JOURNAL OF INTERNATIONAL CRISIS AND RISK COMMUNICATION RESEARCH
ISSN: 2576-0017
2024, VOL 7, NO S9

Comprehensive Review of Dry Socket: Etiology, Risk Factors, Prevention, and Management

Rakan Ibrahim Alrubaish[1], Bandar Abdullah Almegbel[2], Abdulghani Nasser AlGhamdi[3], Rafa Ahmed Alfaifi[4], Lujeen Salem Alkhalaqi[5], Sultan Lafi Aljahdali[6], Mohammed sulaiman S Almousa[7], Zahra Muslem Alhamad[8], Eman Abdulmohsen Al-Yaseen[9], Nasser Muteb Nasser Almutib[10], Danah Khulaif Alanazi[11], Nourah Sultan Alslouli[11], Amal hadi HussainAl Jabir[12], Zainab Ali Ahmed ALMosajen[13], Abdullah Milfi Abdullah Alonazi[14]

1. General Dentist, Dawadmi General Hospital, Riyadh third health cluster, Ministry of Health, kingdom of Saudi Arabia. Rakanru@gmail.com
2. Dentist, Ministry of Health, kingdom of Saudi Arabia. Bandaralmegbel1163@gmail.com
3. Dental Tech, King khaled Hospital Alkharj, Ministry of Health, kingdom of Saudi Arabia. dentalghg@hotmail.com
4. Dentist, Al-Ahsa Health Cluster, Ministry of Health, kingdom of Saudi Arabia. Rafaalfaifi@gmail.com
5. Dentist, First Riyadh Cluster, Ministry of Health, kingdom of Saudi Arabia. Lalkhalaqi@moh.gov.sa
6. General Dentist, Thadiq General Hospital, Riyadh Third Health Cluster, Ministry Of Health, Kingdom Of Saudi Arabia. sultan.lafi@hotmail.com
7. Dentist, Saihat 1 healthcare center, Ministry Of Health, Kingdom Of Saudi Arabia. Msalmousa@moh.gov.sa
8. Dental Assistant, AlThulithia PHC, Ministry Of Health, Kingdom Of Saudi Arabia. Zahramuslem1@hotmail.com
9. Dental Assistant, Almoalmeen PHC, Ministry Of Health, Kingdom Of Saudi Arabia. eman.alyaseen92@gmail.com
10. Dental Helth Care (Dental Hygienist), King Khaled Hospital Al Kharj, Ministry of Health, Kingdom of Saudi Arabia. nmalmutib@moh.gov.sa
11. Dental Assistant, Prince sultan military medical city.
12. Dental assistant, Gharib Health Center Jazan, Ministry of Health, Kingdom of Saudi Arabia. aaljabir@moh.gov.sa
13. General Dentist, Riyadh First Health Cluster, Ministry Of Health, Kingdom Of Saudi Arabia. Zainab.a.almosajen@gmail.com
14. Dentist, Ministry Of Health, Kingdom Of Saudi Arabia. AbmiAlonazi@moh.gov.sa

ABSTRACT

Dry socket, or alveolar osteitis, is a common complication following tooth extraction, characterized by partial or complete loss of the blood clot within the extraction site. It typically presents with intense pain, exposed alveolar bone, necrotic tissue, and unpleasant odor. The exact mechanism remains poorly understood, but increased fibrinolytic activity due to various factors is thought to play a role. Incidence ranges from 1% to 5% for all extractions, reaching up to 38% for mandibular third molars. Surgical trauma, complexity of the procedure, operator experience, smoking, oral contraceptives, and bacterial infection are among the major risk factors. Prevention

strategies include the use of chlorhexidine, antibiotics, antifibrinolytics, antimicrobial photodynamic therapy, and low-level laser therapy. Management involves irrigation, medicated dressings, analgesics, and, in some cases, surgical intervention. Understanding the etiology, risk factors, and preventive measures is crucial for reducing the incidence of dry socket and improving patient outcomes. Further research is needed to elucidate the precise pathophysiology and develop more effective prevention and treatment strategies for this painful postoperative complication.

KEYWORDS: dry Socket, alveolar osteitis, management, risk Factors.

