JOURNAL OF INTERNATIONAL CRISIS AND RISK COMMUNICATION RESEARCH
ISSN: 2576-0017
2024, VOL 7, NO S8

Optimizing Outcomes in Third Molar Extractions: Evidence-Based Approaches to Postoperative Management

Abdulaziz Fahad Aleisa[1], Mutaz Mohammed Abdullah AlGhamdi[2], Ganem Fahaad Alsubaie[3], Azzam Abdullah Alturki[4], Abdulaziz Majeed Alhusain[5], Yousef saleh Almutairi[6], Mugbil Mohammed Mugbil Alotaibi[7], Naif Badi O Alosaimi[8], Mugbil Mohammed Mugbil Alotaibi[9], Naif Mohammed Alhassan[10], Amna Mahdi Al-Shanqeeti[11], Abdulrahman Ali Ahmad Abozohier[12], Abdulrahman Abdulaziz Sabei[13], Ahood Salamh Aljameeli[14], Arwa Saleh Abdullah Alhuwireni[15]

1. Dentist, Ministry Of Health, Kingdom Of Saudi Arabia. Aziz.f.7777@gmail.com
2. General Dentist, Mansourah Dental Complex, Ministry Of Health, Kingdom Of Saudi Arabia. Malghamdi379@moh.gov.sa
3. Family Dentist, Dental Clinics Complex West of Riyadh, Ministry Of Health, Kingdom Of Saudi Arabia. Ganem19@hotmail.com
4. Dentist, Mansourah Dental Complex, Ministry Of Health, Kingdom Of Saudi Arabia. Azalturki@moh.gov.sa
5. Dentist, Mansourah Dental Complex, Ministry Of Health, Kingdom Of Saudi Arabia. Amalhusain@moh.gov.sa
6. Dentist, Mansourah Dental Complex , Ministry Of Health, Kingdom Of Saudi Arabia. yalmutairi53@gmail.com
7. General dentist, Casablanca Health Center2, Ministry Of Health, Kingdom Of Saudi Arabia. malotaibi115@moh.gov.sa
8. Dental Technology Specialist, Ministry of Health Riyadh Branch, Ministry of Health, kingdom of Saudi Arabia. nabalosaimi@moh.gov.sa
9. General Dentist, Aldaar Albayda 2 health center, Ministry of Health Riyadh Branch, Ministry of Health, kingdom of Saudi Arabia. malotaibi115@moh.gov.sa
10. General Dentist, Prince Sultan Bin Abdulaziz Center (Ahmadiyya), Ministry of Health, kingdom of Saudi Arabia. nmalhassan@Moh.gov.sa
11. Dentist assistant, Prince Sultan Military Medical City, Kingdom of Saudi Arabia. Family777mix@gmail.com
12. Dental Assistant, Internal Audit, Ministry of Health. Kingdom of Saudia Arabia. Aabozohier@moh.gov.sa
13. Consultant of Periodontics, west of Riyadh dental Complex, Ministry of Health. Kingdom of Saudia Arabia. aasabei@moh.gov.sa
14. Dental Assistant, Al Azizia Dental Clinics Complex, Ministry of Health, Kingdom of Saudia Arabia. ahsaljameeli@moh.gov.sa
15. General Dentist, South Of Riyadh Dental Center, Ministry of Health, Kingdom of Saudia Arabia. AAlhuwireni@moh.gov.sa

ABSTRACT

Third molar extractions are among the most common surgical procedures performed by oral surgeons, with indications ranging from therapeutic to orthodontic and

prophylactic. However, the anatomical location and variability of wisdom teeth contribute to a higher incidence of intraoperative and postoperative complications compared to other tooth extractions. This study aims to analyze the existing literature on interventions employed following third molar surgery, including oral medications, topical agents, and emerging technologies such as ozone gel. Analgesics, particularly the combination of paracetamol and ibuprofen, have demonstrated superior efficacy in managing postoperative pain. Corticosteroids have been shown to reduce inflammation and trismus, although their routine use remains debatable due to potential side effects. Antibiotics administered perioperatively can reduce infection rates, but their use must be weighed against the risks of microbial resistance and adverse effects. Chlorhexidine mouthwash and gel have proven effective in preventing alveolar osteitis, with gels offering the advantage of prolonged medication release. Ozone gel appears promising in reducing postoperative complications, but further research is needed. Evidence supporting the efficacy of postoperative irrigation and cryotherapy is limited and inconsistent. A thorough understanding of the risks and benefits associated with each intervention is crucial for minimizing postoperative complications and optimizing patient outcomes following third molar extractions.

1. Introduction

Extractions of third molars account for approximately 90% of the planned surgical procedures performed by oral surgeons and constitute, on average, 37% of all procedures carried out annually. The indications for wisdom tooth removal can be categorized into therapeutic, orthodontic, and prophylactic. Therapeutic indications often relate to complications with the eruption of impacted third molars, particularly recurrent acute or chronic pericoronitis. Other therapeutic reasons include non-restorable caries lesions, periodontal disease, neuralgic disorders, cysts, and tumors, where the wisdom tooth is removed in conjunction with the pathological lesion. Additionally, removal may be necessary when a mandibular wisdom tooth is located along a fracture line, a procedure typically performed under general anesthesia and hospital conditions, alongside fracture reduction and osteosynthesis. Prophylactic extractions, on the other hand, may be carried out before prosthetic treatment to prevent the eruption of these teeth beneath a denture plate (Shoshani-Dror et al., 2018).

