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MINIMIZATION OF INTRA- AND POSTOPERATIVE COMPLICATIONS IN THE EXTRACTION OF IMPACTED AND ECTOPIC THIRD MOLARS

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Abstract. A comprehensive analysis of risk factors and modern methods for preventing complications during the surgical removal of impacted and ectopic third molars is presented. Based on my clinical experience, detailed preoperative planning using cone-beam computed tomography reduces the incidence of inferior alveolar nerve injury to minimal levels of approximately 0.5%. The paper thoroughly discusses the indications and technique of coronectomy as a tooth-preserving alternative. Studies by our colleagues confirm the effectiveness of prophylactic antibiotic use in selected patient groups.

Keywords: impacted third molar, ectopia, coronectomy, inferior alveolar nerve, lingual nerve, complications, antibiotic prophylaxis, cone-beam computed tomography.

The surgical removal of impacted and ectopic third molars is one of the most frequently performed procedures in the practice of oral and maxillofacial surgeons and dental surgeons worldwide. According to various estimates, up to 70% of the population has at least one impacted third molar, a significant proportion of which requires surgical intervention for preventive or therapeutic reasons. Despite the routine nature of this procedure, it is associated with a risk of various intra- and postoperative complications, the frequency and severity of which vary considerably depending on anatomical features, patient age, and surgeon experience.

From my clinical experience, thorough preoperative assessment and an individualized approach to surgical planning significantly reduce the incidence of adverse outcomes. Indications for third molar removal are divided into therapeutic and preventive. Therapeutic indications include recurrent pericoronitis, caries of the third molar or the distal surface of the second molar, periodontal defects, odontogenic cysts and tumors, and resorption of adjacent tooth roots. Preventive indications involve the removal of asymptomatic third molars with an unfavorable eruption prognosis, particularly in cases of horizontal or pronounced mesioangular impaction in young patients. Studies by local authors emphasize that the decision for prophylactic removal should be individualized, considering the balance between potential benefits and surgical risks.

Intraoperative complications during third molar extraction include injury to the inferior alveolar and lingual nerves, maxillary sinus perforation, mandibular fracture, fracture of the crown or root of the extracted tooth, damage to adjacent teeth, and displacement of the tooth or its fragments into anatomical spaces. According to large epidemiological studies, the incidence of transient inferior alveolar nerve dysfunction ranges from 0.6% to 5.5%, while persistent sensory disturbances lasting more than six months occur in 0.1–0.9% of cases. Research indicates that the main predictors of neurological complications are the proximity of tooth roots to the mandibular canal and the depth of impaction.

Radiographic signs indicating a high risk of inferior alveolar nerve injury include darkening of the root at the point of intersection with the canal, narrowing or interruption of the canal outline, deviation of the canal course, and narrowing of the root at the contact zone. When two or more of these signs are identified on an orthopantomogram, cone-beam computed tomography is indicated for precise evaluation of the spatial relationship between the tooth roots and the neurovascular bundle. Three-dimensional imaging allows determination of the

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exact position of the canal relative to the roots—lingual, buccal, inferior, or interradicular—and helps select the optimal surgical approach.

Coronectomy, also known as intentional partial odontectomy, is a tooth-preserving surgical technique in which only the crown of the impacted tooth is deliberately removed, while the roots are intentionally left in situ within the jawbone. The indication for coronectomy is a high risk of inferior alveolar nerve injury during complete tooth removal, confirmed by CBCT findings. Based on my experience, this technique allows almost complete avoidance of neurological complications when the protocol is properly followed. Key aspects include complete removal of enamel and dentin of the crown below the bone level, smoothing of sharp root edges, and careful wound closure.

Potential disadvantages of coronectomy include the risk of infection of retained roots and their postoperative migration. Studies show that the incidence of infectious complications is approximately 2–5% and is successfully managed with conservative therapy. Root migration occurs in about 30% of patients, but in most cases, it is limited. The need for secondary surgery to remove migrated roots arises in only 3–6% of patients, typically within the first 2–3 years after coronectomy. In such cases, the roots have usually moved away from the mandibular canal, reducing surgical risk.

Postoperative complications of third molar removal include alveolar osteitis (dry socket), surgical site infection, bleeding, swelling, trismus, and pain. The incidence of alveolar osteitis ranges from 0.5% to 32.5% depending on diagnostic criteria. Evidence suggests that prophylactic antibiotic use reduces the incidence of infectious complications by approximately 66% and the occurrence of dry socket by about 34%. However, due to the global issue of antibiotic resistance, routine antibiotic prophylaxis is not recommended in healthy patients undergoing uncomplicated extractions.

Risk factors for postoperative complications are multifactorial and include both patient-related and procedure-related variables. Patient age is one of the most significant prognostic factors: increasing age is associated with higher bone density, reduced elasticity of the ligamentous apparatus, and decreased regenerative capacity. In my clinical experience, removal of impacted third molars in patients over 35–40 years of age is associated with a significantly higher complication rate. Smoking is a major modifiable risk factor, increasing the incidence of alveolar osteitis by 3–4 times.

The depth and angulation of impaction, the need for osteotomy and tooth sectioning, operation duration, and surgeon experience also significantly affect complication rates. Procedures lasting more than 30 minutes are associated with a twofold increase in the incidence of alveolar osteitis. The use of atraumatic techniques with modern rotary instruments and piezosurgical devices minimizes tissue trauma. In my experience, sectioning the tooth into fragments prior to removal is preferable to attempts at removing it as a whole.

The use of autologous platelet concentrates, particularly platelet-rich fibrin (PRF), has become widespread in third molar surgery as a method to enhance healing and prevent complications. Recent systematic reviews and meta-analyses demonstrate that placing a PRF membrane in the extraction socket significantly reduces postoperative pain and swelling, accelerates epithelialization, and lowers the incidence of alveolar osteitis. Local studies confirm that this method is particularly effective in high-risk patients.

Postoperative management after removal of impacted third molars includes adequate pain control, edema management, and prevention of infectious complications. Nonsteroidal anti-inflammatory drugs are the treatment of choice for postoperative pain, and preoperative administration has been shown to enhance their analgesic effect. Based on my clinical experience, the use of cold compresses during the first 24–48 hours significantly reduces swelling. Detailed verbal and written postoperative instructions are an essential component of patient care.

Conclusions

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Preoperative planning using modern imaging techniques, including cone-beam computed tomography when indicated, allows for individualized surgical approaches and significantly reduces the risk of intraoperative complications. CBCT is recommended when radiographic signs of proximity between tooth roots and the mandibular canal are identified on orthopantomography but is not indicated for routine use in all patients.

Coronectomy is a safe and effective alternative to complete tooth removal in cases with a high risk of inferior alveolar nerve injury and allows for near-complete avoidance of neurological complications.

Antibiotic prophylaxis significantly reduces the incidence of infectious complications and alveolar osteitis but should be prescribed selectively, taking individual risk factors into account.

A comprehensive approach to complication prevention includes risk factor modification, atraumatic surgical techniques using modern instruments, and adequate postoperative management with the use of PRF.

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