1. Introduction

Tooth extraction is among the most performed procedures in surgical dentistry, with a notable increase in frequency during the initial wave of the COVID-19 pandemic (Nijakowski et al., 2021). Indications for extraction include conditions such as oral mucositis, periapical inflammation, bone resorption, damage to the periodontal ligament, orthodontic needs, and resorption of neighbouring teeth (Miclotte et al., 2018). Extraction techniques are generally classified into nonsurgical and surgical methods. Nonsurgical extractions involve basic elevation or separation of the root without raising the mucoperiosteal flap. In contrast, surgical extractions require the reflection of the mucoperiosteal flap and may involve bone removal (Nusair & Younis, 2007). Tooth extraction is associated with both intraoperative and postoperative complications. The most frequent of these complications include prolonged bleeding, alveolar abscesses, postoperative pain, and the development of dry socket (Bouloux et al., 2007).

As previously noted, dry socket is one of the most common complications following tooth extraction (Saravanan & Kumar, 2021). Dry socket, or alveolar osteitis, is characterized by the partial or complete loss of the blood clot within the extraction site. This condition typically presents with intense pain within one to five days postoperatively, often accompanied by symptoms such as exposed alveolar bone, necrotic tissue, and unpleasant odor. Other terms used to describe this condition include fibrinolytic alveolitis, localized osteomyelitis, postoperative alveolitis, and alveolitis sicca (Akinbami & Godspower, 2014). The exact mechanism of dry socket formation remains poorly understood. The prevailing theory suggests that it results from the breakdown of the blood clot within the socket due to increased fibrinolytic activity. Factors thought to initiate fibrinolysis include age, gender, smoking, oral contraceptive use, menstrual cycle, duration and trauma of the surgical procedure, condition and type of the extracted tooth, presence of prior periapical or pericoronal infection, inadequate socket curettage or irrigation, and excessive use of local anesthetics with vasoconstrictors (Bortoluzzi et al., 2010).

The spoken term "dry socket" describes a condition in which some or all the bone within a post-extraction socket, or around the occlusal edges of the socket, becomes exposed in the days following the procedure. This exposure occurs due to the absence of a stable blood clot or a covering layer of vital, healing epithelium over the bone surface. Patients may find it difficult to avoid contact with food particles or

accidental stimulation from the tongue, both of which can aggravate the exposed bone, which is extremely sensitive and painful to touch, leading to frequent episodes of acute pain. All areas of a dry socket lesion, aside from the exposed bone, can typically be touched gently with a periodontal probe or irrigation needle without triggering significant pain. Dry socket lesions are observed in approximately 1% to 5% of all extractions, with a higher incidence of up to 38% following mandibular third molar extractions (Bowe et al., 2011).

The accumulation of food particles in the socket may contribute to the dislodgement of any forming blood clot. Additionally, bacterial biofilm and food particles within the socket may impede the reformation of a dislodged clot by obstructing its attachment to the exposed bone surface. These particles and biofilm can also hinder the contact between the healing epithelium and the exposed bone, potentially extending the healing period of the dry socket lesion. Furthermore, food particles collected within a dry socket can undergo bacterial fermentation. This process may produce toxins or antigens that irritate the exposed bone, resulting in a foul taste, halitosis, and pain that radiates throughout the jaw. However, research suggests that bacterial presence is not the primary cause of dry socket formation (Blum, 2002).

Incidence

The reported incidence of alveolar osteitis (AO) is approximately 3–4% after routine dental extractions (Rood & Murgatroyd, 1979), but it ranges from 1% to 45% following the extraction of mandibular third molars (Barclay, 1987; Fridrich & Olson, 1990). This significant variation in AO incidence can be attributed to multiple factors, including differences in diagnostic criteria, assessment methods, and the presence of mixed data from non-impacted, partially impacted, and fully erupted mandibular third molars. Additionally, variability in the management of extraction sites during and after surgery, along with differences in patient demographics (such as age) and variations in surgical techniques or practitioner experience, contribute to these discrepancies. Individual pain threshold differences across the population also play a role in these findings. Studies reporting a 1% incidence rate lack clinical reliability, while those presenting rates above 30% may reflect unaddressed variables or inadequate sample sizes. Well-controlled studies estimate an incidence of 25–30% for AO following impacted mandibular third molar extractions (Lilly et al., 1974). This review concludes that AO is roughly 10 times more likely to occur after the extraction of mandibular third molars compared to extractions in other locations.