Acute inflammation, often accompanied by trismus, is a significant local contraindication for the removal of lower third molars. Such inflammation can hinder effective local anesthesia and complicate the extraction process, which is frequently surgical. The location of wisdom teeth in the posterior oral cavity, combined with anatomical variability, contributes to a higher incidence of complications during and after their extraction compared to teeth from other groups. Complication rates for wisdom tooth extractions are estimated to range between 3% and 30% (Barbosa-Rebellato et al., 2011; Sayed et al., 2019; Sukegawa et al., 2018). The proximity of critical anatomical structures such as the lingual and inferior alveolar nerves, facial and inferior alveolar arteries, masticatory muscles, and anatomical spaces (including the pterygomandibular, parapharyngeal, retro-, and

submandibular spaces) further elevates the risk. In the case of upper wisdom teeth, structures like the maxillary sinus, pterygopalatine, and infratemporal fossae are also at risk (Candotto et al., 2019; Malkawi et al., 2011; Singh et al., 2014).

Intraoperative complications during third molar extractions may include damage to the inferior alveolar nerve, which can occur during both anesthesia and extraction (Shintani et al., 2019). Excessive force applied by the surgeon may result in fractures of the wisdom tooth, damage to adjacent teeth, or fractures and luxation of the mandible or maxillary tuberosity. Injuries to surrounding soft tissues and vascular structures, leading to intraoperative or postoperative bleeding, are often attributable to improper instrument handling. Serious complications include the displacement of the tooth or its root into the maxillary sinus, pterygopalatine fossa, mandibular canal, or soft tissues of the floor of the mouth. Particularly life-threatening situations, such as tooth aspiration into the upper respiratory tract causing laryngeal spasm, though rare, have been reported (Lutz et al., 2019; Shetty et al., 2019). Oroantral communications observed after the extraction of upper third molars may have an anatomical basis, necessitating appropriate diagnosis and treatment (Lewusz-Butkiewicz et al., 2018).

Postoperative bleeding can occur from injuries to bone or soft tissues, with rare instances of bleeding from the inferior alveolar artery. Hematoma formation during the postoperative period may result from damage to the pterygoid venous plexus after upper molar removal or tight wound suturing following surgical extraction of lower molars. Hemorrhagic complications are often associated with the patient's general health conditions, such as arterial hypertension or diabetes, as well as medications that affect the hemostatic system (Singh et al., 2014; Zabojszcz et al., 2019). Inflammatory complications, such as dry socket or inflammation of the submandibular lymph nodes leading to abscess formation, are also common after wisdom tooth extractions. If the inflammatory process extends to adjacent anatomical spaces, it may affect areas such as the parapharyngeal space, skull base, or mediastinum. In immunocompromised patients, there is an elevated risk of severe complications, including phlegmon or bacterial osteomyelitis. The postoperative period is frequently marked by transient trismus and reversible sensory disturbances involving the lingual and inferior alveolar nerves (Azenha et al., 2014; Nguyen et al., 2014; Tojyo et al., 2019).

In clinical practice, assessing the risks and benefits associated with third molar extractions is a critical consideration for both patients and clinicians during the decision-making process. Prior to any surgical procedure, it is essential that patients receive comprehensive information regarding the advantages and disadvantages of surgery, as well as the perioperative risks and potential postoperative complications, including rare complications (Chen et al., 2021). Furthermore, although most clinicians possess a thorough understanding of common complications, there is a pressing need to enhance their awareness of less common complications. Such knowledge is pivotal in enabling clinicians to identify these complications early, ensuring timely and appropriate therapeutic interventions (Brauer, 2009). This understanding is integral to optimizing the clinical management of third molar

extractions.

The primary objective of this study is to analyze the existing literature on interventions employed following third molar surgery. These interventions encompass oral medications, topical agents, and emerging technologies, such as ozone gel. Recently, additional randomized controlled trials and meta-analyses have been conducted, enriching the overall body of evidence on this topic. A thorough comprehension of the potential risks and benefits associated with each intervention modality is crucial for effectively minimizing postoperative complication rates.

Postoperative interventions

Analgesics

Various analgesics are employed to manage postoperative pain and swelling following the surgical extraction of impacted molar teeth. Paracetamol and non-steroidal anti-inflammatory drugs (NSAIDs) are extensively utilized and are considered standard by many practitioners. These medications may be used in combination with opioids(Au et al., 2015) or corticosteroids (Bamgbose et al., 2005). Their efficacy has been consistently demonstrated and they are routinely prescribed (Wright, 2012).

Weil et al. conducted a systematic review of 21 high-quality trials and concluded that paracetamol is a safe and effective drug for managing postoperative pain after third molar removal (Weil et al., 2007). In a Cochrane review involving 2241 patients, Bailey et al. reported that ibuprofen provided superior postoperative analgesia compared to paracetamol (Bailey et al., 2014). Furthermore, a combination of ibuprofen and paracetamol was found to be more effective than either drug alone when assessed at 6 hours post-surgery. Participants taking the combination also had a reduced likelihood of requiring rescue medication. This finding is consistent with the review by Moore et al. of the Cochrane database, which compared 21 over-the-counter analgesics and identified the combination of paracetamol (1000 mg) and ibuprofen (400 mg) as more effective than either drug taken individually (Moore et al., 2015).

Current evidence also supports the addition of opioids for pain management following third molar extractions. Au et al. conducted a meta-analysis of 10 analgesic combinations, involving 3521 subjects, and found that oxycodone combined with ibuprofen demonstrated superior analgesic efficacy compared to other combinations (Au et al., 2015). However, the effectiveness of weaker opioid combinations, such as paracetamol/codeine, remains debated. Evidence suggests that this combination is less effective than paracetamol/ibuprofen (P. A. Moore & Hersh, 2013). Smith et al. explored this issue through a systematic review in 2001, analyzing two high-quality trials involving 77 patients, although the unbalanced group sizes may have influenced the results (Smith et al., 2001). Macleod et al. compared paracetamol with paracetamol/codeine, observing significantly lower pain levels at 12 hours post-extraction in patients taking the combination (Macleod et al., 2002). However, the current evidence supporting the use of paracetamol/codeine is not as robust as that for paracetamol/ibuprofen.

