, including a triangular mucosal incision, removal of bone with a high-speed rotary instrument, followed by extraction of the impacted lower molars.

Group Two (Modern Method): A comprehensive protocol was followed, which included

Preoperative planning using 3D Cone Beam Computed Tomography (CBCT) to determine the root's relationship to the inferior alveolar canal.

Extraction using a surgical microscope or endoscope, with precise instruments and localized bone removal.

Application of low-level laser therapy to the extraction site post-operation to stimulate healing and reduce inflammation.

A case of impacted lower third molar extraction was documented at Al-Razi Hospital, Department of Oral and Maxillofacial Surgery.

Figure 1: The panoramic radiograph reveals an impacted mandibular left third molar.

The conventional technique was used for the extraction of the lower left third molar in this case: In the first group, extraction was performed using the standard conventional surgical technique. The procedure began with the administration of local anesthesia using 2% lidocaine with 1:100,000 epinephrine. A triangular mucosal flap (a sulcular anterior incision with posterior extension) was made, followed by the elevation of a thick much periosteal flap using a periosteal elevator. The overlying bone was removed using a high-speed surgical handpiece with continuous saline irrigation to cool the area and minimize thermal damage. In cases where tooth sectioning was necessary, the root was divided into segments using a surgical bur and extracted in a stepwise manner. Following tooth removal, the socket was cleaned of bone fragments and necrotic tissue, and then irrigated with 0.12% chlorhexidine solution. Suturing was performed using 3-0 silk sutures in a simple interrupted fashion, and the patient was instructed to follow standard postoperative care guidelines.

Figure 2: Clinical photograph of the impacted third molar

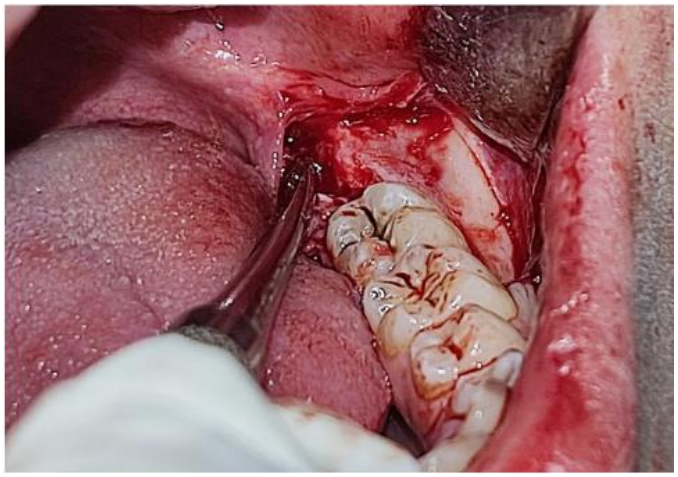

Figure 3: Elevation of a thick mucosal flap using a periosteal elevator.

Figure 4: After removal of the overlying bone of the impacted molar.

Figure 5: Shows the extracted molar.

Figure 6: Clinical appearance of the mucosa after extraction of the impacted molar.

Figure 7: Suturing of the surgical incision.

The second case of surgical extraction using conventional methods

A 35-year-old female patient at Al-Razi Hospital, Department of Maxillofacial Surgery, presented with pain in the left lower jaw.

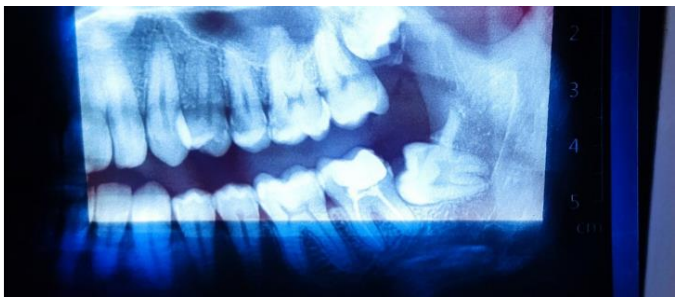

Figure 8: Panoramic radiograph showing the horizontally impacted lower left third molar.

