

RISK FACTORS FOR POSTOPERATIVE COMPLICATIONS FOLLOWING THE EXTRACTION OF IMPACTED THIRD MOLARS

Tursunov Oyatilloh Raxmatillo o'g'li

Resident in the Department of Maxillofacial Surgery,
Central Asian Medical University

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Abstract. *The extraction of impacted third molars is a common procedure in oral and maxillofacial surgery; however, postoperative complications may include pain, swelling, trismus, alveolar osteitis, surgical site infection, bleeding, and neurosensory disturbances. This article aims to analyze risk factors associated with these outcomes based on literature. A narrative review approach was used to examine evidence concerning patient-related characteristics, anatomical and radiological findings, surgical complexity, and preventive strategies. The literature indicates that smoking, pre-existing inflammation, medication-related factors, deep impaction, unfavourable tooth angulation, complex root morphology, and proximity to adjacent anatomical structures may influence complications. The extent of tissue manipulation, bone removal, and operative duration may also affect recovery. These associations differ according to the complication and study design. Comprehensive preoperative assessment, individualized surgical planning, patient education, and postoperative monitoring are therefore important components of care.*

Keywords: *Impacted third molars, postoperative complications, risk factors, alveolar osteitis, surgical site infection, oral and maxillofacial surgery.*

Introduction

Impacted third molars, commonly known as wisdom teeth, represent an important clinical concern in modern dentistry and oral and maxillofacial surgery. These teeth remain partially or completely embedded in the jawbone or surrounding soft tissues because of insufficient space for eruption, abnormal positioning, or other anatomical factors. Their presence may contribute to local inflammation, pain, dental caries, periodontal tissue damage, and pathological changes affecting adjacent second molars. In certain clinical situations, surgical extraction is indicated to prevent or manage these complications. However, the success of the procedure is determined not only by the successful removal of the tooth but also by an uncomplicated postoperative recovery and the restoration of the patient's normal oral functions.

Postoperative complications following impacted third molar extraction may present with varying degrees of severity. Common complications include pain, facial swelling, restricted mouth opening (trismus), alveolar osteitis (dry socket), surgical site infection, postoperative bleeding, and sensory disturbances. The anatomical relationship between the mandibular third molars and the inferior alveolar and lingual nerves is particularly important. Nerve injury may result in numbness, altered sensation, or sensory impairment affecting the lower lip, chin, or tongue. In some cases, these disturbances may persist for an extended period. Therefore, comprehensive preoperative clinical and radiographic assessment is essential for identifying potential surgical risks and selecting an appropriate treatment strategy.

Evidence from the scientific literature indicates that postoperative complications are multifactorial and cannot be attributed to a single cause. Patient-related factors, including age, general health status, body mass index, pre-existing inflammation, and oral hygiene, may influence postoperative outcomes. Anatomical and radiological characteristics, such as the depth

of impaction, angulation of the tooth, root morphology, and proximity to the mandibular canal, may increase the complexity of surgical extraction. Furthermore, operator experience, surgical technique, the extent of bone removal, and the duration of the procedure may affect the postoperative healing process. Different risk factors may be associated with specific complications; therefore, an individualized assessment is preferable to assuming that all patients have the same level of risk

Relevance

The surgical extraction of impacted third molars is one of the most frequently performed procedures in oral and maxillofacial surgery. Despite its routine nature, the procedure may be associated with postoperative complications that affect patients' comfort, oral function, recovery time, and overall quality of life. Pain, swelling, trismus, alveolar osteitis, surgical site infection, postoperative bleeding, and neurosensory disturbances remain clinically relevant outcomes requiring careful assessment.

Aim

The aim of this study is to identify and analyze the principal patient-related, anatomical, radiological, and surgical risk factors associated with postoperative complications following the extraction of impacted third molars, and to evaluate their clinical significance in risk assessment, prevention, and the improvement of postoperative recovery.