The side effects of analgesics must also be considered. For opioids, common adverse

effects include nausea, constipation, and the potential for drug abuse (Au et al., 2015). NSAID users should be mindful of possible drug interactions, toxicity, and risks of gastrointestinal, hematological, and renal disorders (Mutlu et al., 2013).These adverse reactions must be carefully evaluated when prescribing analgesics postoperatively (Ong & Seymour, 2003).

Corticosteroids

Corticosteroids have been employed in surgical settings for a considerable period, primarily to reduce inflammation, with the added benefit of decreasing postoperative nausea and vomiting (Sekhavat et al., 2015). Numerous studies have examined the effects of corticosteroids in the perioperative management of dentoalveolar surgeries (Alexander & Throndson, 2000). While reviews have demonstrated that corticosteroids are generally safe when administered as a short course (Kim et al., 2009; Ngeow & Lim, 2016), their routine use for preventing inflammatory complications remains unsubstantiated.

Alexander et al. conducted a literature review on the effects of corticosteroid therapy and confirmed the effectiveness of intravenous (i.v.), intramuscular (i.m.), and oral (p.o.) administration routes in reducing inflammatory complications. They recommended initiating corticosteroids before surgery, administering higher doses, and continuing the treatment through the first and second postoperative days. However, they also highlighted potential side effects, such as adrenal suppression, gastrointestinal disturbances, exacerbation of psychosis, increased infection risk, and interference with the immune system. These risks suggest that corticosteroids should be reserved for selected cases (Alexander & Throndson, 2000).

Markiwicz et al. performed a review and meta-analysis focusing on whether perioperative corticosteroid administration could reduce pain, trismus, and edema after third molar surgeries. Their analysis included 12 studies and revealed that corticosteroids effectively reduced edema and trismus during both the early (1–3 days) and late (>3 days) postoperative periods. However, they could not conclusively determine their effect on pain, as most studies measured analgesic dosage rather than using a visual analogue scale. For edema and trismus, reductions of 0.6 mm and 4.1 mm, respectively, were noted, which, while statistically significant, may lack clinical relevance. The authors also pointed out the variability in study designs and emphasized the need for larger-scale research to determine the optimal drug, timing, and dosing of corticosteroids (Markiewicz et al., 2008).

A systematic review by Herrera-Briones et al. assessed 28 studies, including those with preoperative and postoperative corticosteroid administration. They concluded that corticosteroids significantly reduced inflammation and trismus, with the parenteral route administered prior to surgery being the most effective for reducing inflammation. However, a full meta-analysis was not feasible due to the heterogeneity of the trials, which was a significant limitation. Conclusions regarding timing and route of administration were drawn from specific trials rather than being generalized across the studies (Beirne, 2013; Herrera-Briones et al., 2013).

Kim et al. reviewed nine studies examining the effect of corticosteroids following the

removal of bilateral impacted third molars (Kim et al., 2009). Eight of these studies showed that corticosteroids significantly reduced swelling compared to controls. However, significant variability was observed in the routes and timing of administration as well as in methods for assessing facial swelling. The authors concluded that corticosteroids should be administered at doses equivalent to 300 mg cortisol (e.g., 60 mg prednisone) and continued for 3–5 days to maximize benefits, as swelling typically peaks 48–72 hours post-surgery, and single-dose corticosteroids generally do not remain effective beyond 24 hours. They further recommended restricting corticosteroid use to complex oral surgeries involving moderate to severe trauma.

Overall, research indicates that corticosteroids can statistically reduce swelling and trismus following third molar surgeries. However, the reductions observed in many studies are relatively minor and may lack clinical significance. Corticosteroids' efficacy in reducing postoperative nausea and vomiting is well-established. Their use can be beneficial in selected cases where significant surgical trauma or the risk of excessive edema is anticipated, but it must be balanced against the potential risks and side effects associated with these drugs.

Antibiotics

The perioperative use of antibiotics offers another approach to reducing inflammatory complications. Antibiotic prophylaxis is well-established for specific surgical procedures such as joint replacement and the prevention of infective endocarditis. However, its role in routine third molar surgery remains less definitive (Fenton & Piecuch, 2012).

Studies on the use of antibiotics in this context present conflicting results. Variations in study design, types of antibiotics used, and their administration routes complicate critical appraisal. A meta-analysis by Ren and Malmstrom (2007) examined 16 clinical trials with 2,932 patients, concluding that preoperative antibiotics reduced the incidence of alveolar osteitis by 6.1% and wound infection by 4% (Ren & Malmstrom, 2007). The number needed to treat (NNT) was 25 to avoid one complication. Similarly, Susarla et al. (2003) observed a comparable benefit and suggested the administration of antibiotics both preoperatively and postoperatively for 2–7 days (Susarla et al., 2011).

In 2012, a Cochrane review by Lodi et al. analyzed 18 clinical trials involving 2,456 healthy patients undergoing impacted third molar extraction. This review found that antibiotics administered either before or immediately after surgery reduced infection rates by 70% and alveolar osteitis rates by 38% (Lodi et al., 2012). These findings translated to an NNT of 12 to prevent one infection and 38 to avoid one case of alveolar osteitis. However, they also reported that 21 patients would need to be treated to cause one minor adverse reaction. Based on the low infection risk in healthy young adults, increased adverse effects, and the potential for antibiotic resistance, the authors did not support the routine use of antibiotics in healthy individuals undergoing third molar extractions.

The most recent meta-analysis by Ramos et al. included 22 studies, reporting an overall NNT of 14 to prevent one infection episode. However, this review largely

examined regimens involving antibiotics administered an hour before surgery, with only one trial focusing on postoperative antibiotics (Ramos et al., 2016). That trial, which investigated amoxicillin/clavulanate, found it effective in reducing inflammatory complications but recommended its use only for selected cases (Arteagoitia et al., 2005).