Impaction Position: The lower third molar (wisdom tooth) is horizontally impacted at an approximate 90-degree angle, with its crown directed anteriorly towards the second molar. This is considered one of the most surgically challenging types of impaction

Complete Bony Impaction: The third molar is completely covered within the cortical and alveolar bone and is not clinically visible. intraorally, indicating a fully impacted tooth that has not erupted

Contact with the Second Molar: There is clear contact between the crown of the impacted third molar and the root of the second molar, which may pose a risk to the adjacent tooth, increasing the possibility of root resorption or development of caries in the second molar

Clinical Evaluation: No clinical exposure of the third molar intraorally No current accompanying gingival inflammation (as long as there is no crown exposure) The patient is currently asymptomatic; however, the presence of the tooth in this position poses a potential future risk due to pressure on the second molar or cyst formation around the impacted tooth.

Figure 9: Clinical image showing no eruption of any part of the third molar.

Proposed Treatment Plan: Surgical extraction under local anesthesia using bone removal and tooth sectioning techniques to minimize potential damage or to extract the tooth intactness

Figure 10: An oblique anterior incision was made along with a horizontal incision on the gingival margin extending behind the second molar.

The surface of the crown, partially covered by bone, is clearly visible after removal of a portion of the alveolar bone surrounding the impacted third molar.

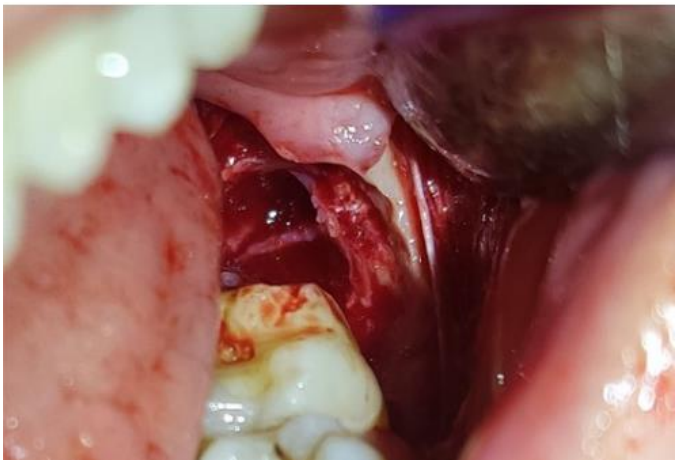

Figure 11: The image shows the extraction socket after complete removal of the horizontally impacted lower third molar.

The extraction socket appears open and clean, with no visible tooth fragments or pathological tissues.

Preoperative Planning Using Three-Dimensional CBCT to Assess the Relationship Between Impacted Molar Roots and the Inferior Alveolar Canal

Accurate assessment of the anatomical relationship between impacted molar roots and the inferior alveolar canal is a critical step in proper surgical planning. The use of three- dimensional cone-beam computed tomography (CBCT) has enhanced the surgeon's ability to visualize root morphology and its proximity to vital structures in a three-dimensional context.

This section aims to highlight the importance of CBCT as a modern diagnostic tool that aids in minimizing surgical extraction complications and improving treatment outcomes.