Pathophysiology of Dry Socket

Haraji et al. observed that the modified triangular flap reduces the incidence of alveolar osteitis (AO) more effectively than the buccal envelope flap. In this study, patients who required extraction of bilaterally impacted mandibular third molars with similar levels of difficulty were included; a modified triangular flap was used on one side, while a buccal envelope flap (control) was used on the other. The incidence of AO and healing progress were evaluated at three and seven days post-surgery (Haraji et al., 2010).

Eshghpour M et al. conducted a study to investigate the association between the

menstrual cycle and AO incidence. Patients with bilaterally impacted third molars underwent randomized extractions: one extraction during their menstrual period and the other during the mid-cycle. The postoperative examiner was unaware of the patients' menstrual cycle phase. The study found an overall AO frequency of 23.45%, with a significantly higher incidence in the mid-cycle phase compared to the menstrual period, in both oral contraceptive users and non-users. Additionally, AO frequency was notably higher among oral contraceptive users than non-users (Eshghpour & Nejat, 2013).

In a study by Oginni FO , it was reported that managing preoperative infections, maintaining good oral hygiene, minimizing surgical trauma, and avoiding surgeries between days 1 and 22 of the menstrual cycle in non-menopausal women may reduce dry socket incidence. Among the female patients, 25% were oral contraceptive users, and extractions were performed within the first 22 days of the menstrual cycle. Traumatic extractions occurred in 66.2% of cases. This study highlighted that a previously infected posterior tooth posed an equal risk of AO in both genders, while poor oral hygiene and traumatic mandibular extractions were prominent risk factors for males, and extractions performed between days 1 and 22 were significant for females (Oginni, 2008).

Bortoluzzi MC et al. assessed dry socket incidence, finding that patients experienced higher levels of pain and longer pain duration (more than two days) after more traumatic surgeries or those with postoperative complications. Smoking was statistically associated with increased postoperative complications, including AO (Bortoluzzi et al., 2010).

According to Mohammed H. Abu Younis and Ra'ed O. Abu Hantash , factors like smoking, surgical trauma, and single-tooth extractions predispose individuals to dry socket. In contrast, factors such as age, gender, medical history, extraction site, anesthesia amount, and surgeon experience did not influence dry socket occurrence. The overall dry socket incidence was 3.2%, with rates of 1.7% for non-surgical extractions and 15% for surgical extractions. Smokers had a notably higher dry socket incidence (12%) compared to non-smokers (4%). A strong association was observed between smoking intensity and dry socket incidence, with single extractions showing a higher incidence (13%) compared to multiple extractions (5%) (Younis & Hantash, 2011).

Two studies by Eshghpour M et al. and Hasan Momeni et al. aimed to identify risk factors for dry socket. Eshghpour M et al. found a dry socket incidence of 19.14%, with no significant associations between AO and factors like age, gender, systemic disorders, or pre-surgical antibiotic use. However, smoking, surgical difficulty as assessed by radiographs and surgeon perception, surgery duration, and the number of anesthesia carpules used were significantly associated with AO (Eshghpour & Nejat, 2013). Conversely, Hasan Momeni et al. reported a 0.6% incidence rate, noting a higher frequency in females (0.08%) than males (0.04%), with mandibular third molars affected more frequently than other teeth. Risk factors such as trauma, poor oral hygiene, and smoking further increased dry socket likelihood (Momeni et al., 2011).

Halabí D et al. identified that previous surgical site infection, traumatic extraction,

and tobacco use are associated with an elevated risk of alveolar osteitis. Their findings showed significant correlations between traumatic extractions, smoking post-extraction, previous infections, and AO development (Halabí et al., 2012).

Al-Sukhun J et al. compared the efficacy of pain management between patients taking the COX-2 inhibitor celecoxib preemptively and those using ibuprofen. The study found a significantly higher AO incidence in the ibuprofen group than in the celecoxib and placebo groups (Al-Sukhun & Penttilä, 2011).

In an experimental study by Rodrigues MT et al., infection was induced in rat extraction sockets using a microbial inoculum containing Capnocytophaga ochracea, Fusobacterium nucleatum, Prevotella melaninogenica, Streptococcus anginosus, Treponema socranskii, and Streptococcus sanguis. Results showed increased serum C-reactive protein levels and disrupted alveolar repair, suggesting that such infections can lead to systemic effects and impaired healing, providing a valuable experimental model for AO studies (Rodrigues et al., 2011).