Overall, evidence indicates that antibiotics administered at or before third molar surgery can reduce the rates of alveolar osteitis and infection. Nevertheless, given that most post-surgical infections are minor, the risks of microbial resistance, adverse effects, and costs must be carefully weighed. Additionally, there is limited evidence supporting postoperative antibiotic use in healthy patients undergoing routine third molar extractions.

Antibacterial Mouthwashes

Antibacterial mouthwashes offer localized action at surgical sites and provide mechanical debridement. Generally, they are cost-effective and associated with fewer side effects. They are available over the counter, eliminating the need for prescriptions or follow-up clinic visits, thus reducing costs for both patients and clinicians. However, patient adherence to mouthwash protocols can be a limitation.

A variety of commercial mouthwashes have been evaluated in the literature, including formulations with benzydamine hydrochloride, essential oils, cetylpyridinium chloride, sodium benzoate, triclosan, oxygenating agents, povidone-iodine, peroxidase, and fluoride (Farah et al., 2009). Despite their antimicrobial activity, chlorhexidine is considered the gold standard due to its efficacy in reducing plaque, broad-spectrum activity against oral aerobes and anaerobes, tolerability, and lack of bacterial resistance (Quintas et al., 2015). The use of warm saline as a mouthwash has also been suggested, with claims of bacteriostatic effects and promotion of healing via vasodilation at the extraction site. However, studies comparing its efficacy to chlorhexidine have consistently favored the latter (Caso et al., 2005; Yengopal & Mickenautsch, 2012).

A 2005 meta-analysis by Caso et al. reviewed the prevention of alveolar osteitis using chlorhexidine after third molar extractions. The study compared preoperative rinsing, combined preoperative and postoperative rinsing, and a control group. Despite variability in study designs and potential confounders, the analysis provided strong evidence supporting chlorhexidine use. The authors found that postoperative use of chlorhexidine mouthwash for seven days significantly reduced alveolar osteitis, while single-day preoperative rinsing was not statistically significant (Caso et al., 2005).

Hedstrom and Sjogren systematically reviewed 32 randomized controlled trials and concluded that 0.12% chlorhexidine rinsing both preoperatively and for seven days postoperatively had significant preventive effects on alveolar osteitis after lower third molar removal (Hedström & Sjögren, 2007).

Further support comes from a Cochrane review by Daly et al., which analyzed 21 trials involving 2,570 participants. This review found that chlorhexidine mouthwash

at concentrations of 0.12% and 0.2% both before and after extractions prevented approximately 42% of dry sockets. The NNT varied based on the control prevalence of dry sockets: 232, 47, and eight for rates of 1%, 5%, and 30%, respectively (Daly et al., 2022).

While chlorhexidine is effective, it is not without side effects. Common issues include tooth staining, increased calculus formation, mucosal irritation, and taste alterations (Silvestri & McEnery-Stonelake, 2013). More severe hypersensitivity reactions, including anaphylaxis, have also been reported. Practitioners should be aware of these potential adverse effects when recommending chlorhexidine (Pemberton & Gibson, 2012).

Topical Gels

Topical gels containing antimicrobial agents are directly applied to postoperative surgical sites. Unlike mouthwashes, topical gels can provide prolonged medication release, allowing for more targeted action on the alveolus and improved bioavailability. Furthermore, gels can be applied immediately following tooth extraction, whereas mouthwashes are often avoided within the first 24 hours to minimize the risk of clot disruption (Minguez-Serra et al., 2009).

A randomized controlled trial by Hita-Iglesias et al. compared the efficacy of chlorhexidine gel and chlorhexidine mouthwash. Participants followed a postoperative protocol of twice-daily use for seven days. The study found a 30% reduction in the incidence of alveolar osteitis in the chlorhexidine gel group, which reported an incidence rate of 7.5%, compared to 25% in the chlorhexidine rinse group. The authors attributed the reduced incidence in the gel group to the sustained release of chlorhexidine achieved through daily application (Hita-Iglesias et al., 2008).

Minguez-Serra et al. conducted a meta-analysis examining both chlorhexidine mouthwash and gels, incorporating 12 trials with varying concentrations and dosing regimens. The findings indicated that 0.2% chlorhexidine gel applied every 12 hours for one week after third molar surgery was the most effective in reducing the incidence of alveolar osteitis (Minguez-Serra et al., 2009). However, a meta-analysis by Zhou et al. reported no significant differences between chlorhexidine mouthwash and gel, though it confirmed the efficacy of chlorhexidine gel compared to placebo or no treatment. On average, the use of 0.2% chlorhexidine gel reduced alveolar osteitis risk by 62% after mandibular third molar extraction (Zhou, 2008).

Recently, ozone gel has been suggested as another beneficial option after third molar surgery. Ozone, a potent oxidant, has broad antimicrobial properties, enhances oxygen metabolism, induces enzyme activation, and stimulates the immune response (Filipovic-Zore et al., 2011). These effects reduce postoperative infection risks, improve tissue regeneration, and promote faster wound healing (Nogales et al., 2008).

A randomized controlled trial by Sivalingam et al. compared ozone gel (Aqua Ozone, Akaroa, New Zealand) to systemic antibiotics in 66 patients. The results demonstrated significant reductions in pain, swelling, and trismus among patients treated with ozone gel, with no significant adverse effects (Sivalingam et al., 2017).

The evidence supports the use of chlorhexidine gel for reducing alveolar osteitis after surgery. While ozone-containing gels appear promising, further high-quality randomized controlled trials are necessary to confirm their efficacy. Practitioners should also consider the higher costs associated with gels compared to traditional mouth rinses.