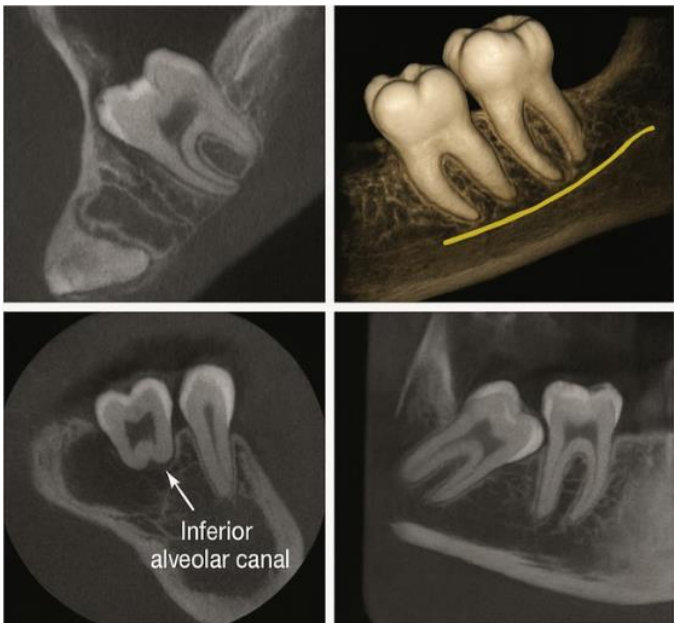

Figure 12: Cross-sectional images obtained via three-dimensional cone- beam computed tomography (CBCT) demonstrating the anatomical relationship between the roots of impacted molars and the inferior alveolar canal at various planes (axial, coronal, and sagittal). These images highlight the importance of preoperative planning in assessing the proximity to the neurovascular canal, thereby reducing the risk of injury during surgical extraction.

The use of the surgical microscope and endoscope in impacted molar extraction techniques.

Oral surgery has witnessed significant advancements in recent years with the introduction of precision optical tools designed to enhance procedural accuracy and minimize the risks associated with conventional surgery. Among the most prominent of these tools are the surgical microscope and endoscope, which provide magnified and guided visualization, allowing the surgeon to navigate deep and delicate areas within the surgical field with high precision.

These techniques are increasingly employed in the extraction of impacted molars, particularly in cases where the roots are in close proximity to the inferior alveolar canal. They contribute to improved visual clarity, better guidance during the extraction process, and reduced risk of nerve injury—ultimately leading to superior treatment outcomes and faster recovery.

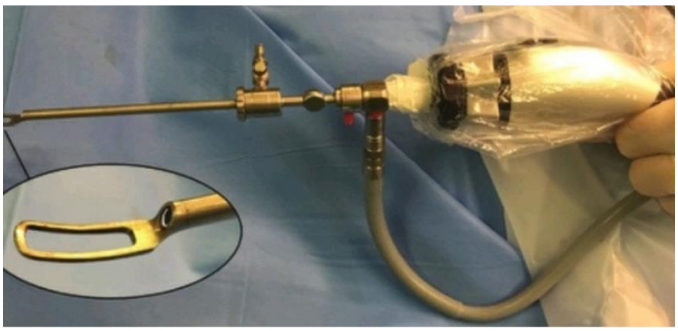

Figure 13: Endoscopic view utilized in oral and maxillofacial surgical procedures. The endoscope provides magnified and targeted visualization of the surgical field, enhancing procedural precision and minimizing the risk of injury to adjacent vital structures.

Low-level laser therapy (LLLT) complements the surgical intervention by promoting healing and enhancing patient comfort.

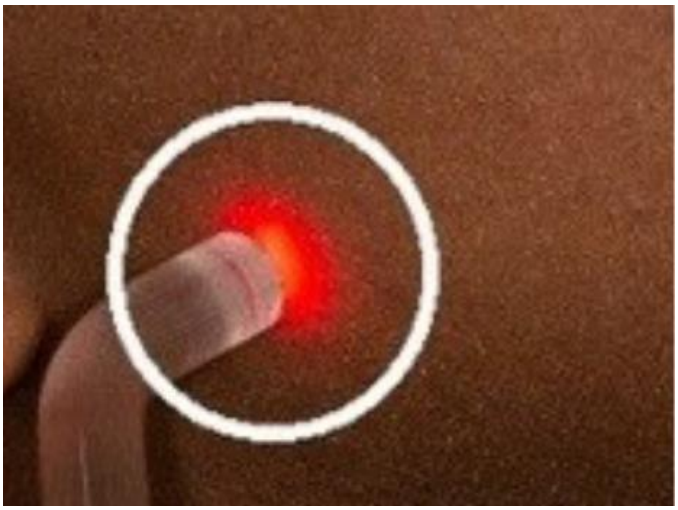

Figure 14: The illustration shows a 30-second extraoral postoperative laser treatment of the skin circled in white with a laser or diode laser "MED_701" immediately after impacted molar extraction.