Main part

Impacted third molars are frequently encountered in oral and maxillofacial surgery. Their surgical extraction may be necessary when they cause pain, inflammation, damage to adjacent teeth, or other pathological conditions. Although this procedure is commonly performed, postoperative complications may occur in some patients. The most frequently observed complications include pain, facial swelling, restricted mouth opening, alveolar osteitis, bleeding, and surgical site infection. In certain cases, patients may develop sensory disturbances associated with injury to the surrounding nerves. The severity of these complications varies according to the patient's clinical condition and the complexity of the surgical procedure. Postoperative pain and swelling are common responses to tissue injury and do not always indicate an adverse complication. However, persistent or progressively worsening symptoms require clinical assessment. Alveolar osteitis is characterized by delayed healing and pain associated with the extraction socket. Infection may present with increasing swelling, fever, purulent discharge, or other inflammatory signs. Neurosensory disturbances are particularly important when the mandibular third molar is located close to the inferior alveolar or lingual nerve. Understanding the clinical characteristics of these conditions helps clinicians distinguish normal postoperative recovery from pathological healing. Early identification of complications supports timely treatment and reduces the risk of further problems.

Patient-related characteristics play an important role in postoperative recovery following impacted third molar extraction. Age may influence bone density, tissue healing, and the technical difficulty of the procedure. General health status should also be considered because certain systemic conditions may affect wound healing and the body's response to surgical trauma. Diabetes mellitus, immune system disorders, and other relevant medical conditions may require additional assessment before surgery. Smoking is another important factor because it can negatively affect oral wound healing and may increase the risk of alveolar osteitis. Poor oral hygiene and pre-existing inflammation around the impacted tooth may contribute to an increased risk of postoperative infection. The presence of pericoronitis before surgery should be evaluated

as part of the patient's clinical assessment. Medication use is also relevant, particularly when patients take anticoagulants, immunosuppressive agents, or other medicines that may influence bleeding or healing. Previous complications following dental surgery may provide additional information when planning treatment. Patient compliance with postoperative instructions can influence recovery, especially regarding oral hygiene, smoking avoidance, prescribed medication, and follow-up appointments. Anxiety and individual pain sensitivity may also affect the patient's experience during the postoperative period. These factors should be considered together rather than evaluated in isolation. A detailed medical and dental history allows the clinician to identify potentially modifiable risks.

The anatomical position of an impacted third molar is an important determinant of surgical complexity. Teeth may be impacted vertically, horizontally, mesioangularly, or distoangularly, and their orientation can influence the extraction technique. The depth of impaction and the amount of surrounding bone may determine whether additional bone removal or tooth sectioning is required. Root number, shape, curvature, and proximity to adjacent structures should also be assessed. In mandibular third molar surgery, the relationship between the tooth roots and the inferior alveolar canal is particularly important because of the potential risk of nerve injury. Panoramic radiography is commonly used for initial assessment, while cone-beam computed tomography may be appropriate in selected cases when three-dimensional information is required for clinical decision-making. The surgical approach should be planned according to the individual anatomical findings. Operative factors, including the extent of tissue manipulation, the amount of bone removal, and the duration of surgery, may influence postoperative pain, swelling, and recovery. Excessive tissue trauma may prolong the inflammatory response and delay healing. The surgeon's experience and familiarity with different extraction techniques can also contribute to procedural safety. Careful handling of soft tissues and appropriate surgical technique are essential for minimizing avoidable injury. However, the presence of an anatomical risk factor does not necessarily mean that a complication will occur. Radiological findings should therefore be interpreted alongside the patient's clinical presentation and the planned surgical approach.

The prevention of postoperative complications begins with a comprehensive assessment before surgery. The patient's medical history, current medications, oral hygiene, symptoms, and relevant radiological findings should be reviewed. Based on this assessment, the clinician can determine the complexity of the procedure and explain the potential risks to the patient. Appropriate surgical planning may help minimize unnecessary tissue trauma and protect adjacent anatomical structures. During the operation, careful tissue handling, adequate visualization, and a suitable extraction technique are important for reducing avoidable injury. Postoperative care should focus on pain control, maintenance of oral hygiene, protection of the extraction site, and monitoring for signs of abnormal healing. Patients should receive clear instructions regarding oral hygiene, diet, physical activity, smoking avoidance, and the appropriate use of prescribed medicines. Antibiotics should not be used routinely in every patient without considering the clinical indication and individual circumstances. Follow-up assessment is particularly important for patients with complicated extractions or relevant risk factors. Increasing pain, persistent bleeding, progressive swelling, fever, purulent discharge, or altered sensation should prompt appropriate clinical evaluation. Alveolar osteitis, infection, and neurosensory disturbances require different management strategies and should not be treated as identical conditions. Documentation of complications and recovery outcomes can help clinicians evaluate their

practices and identify areas for improvement. A structured approach combining risk assessment, appropriate surgical technique, patient education, and timely follow-up may improve treatment safety.

