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Review Article

Dry Socket: A review of its etiology, diagnosis and its management

1.Pushpendra Singh

2. Radhika Vaidya

3. Sagnik mandal

1,2,3. BDS, Hitkarini Dental College and Hospital, Jabalpur, Madhya Pradesh, India.

Corresponding Author: Pushpendra Singh, drpushpendrasingh12@gmail.com

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Abstract

Alveolar osteitis commonly called as dry socket, alveolalgia osteomyelitis, fibrinolytic osteitis and localized osteitis alveolalgia. It is commonly seen after tooth extraction mainly in third molar extraction. It is a severely painful condition characterized by dislodgement of the blood clot that forms in the socket, leading to exposure of bone. The aproximity in incidence for all routine extraction is 3% and for impacted Mandibular third molar it reaches upto 30%. This review aims to provide an in-depth understanding of dry socket (alveolar osteitis) including it's pathophysiology, risk factors, prevention strategies and clinical management.

Keywords: Dry socket, Alveolar osteitis, Dry socket treatment, Dry socket management.

|| INTRODUCTION

Dry socket (Alveolar osteitis) usually occurs after tooth extraction, particularly after the extraction of impacted third molars. While most extractions heal uneventfully, a subset of patients experience complications. A dry socket (alveolar osteitis) is the most frequent and painful complication. It occurs after the first to third day after extraction. The gingiva is erythematous, swollen, and tender, and the surrounding bone is exposed [1]. It occurs in approximately 3% of extractions and up to 30% of third molar extractions [2,3]. Predisposing factors include the presence of any infection at the site before and after extraction, smoking, use of oral contraceptives, irradiation, bone disease, underlying pathologies, systemic illnesses such as diabetes mellitus, clotting disorders, and failure to follow post-extraction instructions [4]. Role of bacteria in the breakdown of the clot. An increased incidence of dry sockets supports this. The most commonly detected bacteria were Prevotella, Fusobacterium, Parvimonas, and Peptostreptococcus [5].

Dry socket rarely occurs in patients under 20 years old, likely due to better bone elasticity, improved blood circulation, and enhanced healing capacity [6]. The incidence of dry sockets is mainly seen between the 20 to 40-year age group, with an increased incidence of third molar extraction procedures and a greater prevalence of

smoking [5,6]. The clinical picture typically presents with pain in an empty alveolus, which is observed in most cases. The literature also reveals that pain radiates from dry sockets primarily towards the temporal and ear regions in most cases, and less towards the frontal and ocular areas.

|| REVIEW

The pathophysiology of dry socket (alveolar osteitis) is due to the premature loss or failure of the blood clot that forms within the extraction site after a tooth is extracted, typically or surgically.

Increased fibrinolysis causes the disintegration of blood clots, resulting in the activation of the plasminogen pathway, which can be achieved by physiological and non-physiological activator substances, i.e., direct and indirect activators. Bacterial products and toxins trigger the indirect activators. It was discovered that active plasmins in the general circulation are inactivated by antiplasmin [4-7]. Brim and this team revealed that the heart, brain, and kidney have less fibrinolytic activity than the uterus tissue and bone [8]. Several mechanisms have been proposed to explain the development of dry sockets. The blood clot may become dislodged prematurely due to mechanical trauma, such as vigorous rinsing, sucking, or forceful coughing. Bacterial invasion in the socket can interfere with clot formation. Common microorganisms associated with dry sockets are Prevotella, Fusobacterium, Parvimonas, and Peptostreptococcus [7]. Inadequate Blood Supply: Factors such as trauma to the blood vessels during extraction, smoking, or any underlying systemic condition can affect blood flow to the socket, reducing the ability to form and maintain a stable blood clot.

Several factors that cause dry socket after tooth extraction:

Smoking	Inhibit clot formation and delay healing
Infection	Poor oral hygiene and having local infections like pericoronitis and periodontal disease
Oral contraceptive / Menstrual cycle	Alters hormonal levels and increases fibrinolytic activity.
Age	The older the patient, the more significant the risk.
Difficult extraction	Increase mechanical trauma and clot displacement risk.
Previous history of extraction	Increase the risk of dry sockets.
Inadequate irrigation	Vigorous rinsing or improper hygiene disrupts clot stability.
Remnants of debris and bone /root fragments	Disturbed healing

Table 1: Factors that cause dry socket

The main hallmark feature of a dry socket is severe pain, often described as throbbing or radiating pain to the ear, eye, or temporal region. Severe, persistent nocturnal pain typically begins 2–5 days after tooth extraction. Other common signs and symptoms include visible bone exposure, halitosis, pain on palpation, a foul taste, low-grade fever, and regional lymphadenopathy [6].



Figure 1: Signs and symptoms

The diagnosis of dry socket (alveolar osteitis) is mainly done clinically. Radiographs are not required unless complications like infection or fracture are suspected. Clinically, suppose the patient has any history of extraction, severe persistent pain starting a few days after extraction, visible bone exposure (empty socket with exposed bone), no signs of infection (no pus), or tenderness on palpation. In that case, these clinical findings are diagnostic of dry sockets [3-5].