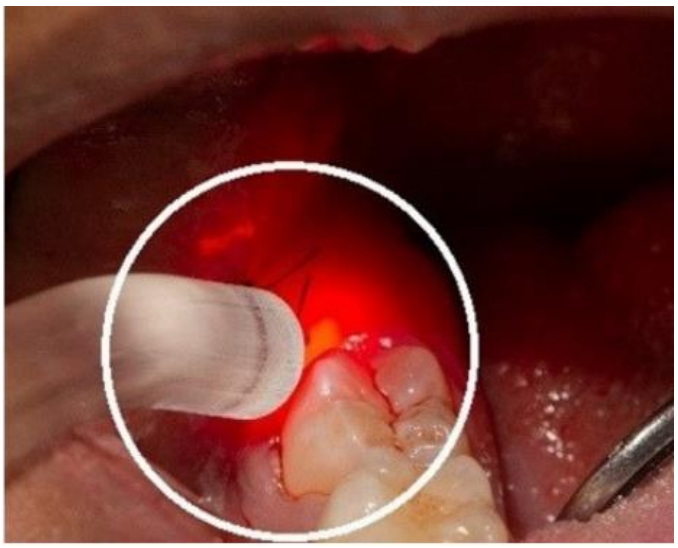

Figure 15: Postoperative intraoral laser application for 30 seconds without direct contact with the oral mucosa (highlighted by a white circle), using either a sham laser or a diode laser (Model: MED_701, GalAllnp), immediately after surgical extraction of the impacted third molar.

Results

The study demonstrated that the use of advanced techniques in the extraction of impacted third molars provides significant improvements compared to conventional surgical methods in terms of pain reduction, bleeding control, and recovery time. Patients who underwent extraction using modern instruments exhibited faster healing and greater postoperative comfort, with fewer complications such as inflammation and damage to surrounding tissues. Conversely, cases treated with traditional extraction methods showed higher rates of pain, bleeding, and prolonged recovery periods. Additionally, the operator's skill in utilizing advanced techniques was identified as a critical factor in ensuring successful outcomes. Despite these benefits, the cost of equipment and limited availability in certain regions may restrict the widespread adoption of these technologies. Accordingly, the study recommends enhancing training programs on modern techniques and expanding their accessibility to improve the quality of dental care in impacted third molar extractions.

Conclusion

The findings of this study highlight the significance of technological advancements in the extraction of impacted third molars, demonstrating that modern techniques effectively improve surgical outcomes compared to conventional methods. These techniques reduce surgical invasiveness, leading to decreased postoperative pain and bleeding, accelerated healing, and fewer potential complications such as inflammation and damage to surrounding tissues. This progress not only enhances patient comfort but also elevates the quality of oral healthcare delivery.

However, challenges associated with these technologies should not be overlooked, including the high cost of advanced equipment and the requirement for specialized skills and expertise for successful implementation. Additionally, limited availability of these technologies in certain regions or clinics restricts equitable patient

access. Therefore, it is recommended to invest in comprehensive training programs for clinicians to proficiently utilize these modern techniques and to provide adequate support for their implementation. Expanding the accessibility of advanced instruments across medical centers and dental clinics is also crucial to ensure broader patient benefit. Adopting these innovative approaches not only enhances treatment efficacy but also contributes to increased patient satisfaction and reduced surgical complications, positively impacting overall oral health and quality of life.

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