Tolstunov L examined the impact of irrigating extraction sockets with saline solution on the incidence of AO following impacted mandibular third molar removals. The study found a notable difference in dry socket occurrence (77.8% in irrigated sites vs. 22.2% in non-irrigated sites) when comparing traditional extraction protocols with a modified approach that omitted end-of-surgery irrigation. The study suggests that preserving socket bleeding without irrigation may increase the likelihood of stable blood clot formation and thereby support uncomplicated healing without alveolar osteitis development (Tolstunov, 2012).

Risk factors

Surgical Trauma and Complexity of Procedure

Many researchers concur that surgical trauma and the complexity of a procedure are significant factors contributing to the incidence of alveolar osteitis (AO) (Alexander, 2000; Birn, 1973). Increased trauma during more complex, challenging extractions can lead to a heightened release of tissue activators because of bone marrow inflammation (Nusair & Younis, 2007). Indeed, surgical extractions increase the incidence of AO by up to tenfold compared to nonsurgical procedures. Lilly et al. observed that surgical procedures involving mucoperiosteal flap reflection and bone removal are more likely to result in AO (Lilly et al., 1974).

Operator Experience

Several studies suggest that an operator's level of experience may influence AO risk. Larsen concluded that surgeon inexperience could lead to higher trauma during extractions, particularly for mandibular third molars (Larsen, 1992). Study by Oginni et al. further reported higher AO incidence in extractions performed by less experienced al, highlighting the importance of surgical skill (Oginni et al., 2003).

Mandibular Third Molars

AO appears more prevalent following mandibular third molar extractions. This may be due to factors like increased bone density, reduced vascularity, and limited

granulation tissue formation in this region, although evidence linking these anatomical factors directly to AO remains inconclusive. It is more likely that the elevated AO incidence stems from the higher proportion of surgical extractions in this area (Nusair & Younis, 2007).

Systemic Disease

Some studies indicate that systemic diseases might predispose individuals to AO, especially among immunocompromised or diabetic patients, who may experience delayed healing (Lilly et al., 1974). However, there is no definitive evidence proving a relationship between systemic disease and AO.

Oral Contraceptives

Among medications, oral contraceptives are uniquely associated with AO. Following their rise in popularity in the 1960s, studies showed an increased AO rate in women (Schow, 1974). Research by Sweet and Butler suggests a correlation between the use of oral contraceptives and AO incidence (Sweet & Butler, 1978). Estrogen may enhance fibrinolysis by increasing factors II, VII, VIII, X, and plasminogen, thereby promoting clot lysis. Catellani et al. found that AO risk correlates with the estrogen dose in contraceptives, and one study even recommended scheduling elective tooth extractions with the hormonal cycle in mind to reduce AO risk (Catellani et al., 1980).

Gender

Some literature posits that female gender alone may predispose individuals to AO. MacGregor observed a 50% higher AO incidence in women than in men among 4,000 cases (MacGregor, 1968), though Colby found no gender-related differences in AO rates (Colby, 1997).

Smoking

Multiple studies confirm a strong association between smoking and AO, with evidence indicating a dose-dependent relationship. Among patients who had mandibular third molars surgically removed, smokers who consumed half a pack daily had a four- to fivefold increased AO risk (12% vs. 2.6%) compared to nonsmokers. This incidence rose to 20% for individuals smoking a pack daily, reaching 40% for those who smoked on the day of surgery. Whether AO development is due to local effects (such as heat or suction) or systemic factors is still debated. Blum proposed that foreign materials introduced during smoking might act as contaminants at the extraction site (Blum, 2002; Sweet & Butler, 1979).

Physical Clot Dislodgement

Though frequently discussed, no conclusive evidence indicates that physical dislodgement of the clot from actions like sucking through a straw is a major cause of AO (Blum, 2002).

Bacterial Infection

Many studies support that bacterial infection is a significant AO risk factor. AO incidence is higher among patients with poor oral hygiene, existing local infections

like pericoronitis, or advanced periodontal disease (Rud, 1970). Specific bacteria may play a role, as Rozantis et al. found delayed healing in animal models after inoculating extraction sites with Actinomyces viscosus and Streptococcus mutans. Nitzan et al. observed high plasmin-like activity from cultures of Treponema denticola, a bacterium associated with periodontal disease, suggesting it may exacerbate fibrinolysis (Nitzan et al., 1978).

Excessive Irrigation or Curettage

Excessive irrigation or aggressive curettage of the socket has been proposed as potentially disrupting clot formation or damaging bone, which might contribute to AO, though concrete evidence supporting this hypothesis is limited (Birn, 1973).