Managing dry socket (alveolar osteitis) focuses on relieving pain, controlling infection, and promoting healing. Systemic antibiotics are given, like penicillins, metronidazole, clindamycin, and erythromycin [8]. The routine use of systemic pre- and postoperative antibiotics can lead to bacterial strain resistance, hypersensitivity, and disruption of host commensalism [9]. Tetracycline is applied locally in the form of powder. Pre- and post-operative use of 0.12% chlorhexidine solution can irrigate the socket and decrease the frequency of dry socket. A 50% reduction in the occurrence of dry socket is discovered with 0.12% chlorhexidine for 30-second prerinsing of patients [10]. Topical medicinal dressings, such as Eugenol-based dressings containing eugenol, butamben, and iodoform, are also used to manage pain and inflammation in dry sockets. These dressings provide symptomatic relief and should be replaced every two days for optimal efficacy. Studies indicate an 8% incidence of dry sockets when packed immediately compared to 26% in unpacked sockets [11].

Some steroids, such as hydrocortisone and oxytetracycline mixtures, are used topically, which can decrease the chances of developing a dry socket (Alveolar osteitis) after extraction [12]. It was found that corticosteroids can reduce postoperative complications but fail to prevent the development of dry sockets [7-9]. Other treatments, such as antifibrinolytics like tranexamic acid and para-hydroxybenzoic acid (PHBA), are anti-fibrinolytic agents that inhibit both plasma and plasminogen. Using tranexamic acid and parahydroxybenzoic acid prevents the incidence of dry socket (Alveolar osteitis) [13]. Sutures and local hemostatics were used, and the combination of local hemostatics, primary closure, sutures, and tranexamic acid can decrease the risk of dry socket (Alveolar osteitis) [14]. Some adjunctive and experimental treatments are PRP and Laser therapy. Platelet-rich plasma (PRP) is used in dry socket management because it can enhance tissue healing and alleviate pain. Substantial reduction in the incidence of dry socket (Alveolar Osteitis) is achieved by treating the extraction site with PRP and PRF (platelet-rich fibrin) with a gelatin sponge, which promotes healing [6]. Laser Therapy includes Low-level laser therapy (LLLT), a non-invasive method of reducing pain and inflammation, and promoting healing, thereby enhancing the speed of wound healing and reducing inflammation. LLLT is applied after continuous-mode diode laser irradiation of the socket (808nm, 100, 60 seconds, 7.64J/cm2) irradiation [10-14].



Figure 2: Treatment and Management

|| DISCUSSION

The standard review shows diverse papers, including eight review papers and six research papers. All 14 articles indicate that alveolar osteitis is a common post-extraction complication. As we see, several causes of dry sockets include smoking, infection, contraceptive use, menstrual cycle, age, traumatic extraction, a previous history of extraction, inadequate irrigation, remnants of debris and bone, and root fragments. The management of dry sockets focuses on relieving pain, controlling infection, and promoting healing. Prescribed medications include antibiotics, anti-fibrinolytic agents, and topical treatments. Advanced interventions, such as platelet-rich plasma, platelet-rich fibrin, and laser therapy, may also be used [6]. To reduce the occurrence of dry sockets, pre-extraction and preventive Measures should be assessed before the extraction. We can execute it by advising to avoid smoking pre- and post-surgery and by doing copious irrigation of the socket [3].

One of the most notable findings is the age-related variation in the incidence of dry sockets. Patients aged 20–40 years are disproportionately affected, likely due to higher frequencies of third molar extractions and smoking in this demographic. Younger individuals exhibit lower susceptibility, potentially due to better bone elasticity and superior healing capacity, as previously noted in the literature [6].

The review also highlights a wide range of risk factors, including systemic conditions (e.g., diabetes mellitus and clotting disorders), hormonal influences from oral contraceptives, and local factors such as smoking, infection, and trauma during or after the procedure. These findings underscore the importance of a comprehensive preoperative assessment to identify and mitigate modifiable risk factors, thereby enhancing patient outcomes.

From a clinical standpoint, the hallmark symptom of a dry socket is severe, persistent, and radiating pain, often accompanied by bone exposure and a foul taste. These Clinical features facilitate diagnosis, which is primarily based on a thorough history and physical examination. This reduces reliance on imaging unless complications such as infection or fracture are suspected.

The management strategies explored in this review emphasise a multimodal approach that focuses on symptom relief, infection control, and enhanced healing. Topical applications, such as eugenol-based dressings and tetracycline powder, have been shown to effectively reduce pain and inflammation. Chlorhexidine mouth rinses, mainly when used preoperatively, significantly decrease the incidence of dry sockets by enhancing antimicrobial control [10]. However, the routine use of systemic antibiotics remains controversial due to concerns about antibiotic resistance and disruption of the normal oral microbiota.

|| CONCLUSION

Dry Socket (Alveolar Osteitis) is a common complication following dental extraction, particularly in removing impacted third molars. The aetiology of alveolar osteitis is multifactorial and is a self-limiting condition. Understanding the pathophysiology, risk factors, and management strategies for dry sockets can help clinicians deliver more effective care to patients with dry sockets. Effective management of dry sockets focuses on alleviating pain, controlling infection, and promoting healing. Future research should explore innovative interventions, such as nanotechnology-based dressings and enhanced PRP formulations, to further improve outcomes. Early diagnosis and treatment are key for minimising pain and promoting optimal healing. The socket irrigation is performed with 0.12% chlorhexidine, followed by the placement of a medicinal dressing containing analgesics to control pain, and the patient is kept under follow-up. The determination of healing depends upon the severity and duration of the condition.

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