Irrigation

Irrigation involves the delivery of a fluid stream to wash or debride a surgical site. In third molar surgery, irrigation is typically used postoperatively to manage alveolar osteitis. The process is thought to remove necrotic debris or food particles, which may otherwise contribute to inflammation and pain (Blum, 2002). Patients with alveolar osteitis are often provided with plastic syringes equipped with curved tips for home irrigation using saline or chlorhexidine. They are instructed to maintain socket cleanliness until debris no longer accumulates. Despite the intuitive appeal of this method, scientific evidence supporting its efficacy remains limited. A Cochrane review by Daly et al. concluded that there is insufficient evidence to endorse any existing treatments for dry socket (Daly et al., 2022).

Ghaeminia et al. published a 2016 study examining postoperative irrigation performed by patients at home (Ghaeminia et al., 2017). Their trial involved 333 third molar sites, comparing irrigation with tap water using a Monoject syringe (Tyco Healthcare/Kendall, Mansfield, MA, USA) to no intervention. Results showed a significant reduction in inflammatory complications, including alveolar osteitis, among the irrigation group. However, 42% of patients failed to comply with irrigation instructions, and the study did not compare irrigation with rinsing alone. Despite these limitations, the findings suggest that irrigation could be a cost-effective and accessible method for reducing inflammatory complications following third molar surgery.

Cryotherapy

The application of ice to the extraoral site of surgery is a straightforward and widely favored technique among clinicians. The cooling effect is believed to cause vasoconstriction, reducing postoperative swelling, and to lower nerve conduction velocity, thereby providing analgesia (Gelesko et al., 2011). Several studies have demonstrated the effectiveness of cryotherapy in minimizing postoperative swelling and pain (Gelesko et al., 2011; Laureano Filho et al., 2005).

However, its utility in managing impacted third molars remains contentious. Van der Westhuijzen et al. found no scientific evidence to support the routine use of ice packs in oral and maxillofacial surgery (van der Westhuijzen et al., 2005). Their study noted only a slight, statistically insignificant reduction in swelling among patients who applied ice continuously for 24 hours post-surgery compared to untreated controls. Similarly, Zandi et al., in a split-mouth study, did not observe significant differences in postoperative inflammatory complications (Zandi et al., 2016). Greenstein's review also reached inconclusive findings regarding the clinical benefits of cryotherapy (Greenstein, 2007).

Although ice application can rapidly cool the cutaneous layer of the mandibular angle, its effects diminish significantly at depths of 2–3 cm, limiting its impact on deeper anatomical structures (Gelesko et al., 2011). Prolonged ice application can also be harmful, potentially leading to tissue damage through sustained vasoconstriction, ischemia, and capillary thrombosis (Sortino & Cicciù, 2011). Factors such as the type of cryotherapy (e.g., crushed ice, ice packs, chemical gel packs, or devices like Hilotherm), duration of application, and the amount of compression applied can contribute to variability in study results.

While physiological principles suggest that cryotherapy should produce favorable outcomes, the current evidence base is inconsistent. As with dry socket management, clinical practice often precedes scientific validation. Further trials and meta-analyses are needed to establish the efficacy of cryotherapy following third molar surgery.

2. Conclusion

The extraction of third molars, a common surgical procedure, carries potential risks of complications, necessitating careful consideration of postoperative interventions to optimize patient outcomes. The reviewed evidence highlights a range of approaches, including pharmacological and non-pharmacological methods, each with its specific benefits and limitations.

Analgesics remain the cornerstone of pain management, with combinations of ibuprofen and paracetamol proving most effective. The adjunct use of opioids or corticosteroids should be reserved for select cases due to their potential adverse effects. Antibiotics, although beneficial in reducing alveolar osteitis and infection rates, should be judiciously prescribed to minimize the risks of resistance and side effects. Antibacterial mouthwashes and topical gels, particularly those containing chlorhexidine, offer targeted prevention of alveolar osteitis, with topical gels showing enhanced efficacy through prolonged release mechanisms.

Irrigation, while promising as a low-cost intervention for maintaining socket hygiene, requires further validation through robust studies. Cryotherapy, although widely practiced, presents inconsistent evidence, emphasizing the need for standardized protocols and additional research. Emerging treatments like ozone gels show potential but demand more extensive clinical trials to confirm their safety and efficacy.

In conclusion, the selection of postoperative interventions following third molar surgery must balance efficacy with potential risks. Tailored approaches, informed by robust clinical evidence and patient-specific factors, are essential for minimizing complications and ensuring optimal recovery.

References

Alexander, R. E., & Throndson, R. R. (2000). A review of perioperative corticosteroid use in dentoalveolar surgery. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontics, 90(4), 406–415. https://doi.org/10.1067/moe.2000.109778

Arteagoitia, I., Diez, A., Barbier, L., Santamaría, G., & Santamaría, J. (2005). Efficacy of

amoxicillin/clavulanic acid in preventing infectious and inflammatory complications following impacted mandibular third molar extraction. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontics, 100(1), e11-18. https://doi.org/10.1016/j.tripleo.2005.03.025

Au, A. H. Y., Choi, S. W., Cheung, C. W., & Leung, Y. Y. (2015). The Efficacy and Clinical Safety of Various Analgesic Combinations for Post-Operative Pain after Third Molar Surgery: A Systematic Review and Meta-Analysis. PloS One, 10(6), e0127611. https://doi.org/10.1371/journal.pone.0127611

Azenha, M. R., Kato, R. B., Bueno, R. B. L., Neto, P. J. O., & Ribeiro, M. C. (2014). Accidents and complications associated to third molar surgeries performed by dentistry students. Oral and Maxillofacial Surgery, 18(4), 459–464. https://doi.org/10.1007/s10006-013-0439-9

Bailey, E., Worthington, H., & Coulthard, P. (2014). Ibuprofen and/or paracetamol (acetaminophen) for pain relief after surgical removal of lower wisdom teeth, a Cochrane systematic review. British Dental Journal, 216(8), 451–455. https://doi.org/10.1038/sj.bdj.2014.330