Age

There is ongoing debate regarding age and AO incidence. Generally, older patients are thought to be at greater risk, and some recommend removing impacted mandibular third molars before age 24, especially for females, to reduce postoperative complications (Alexander, 2000).

Single vs. Multiple Extractions

Limited data suggest a higher AO prevalence after single extractions than multiple extractions, possibly because patients undergoing single extractions might have lower pain tolerance than those requiring multiple extractions due to extensive tooth deterioration (Field et al., 1985).

Saliva

A few researchers have suggested saliva may be an AO risk factor, though Birn and others found no substantial evidence to support this association (Birn, 1973).

Bone or Root Fragments Left in the Wound

It has been proposed that retained bone or root fragments might impede healing and contribute to AO. However, Simpson's study showed that small fragments are common post-extraction and are often externalized by the oral epithelium without causing complications (Blum, 2002).

Flap Design and Suturing

While some earlier studies suggested flap design and suturing might influence AO risk, more recent research provides little evidence to support this claim, suggesting these factors are not major contributors (Alexander, 2000).

Prevention

Chlorhexidine

Chlorhexidine (CHX), a bisguanide antiseptic, effectively reduces oral microbiota when used as a preoperative irrigant and mouthwash. Field et al. (1987) observed that patients who received irrigation of the gingival crevice and a two-minute mouth rinse with 0.2% CHX digluconate had a lower incidence of dry socket compared to those who received no irrigation or irrigation with saline. In a study conducted in a

private dental practice, the effects of a 0.12% chlorhexidine gluconate rinse (Peridex, Proctor & Gamble, Cincinnati, Ohio) were analyzed for dry socket prevention after removal of impacted mandibular third molars. Over three years, 371 patients (a total of 654 impacted mandibular third molars) were divided into three groups: a control group without treatment (group 1), a group rinsing with Peridex twice daily for two weeks after surgery (group 2), and a group using one rinse presurgery (group 3). Results showed a 56% decrease in dry socket incidence in the group that used Peridex twice daily post-surgery (group 2), compared to both the no-rinse group (group 1) and the single presurgery rinse group (group 3) (Bonine, 1995).

Antibiotics

Both systemic and topical antibiotics are known to reduce dry socket risk (Torres-Lagares et al., 2005). Systemic antibiotics such as penicillin, clindamycin, erythromycin, and metronidazole have demonstrated efficacy in preventing dry socket. However, topical tetracyclines may induce side effects and foreign body reactions.

Antifibrinolytics

Antifibrinolytic agents, like tranexamic acid, inhibit fibrinolysis by preventing plasmin formation from plasminogen through plasminogen activators, reducing the risk of clot dissolution associated with dry socket (Kolokythas et al., 2010).

Antimicrobial Photodynamic Therapy (aPDT)

Antimicrobial photodynamic therapy is emerging as a promising approach for reducing dry socket incidence. In one study, patients who underwent aPDT at the extraction site had significantly fewer cases of alveolar osteitis (AO)—only one case in the aPDT group versus 13 cases in the control group without aPDT. On the day following extraction, subjective pain scores were notably lower in the aPDT group (11.2 ± 9.8) compared to the control group (19.0 ± 12.2). After one week, pain levels in the aPDT group further decreased to 2.4 ± 9.2, while the control group's pain scores remained higher at 13.1 ± 25.2. These differences were statistically significant, with $p=0.000$ on the first and eighth post-surgical days (Neugebauer et al., 2004).

Low-Level Laser Therapy (LLLT)

LLLT has been shown to accelerate wound healing and reduce inflammation more effectively than conventional treatments such as Alvogyl and Salilept. This therapy is applied after socket irrigation, using a continuous-mode diode laser with parameters of 808 nm wavelength, 100 mW power, 60-second duration, and an intensity of 7.645/cm (Kaya et al., 2011).

Management

Irrigation

Irrigation is a common management technique for dry socket, aiding in the removal of debris, sequestra, and bacteria from the exposed bone in the affected area (Betts et al., 1995). In 1929, the use of heated saline, powdered sodium perborate, gauze with iodoform, codeine prescriptions, and subsequent irrigation with a concentrated

sodium perborate solution was proposed. Patients are advised to maintain oral hygiene and use gentle warm saline rinses at home, as these practices promote healing in the socket (Fazakerley & Field, 1991).