Results

The analysis of the available literature suggests that postoperative complications following impacted third molar extraction are associated with several interconnected factors. These factors can be broadly classified into patient-related characteristics, anatomical features of the impacted tooth, radiological findings, and aspects of surgical management. Their clinical significance depends on the type of complication being considered, meaning that a factor associated with alveolar osteitis may not necessarily have the same relationship with postoperative infection or nerve injury.

Patient-related characteristics emerged as an important consideration in preoperative risk assessment. Smoking habits, medical history, medication use, and the presence of inflammation before surgery may influence the postoperative healing process. The literature particularly emphasizes smoking as a potentially modifiable factor associated with an increased likelihood of alveolar osteitis. Oral contraceptive use has also been investigated in relation to this complication. In a systematic review and meta-analysis, Tang and colleagues reported a higher risk of alveolar osteitis among oral contraceptive users following third molar extraction. This finding highlights the importance of reviewing relevant medication history before surgery rather than assessing the patient's risk exclusively on the basis of dental and anatomical characteristics.

Anatomical characteristics were another recurring theme in the reviewed evidence. The position of an impacted tooth, the degree of bony coverage, root configuration, and its relationship with neighbouring structures can influence the technical demands of extraction. Sánchez-Torres and colleagues identified older age, overweight status, unfavourable tooth positioning, complex root morphology, and limited anatomical access among the factors associated with greater surgical difficulty. Their findings suggest that preoperative radiological assessment is valuable not only for locating the impacted tooth but also for anticipating procedural challenges that may affect postoperative recovery.

Discussion

The findings of this literature-based analysis support an individualized approach to patients undergoing impacted third molar extraction. Although the procedure is routinely performed, its clinical course may differ considerably depending on the patient's condition and the anatomical difficulty of the extraction. Consequently, preoperative assessment should be directed towards identifying factors that can influence a particular outcome rather than treating all potential complications as manifestations of a single risk process.

One important implication concerns the assessment of modifiable patient-related factors. Smoking is particularly relevant because it can interfere with the healing environment of the extraction socket and is associated in the literature with an increased likelihood of alveolar osteitis. This provides a practical reason to discuss smoking cessation or temporary avoidance before surgery and during early recovery. Nevertheless, the presence of smoking alone cannot establish that a complication will occur, and clinical advice should be adapted to the patient's circumstances. Similarly, evidence concerning oral contraceptive use supports careful medication history-taking, but it does not justify automatically discontinuing prescribed medication. Decisions about medication management should be individualized and made with appropriate clinical guidance.

The anatomical assessment of impacted third molars has a different but equally important purpose. Deep impaction, unfavourable angulation, complex root morphology, and close proximity to neighbouring anatomical structures may increase surgical difficulty. In mandibular third molar extraction, the relationship between the roots and the inferior alveolar canal deserves particular attention because of the possibility of postoperative sensory disturbance. Radiographic findings can help identify potentially challenging cases and inform surgical planning. However, an imaging feature should not be interpreted in isolation; its significance depends on the clinical indication, the overall anatomical presentation, and the proposed operative technique.

Conclusion

The analysis of the scientific literature demonstrates that postoperative complications following the extraction of impacted third molars are influenced by a combination of patient-related, anatomical, radiological, and surgical factors. Smoking, pre-existing inflammation, general health status, tooth angulation, depth of impaction, root morphology, and the proximity of the mandibular third molar to the inferior alveolar canal are important considerations during preoperative assessment. However, the clinical significance of each factor depends on the type of complication and the individual characteristics of the patient. A comprehensive evaluation before surgery can help identify patients who may require additional precautions and a more individualized surgical approach. Careful treatment planning, appropriate surgical techniques, patient education, and postoperative monitoring are essential components of safe clinical practice. Particular attention should be given to the prevention and early recognition of alveolar osteitis, surgical site infection, excessive bleeding, and neurosensory disturbances.

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