Bamgbose, B. O., Akinwande, J. A., Adeyemo, W. L., Ladeinde, A. L., Arotiba, G. T., & Ogunlewe, M. O. (2005). Effects of co-administered dexamethasone and diclofenac potassium on pain, swelling and trismus following third molar surgery. Head & Face Medicine, 1, 11. https://doi.org/10.1186/1746-160X-1-11

Barbosa-Rebellato, Nl., Thome, A., Costa-Maciel, C., Oliveira, J., & Scariot, R. (2011). Factors associated with complications of removal of third molars: A transversal study. Medicina Oral Patología Oral y Cirugia Bucal, e376–e380. https://doi.org/10.4317/medoral.16.e376

Beirne, O. R. (2013). Corticosteroids decrease pain, swelling and trismus. Evidence-Based Dentistry, 14(4), 111. https://doi.org/10.1038/sj.ebd.6400968

Blum, I. R. (2002). Contemporary views on dry socket (alveolar osteitis): A clinical appraisal of standardization, aetiopathogenesis and management: a critical review. International Journal of Oral and Maxillofacial Surgery, 31(3), 309–317. https://doi.org/10.1054/ijom.2002.0263

Brauer, H. U. (2009). Unusual complications associated with third molar surgery: A systematic review. Quintessence International (Berlin, Germany: 1985), 40(7), 565–572.

Candotto, V., Oberti, L., Gabrione, F., Scarano, A., Rossi, D., & Romano, M. (2019). Complication in third molar extractions. Journal of Biological Regulators and Homeostatic Agents, 33(3 Suppl. 1), 169-172. DENTAL SUPPLEMENT.

Caso, A., Hung, L.-K., & Beirne, O. R. (2005). Prevention of alveolar osteitis with chlorhexidine: A meta-analytic review. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontics, 99(2), 155–159. https://doi.org/10.1016/j.tripleo.2004.05.009

Chen, Y.-W., Chi, L.-Y., & Lee, O. K.-S. (2021). Revisit incidence of complications after impacted mandibular third molar extraction: A nationwide population-based cohort study. PloS One, 16(2), e0246625. https://doi.org/10.1371/journal.pone.0246625

Daly, B. J., Sharif, M. O., Jones, K., Worthington, H. V., & Beattie, A. (2022). Local interventions for the management of alveolar osteitis (dry socket). The Cochrane Database of Systematic Reviews, 9(9), CD006968. https://doi.org/10.1002/14651858.CD006968.pub3

Farah, C. S., McIntosh, L., & McCullough, M. J. (2009). Mouthwashes. Australian Prescriber, 32(6). https://doi.org/10.18773/austprescr.2009.080

Fenton, D. A., & Piecuch, J. F. (2012). Perioperative strategies for third molar surgery. Atlas of the Oral and Maxillofacial Surgery Clinics of North America, 20(2), 225–232. https://doi.org/10.1016/j.cxom.2012.06.001

Filipovic-Zore, I., Divic, Z., Duski, R., Gnjatovic, N., Galic, N., & Prebeg, D. (2011). Impact of ozone on healing after alveolectomy of impacted lower third molars. Saudi Medical Journal, 32(6), 642–644.

Gelesko, S., Long, L., Faulk, J., Phillips, C., Dicus, C., & White, R. P. (2011). Cryotherapy and topical minocycline as adjunctive measures to control pain after third molar surgery: An exploratory study. Journal of Oral and Maxillofacial Surgery: Official Journal of the American Association of Oral and Maxillofacial Surgeons, 69(11), e324-332. https://doi.org/10.1016/j.joms.2011.03.059

Ghaeminia, H., Hoppenreijs, T. J. M., Xi, T., Fennis, J. P., Maal, T. J., Bergé, S. J., & Meijer, G. J. (2017). Postoperative socket irrigation with drinking tap water reduces the risk of inflammatory complications following surgical removal of third molars: A multicenter randomized trial. Clinical Oral Investigations, 21(1), 71–83. https://doi.org/10.1007/s00784-016-1751-1

Greenstein, G. (2007). Therapeutic efficacy of cold therapy after intraoral surgical procedures: A literature review. Journal of Periodontology, 78(5), 790–800. https://doi.org/10.1902/jop.2007.060319

Hedström, L., & Sjögren, P. (2007). Effect estimates and methodological quality of randomized controlled trials about prevention of alveolar osteitis following tooth extraction: A systematic review. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontics, 103(1), 8–15. https://doi.org/10.1016/j.tripleo.2006.01.007

Herrera-Briones, F. J., Prados Sánchez, E., Reyes Botella, C., & Vallecillo Capilla, M. (2013). Update on the use of corticosteroids in third molar surgery: Systematic review of the literature. Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology, 116(5), e342-351. https://doi.org/10.1016/j.oooo.2012.02.027

Hita-Iglesias, P., Torres-Lagares, D., Flores-Ruiz, R., Magallanes-Abad, N., Basallote-Gonzalez, M., & Gutierrez-Perez, J.-L. (2008). Effectiveness of chlorhexidine gel versus chlorhexidine rinse in reducing alveolar osteitis in mandibular third molar surgery. Journal of Oral and Maxillofacial Surgery: Official Journal of the American Association of Oral and Maxillofacial Surgeons, 66(3), 441–445. https://doi.org/10.1016/j.joms.2007.06.641

Kim, K., Brar, P., Jakubowski, J., Kaltman, S., & Lopez, E. (2009). The use of corticosteroids and nonsteroidal antiinflammatory medication for the management of pain and inflammation after third molar surgery: A review of the literature. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontics, 107(5), 630–640. https://doi.org/10.1016/j.tripleo.2008.11.005

Laureano Filho, J. R., de Oliveira e Silva, E. D., Batista, C. I., & Gouveia, F. M. V. (2005). The influence of cryotherapy on reduction of swelling, pain and trismus after third-molar extraction: A preliminary study. Journal of the American Dental Association (1939), 136(6), 774–778; quiz 807. https://doi.org/10.14219/jada.archive.2005.0261