Medicated Dressing

Medicated dressing is often used alongside surgical intervention due to possible local complications (Oginni et al., 2003). Turner suggested that packing the socket may hinder wound healing and increase infection risk. Fazakerley and Field recommended removing sutures, irrigating with warm saline under local anesthesia, and applying a medicated dressing. This dressing typically includes zinc oxide and eugenol mixed to a semi-solid consistency and placed on iodoform ribbon gauze. The pack should be changed every 2-3 days and removed after the pain subsides (Houston et al., 2002). Petroleum-based carriers are discouraged due to the risk of myospherulosis. Common medicated dressings combine antibacterials, topical anesthetics, and obtundants, such as zinc oxide and eugenol–impregnated cotton pellets, Alvogyl (containing eugenol, iodoform, and butamen), Dentalone, bismuth subnitrate and iodoform paste (BIPP) on ribbon gauze, as well as metronidazole and lidocaine ointment (Daly et al., 2022).

Analgesics

Pain management for dry socket can include a short course of non-steroidal anti-inflammatory drugs (NSAIDs) or narcotic-based analgesics such as codeine, depending on the severity of the pain.

Surgical Intervention

Curettage is an available treatment option for dry socket but is generally not recommended due to the potential for additional pain. This technique involves administering anesthesia, performing surgical debridement of the socket, and closing the wound with an advanced flap. Turner noted that curettage with granulation tissue removal could reduce the number of required visits compared to methods using zinc oxide eugenol or iodoform gauze with eugenol.

2. Conclusion

understanding the etiology, risk factors, and management of dry socket is essential for improving patient outcomes post-extraction. This condition, marked by severe pain due to the loss of the blood clot at the extraction site, can be influenced by factors such as surgical trauma, smoking, oral contraceptive use, and timing relative to the menstrual cycle. Effective prevention strategies include using chlorhexidine rinses, appropriate surgical techniques, and avoiding extractions during high-risk periods for susceptible patients. For those who develop dry socket, treatments like medicated dressings, irrigation, and pain management can significantly alleviate symptoms and aid recovery.

References

Akinbami, B. O., & Godspower, T. (2014). Dry Socket: Incidence, Clinical Features, and Predisposing Factors. International Journal of Dentistry, 2014, 796102. https://doi.org/10.1155/2014/796102

Alexander, R. E. (2000). Dental extraction wound management: A case against medicating postextraction sockets. Journal of Oral and Maxillofacial Surgery: Official Journal of the American Association of Oral and Maxillofacial Surgeons, 58(5), 538–551. https://doi.org/10.1016/s0278-2391(00)90017-x

Al-Sukhun, J., & Penttilä, H. (2011). The cyclooxygenase-2 inhibitor celecoxib and alveolar osteitis. Journal of the Irish Dental Association, 57(1), 50–53.

Barclay, J. K. (1987). Metronidazole and dry socket: Prophylactic use in mandibular third molar removal complicated by non-acute pericoronitis. The New Zealand Dental Journal, 83(373), 71–75.

Betts, N. J., Makowski, G., Shen, Y. H., & Hersh, E. V. (1995). Evaluation of topical viscous 2% lidocaine jelly as an adjunct during the management of alveolar osteitis. Journal of Oral and Maxillofacial Surgery: Official Journal of the American Association of Oral and Maxillofacial Surgeons, 53(10), 1140–1144. https://doi.org/10.1016/0278-2391(95)90619-3

Birn, H. (1973). Etiology and pathogenesis of fibrinolytic alveolitis ("dry socket"). International Journal of Oral Surgery, 2(5), 211–263. https://doi.org/10.1016/S0300-9785(73)80045-6

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

Bonine, F. L. (1995). Effect of chlorhexidine rinse on the incidence of dry socket in impacted mandibular third molar extraction sites. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontics, 79(2), 154–157; discussion 157-158. https://doi.org/10.1016/s1079-2104(05)80273-2

Bortoluzzi, M. C., Manfro, R., De Déa, B. E., & Dutra, T. C. (2010). Incidence of dry socket, alveolar infection, and postoperative pain following the extraction of erupted teeth. The Journal of Contemporary Dental Practice, 11(1), E033-040.

Bouloux, G. F., Steed, M. B., & Perciaccante, V. J. (2007). Complications of third molar surgery. Oral and Maxillofacial Surgery Clinics of North America, 19(1), 117–128, vii. https://doi.org/10.1016/j.coms.2006.11.013

Bowe, D. C., Rogers, S., & Stassen, L. F. A. (2011). The management of dry socket/alveolar osteitis. Journal of the Irish Dental Association, 57(6), 305–310.

Catellani, J. E., Harvey, S., Erickson, S. H., & Cherkin, D. (1980). Effect of oral contraceptive cycle on dry socket (localized alveolar osteitis). Journal of the American Dental Association (1939), 101(5), 777–780. https://doi.org/10.14219/jada.archive.1980.0420

Colby, R. C. (1997). The general practitioner's perspective of the etiology, prevention, and treatment of dry socket. General Dentistry, 45(5), 461–467; quiz 471–472.

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

Eshghpour, M., & Nejat, A. H. (2013). Dry socket following surgical removal of impacted third molar in an Iranian population: Incidence and risk factors. Nigerian Journal of Clinical Practice, 16(4), 496–500. https://doi.org/10.4103/1119-3077.116897

Fazakerley, M., & Field, E. A. (1991). Dry socket: A painful post-extraction complication (a review). Dental Update, 18(1), 31–34.

Field, E. A., Speechley, J. A., Rotter, E., & Scott, J. (1985). Dry socket incidence compared after a 12 year interval. The British Journal of Oral & Maxillofacial Surgery, 23(6), 419–427. https://doi.org/10.1016/0266-4356(85)90026-9

Fridrich, K. L., & Olson, R. A. (1990). Alveolar osteitis following surgical removal of mandibular third molars. Anesthesia Progress, 37(1), 32–41.

Halabí, D., Escobar, J., Muñoz, C., & Uribe, S. (2012). Logistic regression analysis of risk factors for the development of alveolar osteitis. Journal of Oral and Maxillofacial Surgery: Official Journal of the American Association of Oral and Maxillofacial Surgeons, 70(5), 1040–1044. https://doi.org/10.1016/j.joms.2011.11.024

Haraji, A., Motamedi, M. H. K., & Rezvani, F. (2010). Can flap design influence the incidence of alveolar osteitis following removal of impacted mandibular third molars? General Dentistry, 58(5), e187-189.

Houston, J. P., McCollum, J., Pietz, D., & Schneck, D. (2002). Alveolar osteitis: A review of its etiology, prevention, and treatment modalities. General Dentistry, 50(5), 457–463; quiz 464–465.

Kaya, G. Ş., Yapici, G., Savaş, Z., & Güngörmüş, M. (2011). Comparison of alvogyl, SaliCept patch, and low-level laser therapy in the management of alveolar osteitis. Journal of Oral and Maxillofacial Surgery: Official Journal of the American Association of Oral and Maxillofacial Surgeons, 69(6), 1571–1577. https://doi.org/10.1016/j.joms.2010.11.005

Kolokythas, A., Olech, E., & Miloro, M. (2010). Alveolar osteitis: A comprehensive review of concepts and controversies. International Journal of Dentistry, 2010, 249073. https://doi.org/10.1155/2010/249073

Larsen, P. E. (1992). Alveolar osteitis after surgical removal of impacted mandibular third molars. Identification of the patient at risk. Oral Surgery, Oral Medicine, and Oral Pathology, 73(4), 393–397. https://doi.org/10.1016/0030-4220(92)90312-e

Lilly, G. E., Osbon, D. B., Rael, E. M., Samuels, H. S., & Jones, J. C. (1974). Alveolar osteitis associated with mandibular third molar extractions. Journal of the American Dental Association (1939), 88(4), 802–806. https://doi.org/10.14219/jada.archive.1974.0168

MacGregor, A. J. (1968). Aetiology of dry socket: A clinical investigation. The British Journal of Oral Surgery, 6(1), 49–58. https://doi.org/10.1016/s0007-117x(68)80026-5

Miclotte, I., Agbaje, J. O., Spaey, Y., Legrand, P., & Politis, C. (2018). Incidence and treatment of complications in patients who had third molars or other teeth extracted. The British Journal of Oral & Maxillofacial Surgery, 56(5), 388–393. https://doi.org/10.1016/j.bjoms.2018.02.001

Momeni, H., Shahnaseri, S., & Hamzeheil, Z. (2011). Evaluation of relative distribution and risk factors in patients with dry socket referring to Yazd dental clinics. Dental Research Journal, 8(Suppl 1), S84-87.