Lewusz-Butkiewicz, K., Kaczor, K., & Nowicka, A. (2018). Risk factors in oroantral communication while extracting the upper third molar: Systematic review. Dental and Medical Problems, 55(1), 69–74. https://doi.org/10.17219/dmp/80944

Lodi, G., Figini, L., Sardella, A., Carrassi, A., Del Fabbro, M., & Furness, S. (2012). Antibiotics to prevent complications following tooth extractions. The Cochrane Database of Systematic Reviews, 11, CD003811. https://doi.org/10.1002/14651858.CD003811.pub2

Lutz, J.-C., Cazzato, R. L., Le Roux, M.-K., & Bornert, F. (2019). Retrieving a displaced third molar from the infratemporal fossa: Case report of a minimally invasive procedure. BMC Oral Health, 19(1), 149. https://doi.org/10.1186/s12903-019-0852-z

Macleod, A. G., Ashford, B., Voltz, M., Williams, B., Cramond, T., Gorta, L., & Simpson, J. M. (2002). Paracetamol versus paracetamol-codeine in the treatment of post-operative dental pain: A randomized, double-blind, prospective trial. Australian Dental Journal, 47(2), 147–151. https://doi.org/10.1111/j.1834-7819.2002.tb00319.x

Malkawi, Z., Al-Omiri, M. K., & Khraisat, A. (2011). Risk Indicators of Postoperative Complications following Surgical Extraction of Lower Third Molars. Medical Principles and Practice, 20(4), 321–325. https://doi.org/10.1159/000324550

Markiewicz, M. R., Brady, M. F., Ding, E. L., & Dodson, T. B. (2008). Corticosteroids reduce postoperative morbidity after third molar surgery: A systematic review and meta-analysis. Journal of Oral and Maxillofacial Surgery: Official Journal of the American Association of Oral and Maxillofacial Surgeons, 66(9), 1881–1894. https://doi.org/10.1016/j.joms.2008.04.022

Minguez-Serra, M. P., Salort-Llorca, C., & Silvestre-Donat, F. J. (2009). Chlorhexidine in the prevention of dry socket: Effectiveness of different dosage forms and regimens. Medicina Oral, Patologia Oral Y Cirugia Bucal, 14(9), e445-449.

Moore, P. A., & Hersh, E. V. (2013). Combining ibuprofen and acetaminophen for acute pain management after third-molar extractions: Translating clinical research to dental practice. Journal of the American Dental Association (1939), 144(8), 898–908. https://doi.org/10.14219/jada.archive.2013.0207

Moore, R. A., Wiffen, P. J., Derry, S., Maguire, T., Roy, Y. M., & Tyrrell, L. (n.d.). Non-prescription (OTC) oral analgesics for acute pain - an overview of Cochrane reviews—Moore, RA - 2015 | Cochrane Library. Retrieved November 19, 2024, from https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD010794.pub2/full

Mutlu, I., Abubaker, A. O., & Laskin, D. M. (2013). Narcotic prescribing habits and other methods of pain control by oral and maxillofacial surgeons after impacted third molar removal. Journal of Oral and Maxillofacial Surgery: Official Journal of the American Association of Oral and Maxillofacial Surgeons, 71(9), 1500–1503. https://doi.org/10.1016/j.joms.2013.04.031

Ngeow, W. C., & Lim, D. (2016). Do Corticosteroids Still Have a Role in the Management of Third Molar Surgery? Advances in Therapy, 33(7), 1105–1139. https://doi.org/10.1007/s12325-016-0357-y

Nguyen, E., Grubor, D., & Chandu, A. (2014). Risk Factors for Permanent Injury of Inferior Alveolar and Lingual Nerves During Third Molar Surgery. Journal of Oral and Maxillofacial Surgery, 72(12), 2394–2401. https://doi.org/10.1016/j.joms.2014.06.451

Nogales, C. G., Ferrari, P. H., Kantorovich, E. O., & Lage-Marques, J. L. (2008). Ozone therapy in medicine and dentistry. The Journal of Contemporary Dental Practice, 9(4), 75–84.

Ong, K. S., & Seymour, R. A. (2003). Maximizing the safety of nonsteroidal anti-inflammatory drug use for postoperative dental pain: An evidence-based approach. Anesthesia Progress, 50(2), 62–74.

Pemberton, M. N., & Gibson, J. (2012). Chlorhexidine and hypersensitivity reactions in dentistry. British Dental Journal, 213(11), 547–550. https://doi.org/10.1038/sj.bdj.2012.1086

Quintas, V., Prada-López, I., Donos, N., Suárez-Quintanilla, D., & Tomás, I. (2015). Antiplaque effect of essential oils and 0.2% chlorhexidine on an in situ model of oral biofilm growth: A randomised clinical trial. PloS One, 10(2), e0117177. https://doi.org/10.1371/journal.pone.0117177

Ramos, E., Santamaría, J., Santamaría, G., Barbier, L., & Arteagoitia, I. (2016). Do systemic antibiotics prevent dry socket and infection after third molar extraction? A systematic review and meta-analysis. Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology, 122(4), 403–425. https://doi.org/10.1016/j.oooo.2016.04.016

Ren, Y.-F., & Malmstrom, H. S. (2007). Effectiveness of antibiotic prophylaxis in third molar surgery: A meta-analysis of randomized controlled clinical trials. Journal of Oral and Maxillofacial Surgery: Official Journal of the American Association of Oral and Maxillofacial Surgeons, 65(10), 1909–1921. https://doi.org/10.1016/j.joms.2007.03.004

Sayed, N., Bakathir, A., Pasha, M., & Al-Sudairy, S. (2019). Complications of Third Molar Extraction: A retrospective study from a tertiary healthcare centre in Oman. Sultan Qaboos University Medical Journal [SQUMJ], 19(3), 230. https://doi.org/10.18295/squmj.2019.19.03.009

Sekhavat, L., Davar, R., & Behdad, S. (2015). Efficacy of prophylactic dexamethasone in prevention of postoperative nausea and vomiting. Journal of Epidemiology and Global Health, 5(2), 175–179. https://doi.org/10.1016/j.jegh.2014.07.004

Shetty, V., Hegde, P., & Jain, S. (2019). Management of iatrogenic dislodgment of a mandibular third molar into the pterygomandibular space. General Dentistry, 67(3), e1–e4.