Neugebauer, J., Jozsa, M., & Kübler, A. (2004). [Antimicrobial photodynamic therapy for prevention of alveolar ostitis and post-extraction pain]. Mund-, Kiefer- und Gesichtschirurgie: MKG, 8(6), 350–355. https://doi.org/10.1007/s10006-004-0572-6

Nijakowski, K., Cieślik, K., Łaganowski, K., Gruszczyński, D., & Surdacka, A. (2021). The Impact of the COVID-19 Pandemic on the Spectrum of Performed Dental Procedures. International Journal of Environmental Research and Public Health, 18(7), 3421. https://doi.org/10.3390/ijerph18073421

Nitzan, D., Sperry, J. F., & Wilkins, T. D. (1978). Fibrinolytic activity of oral anaerobic bacteria. Archives of Oral Biology, 23(6), 465–470. https://doi.org/10.1016/0003-9969(78)90078-x

Nusair, Y. M., & Younis, M. H. A. (2007). Prevalence, clinical picture, and risk factors of dry socket in a Jordanian dental teaching center. The Journal of Contemporary Dental Practice, 8(3), 53–63.

Oginni, F. O. (2008). Dry socket: A prospective study of prevalent risk factors in a Nigerian population. Journal of Oral and Maxillofacial Surgery: Official Journal of the American Association of Oral and Maxillofacial Surgeons, 66(11), 2290–2295. https://doi.org/10.1016/j.joms.2008.01.063

Oginni, F. O., Fatusi, O. A., & Alagbe, A. O. (2003). A clinical evaluation of dry socket in a Nigerian teaching hospital. Journal of Oral and Maxillofacial Surgery: Official Journal of the American Association of Oral and Maxillofacial Surgeons, 61(8), 871–876. https://doi.org/10.1016/s0278-2391(03)00248-9

Rodrigues, M. T. V., Cardoso, C. L., Carvalho, P. S. P. de, Cestari, T. M., Feres, M., Garlet, G. P., & Ferreira, O. (2011). Experimental alveolitis in rats: Microbiological, acute phase response and histometric characterization of delayed alveolar healing. Journal of Applied Oral Science: Revista FOB, 19(3), 260–268. https://doi.org/10.1590/s1678-77572011000300015

Rood, J. P., & Murgatroyd, J. (1979). Metronidazole in the prevention of "dry socket." The British Journal of Oral Surgery, 17(1), 62–70. https://doi.org/10.1016/0007-117x(79)90009-x

Rud, J. (1970). Removal of impacted lower third molars with acute pericoronitis and necrotising gingivitis. The British Journal of Oral Surgery, 7(3), 153–160. https://doi.org/10.1016/s0007-117x(69)80015-6

Saravanan, K., & Kumar, M. S. (2021). Assessment of post extraction complications in Indians. Bioinformation, 17(12), 1120. https://doi.org/10.6026/973206300171120

Schow, S. R. (1974). Evaluation of postoperative localized osteitis in mandibular third molar surgery. Oral Surgery, Oral Medicine, and Oral Pathology, 38(3), 352–358. https://doi.org/10.1016/0030-4220(74)90360-0

Sweet, J. B., & Butler, D. P. (1978). Predisposing and operative factors: Effect on the incidence of localized osteitis in mandibular third-molar surgery. Oral Surgery, Oral Medicine, and Oral Pathology, 46(2), 206–215. https://doi.org/10.1016/0030-4220(78)90195-0

Sweet, J. B., & Butler, D. P. (1979). The relationship of smoking to localized osteitis. Journal of Oral Surgery (American Dental Association: 1965), 37(10), 732–735.

Tolstunov, L. (2012). Influence of immediate post-extraction socket irrigation on development of alveolar osteitis after mandibular third molar removal: A prospective split-mouth study, preliminary report. British Dental Journal, 213(12), 597–601. https://doi.org/10.1038/sj.bdj.2012.1134

Torres-Lagares, D., Serrera-Figallo, M. A., Romero-Ruíz, M. M., Infante-Cossío, P., García-Calderón, M., & Gutiérrez-Pérez, J. L. (2005). Update on dry socket: A review of the literature. Medicina Oral, Patologia Oral Y Cirugia Bucal, 10(1), 81–85; 77–81.

Younis, M. H. A., & Hantash, R. O. A. (2011). Dry Socket: Frequency, Clinical Picture, and Risk Factors in a Palestinian Dental Teaching Center. The Open Dentistry Journal, 5, 7. https://doi.org/10.2174/1874210601105010007