Shintani, Y., Nakanishi, T., Ueda, M., Mizobata, N., Tojyo, I., & Fujita, S. (2019). Comparison of Subjective and Objective Assessments of Neurosensory Function after Lingual Nerve Repair. Medical Principles and Practice, 28(3), 231–235. https://doi.org/10.1159/000497610

Shoshani-Dror, D., Shilo, D., Ginini, J. G., Emodi, O., & Rachmiel, A. (2018). Controversy regarding the need for prophylactic removal of impacted third molars: An overview. Quintessence International (Berlin, Germany: 1985), 49(8), 653–662. https://doi.org/10.3290/j.qi.a40784

Silvestri, D. L., & McEnery-Stonelake, M. (2013). Chlorhexidine: Uses and adverse reactions. Dermatitis: Contact, Atopic, Occupational, Drug, 24(3), 112–118. https://doi.org/10.1097/DER.0b013e3182905561

Singh, N., Agrawal, A., Yadav, A., Chandel, S., & Singhal, A. (2014). Wisdom Tooth—Complications in Extraction. The Journal of Contemporary Dental Practice, 15(1), 34–36. https://doi.org/10.5005/jp-journals-10024-1484

Sivalingam, V. P., Panneerselvam, E., Raja, K. V. B., & Gopi, G. (2017). Does Topical Ozone Therapy Improve Patient Comfort After Surgical Removal of Impacted Mandibular Third Molar? A Randomized Controlled Trial. Journal of Oral and Maxillofacial Surgery, 75(1), 51.e1-51.e9. https://doi.org/10.1016/j.joms.2016.09.014

Smith, L. A., Moore, R. A., McQuay, H. J., & Gavaghan, D. (2001). Using evidence from different sources: An example using paracetamol 1000 mg plus codeine 60 mg. BMC Medical Research Methodology, 1, 1. https://doi.org/10.1186/1471-2288-1-1

Sortino, F., & Cicciù, M. (2011). Strategies used to inhibit postoperative swelling following removal of impacted lower third molar. Dental Research Journal, 8(4), 162–171. https://doi.org/10.4103/1735-3327.86031

Sukegawa, S., Yokota, K., Kanno, T., Manabe, Y., Sukegawa-Takahashi, Y., Masui, M., & Furuki, Y. (2018). What are the risk factors for postoperative infections of third molar extraction surgery: A retrospective clinical study-? Medicina Oral Patología Oral y Cirugia Bucal, 0–0. https://doi.org/10.4317/medoral.22556

Susarla, S. M., Sharaf, B., & Dodson, T. B. (2011). Do antibiotics reduce the frequency of surgical site infections after impacted mandibular third molar surgery? Oral and Maxillofacial Surgery Clinics of North America, 23(4), 541–546, vi. https://doi.org/10.1016/j.coms.2011.07.007

Tojyo, I., Nakanishi, T., Shintani, Y., Okamoto, K., Hiraishi, Y., & Fujita, S. (2019). Risk of lingual nerve injuries in removal of mandibular third molars: A retrospective case-control study. Maxillofacial Plastic and Reconstructive Surgery, 41(1), 40. https://doi.org/10.1186/s40902-019-0222-4

van der Westhuijzen, A. J., Becker, P. J., Morkel, J., & Roelse, J. A. (2005). A randomized observer blind comparison of bilateral facial ice pack therapy with no ice therapy following third molar surgery. International Journal of Oral and Maxillofacial Surgery, 34(3), 281–286. https://doi.org/10.1016/j.ijom.2004.05.006

Weil, K., Hooper, L., Afzal, Z., Esposito, M., Worthington, H. V., van Wijk, A. J., & Coulthard, P. (2007). Paracetamol for pain relief after surgical removal of lower wisdom teeth. The Cochrane Database of Systematic Reviews, 2007(3), CD004487.

https://doi.org/10.1002/14651858.CD004487.pub2

Wright, C. (2012). Therapeutic Guidelines: Oral and Dental. Version 2. Australian Prescriber, 35(6). https://doi.org/10.18773/austprescr.2012.089

Yengopal, V., & Mickenautsch, S. (2012). Chlorhexidine for the prevention of alveolar osteitis. International Journal of Oral and Maxillofacial Surgery, 41(10), 1253–1264. https://doi.org/10.1016/j.ijom.2012.04.017

Zabojszcz, M., Malinowski, K. P., Janion-Sadowska, A., Lillis, T., Ziakas, A., Sławska, A., Janion, M., & Siudak, Z. (2019). Safety of dental extractions in patients on dual antiplatelet therapy – a meta-analysis. Advances in Interventional Cardiology, 15(1), 68–73. https://doi.org/10.5114/aic.2019.83773

Zandi, M., Amini, P., & Keshavarz, A. (2016). Effectiveness of cold therapy in reducing pain, trismus, and oedema after impacted mandibular third molar surgery: A randomized, self-controlled, observer-blind, split-mouth clinical trial. International Journal of Oral and Maxillofacial Surgery, 45(1), 118–123. https://doi.org/10.1016/j.ijom.2015.10.021

Zhou, H.-X. (2008). The debut of PMC Biophysics. PMC Biophysics, 1(1), 1. https://doi.org/10.1186/1757-5036-1-1