

Recent Advancements in Management of Alveolar Osteitis (Dry Socket)

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Abstract:- Following dental extractions, dry socket/alveolar osteitis is a very crippling, excruciatingly painful, but rather frequent condition. For all normal extractions, its incidence is roughly 3%, but for impacted mandibular third molars, it can be as high as 30%. In the literature, a number of strategies for managing and preventing this illness have been proposed. Most of these recommendations are empirical and not supported by data. Various conventional methods are used for management of Alveolar osteitis like gels, rinse, and medicated gauze. Use of novel methods can prove to be more effective in treatment of Alveolar osteitis since it provides local delivery of drug with sustained and controlled release, low dose thus leading to reduced side effects with a better patient compliance compared to conventional methods.

Rinsing the socket with chlorhexidine (74% or saline); placement of a non-resorbable obtundent dressing (56%); and instruction in home chlorhexidine rinsing (44%). This is one of the most researched topics in dentistry, and it is currently being studied at the Dublin Dental School and Hospital. Over the years, little progress has been made in reaching firm conclusions about how to best manage dry socket. Our recommendations are based on a review of the literature, which we believe is the best available evidence for guiding our clinical practice.

I. INTRODUCTION

As per the World statistics conducted by World Health Organization (WHO), 2012 the burden of oral diseases is very high in India. They can affect the periodontium, cheeks, palate, floor of the mouth, tongue. The prevalence of various oral diseases in India is Dental caries (40-45%), periodontal diseases (40%), Malocclusion (30% of children). Oral diseases can be severe if not treated properly and hence maintaining oral hygiene is important to reduce the risk of infections. There are various oral infections like Periodontitis, characterized by destruction of the periodontal ligament, resorption of the alveolar bone, and the migration of the junctional epithelium along with the tooth surface, Oral Candidiasis, a common oral and per oral opportunistic infection that usually results from overgrowth of endogenous Candida fungal microorganisms, Aphthous Ulcer, Dental caries, Xerostomia, Alveolar Osteitis. Alveolar osteitis (AO) is a well-known complication which occurs on tooth extraction. It is commonly known as Dry Socket. The treatment of AO includes conventional methods like use of antibiotics, medicated gauze, gel, rinse. It is a very common condition arising on extraction of mandibular molars it is associated with postoperative pain in and around the

extraction site, accompanied by a partially or totally disintegrated blood clot within the alveolar socket, with or without halitosis. The incidence of dry socket ranges from 0.5-5% for all routine extractions, can reach up to 38% on extraction of impacted mandibular third molars. Alveolar osteitis generally arises between one and three days post extraction and the duration usually ranges from 5 to 10 days. The incidence of dry socket is higher in the mandible, occurring up to 10 times more often for mandibular molars compared with maxillary molars. The term “dry socket” or alveolar osteitis was originally coined in 1896. It has also been referred to as alveolar osteitis, localized osteitis, alveolalgia, alveolitis sicca dolorosa, septic socket, necrotic socket, localized osteomyelitis, fibrinolytic alveolitis.

II. PATHOGENESIS

Flap Design: Haraji et al., [1] reported that the modified triangular flap decreases the incidence of Alveolar Osteitis more than the buccal envelope flap. In this study he examined the patients who were candidates for extraction of a bilaterally impacted mandibular third molar with the same difficulty index; a modified triangular flap was placed on one side and a buccal envelope flap (control) was placed on the other side, Alveolar Osteitis and healing were assessed at three and seven days after surgery.

Another study was done by Eshghpour M et al., [2] to ensure the association between the menstrual cycle and the frequency of alveolar osteitis (AO), In this study the patients with bilateral impacted third molar teeth underwent randomized surgical extraction: one tooth during the menstrual period and one during the middle of the cycle, the postoperative examiner was unaware of the menstrual cycle status of the patients, the overall frequency of AO was 23.45%. The frequency of AO was significantly greater in the middle of the cycle than during the menstrual period in both the Oral Contraceptive users and nonusers, Although Oral Contraceptive users revealed a significantly greater frequency of AO compared with nonusers controlling preoperative infection, maintaining good dental hygiene, avoiding trauma, and avoiding surgery on days 1 to 22 of the menstrual cycle may lower the occurrence of dry socket in the study population, according to Oginni FO [3]. In 25% of the females, the usage of an oral contraceptive was elicited, and extractions were performed between days 1 and 22 of their menstrual cycle. Extraction was traumatic in 66.2% of patients, and a ranking of the risk factors evoked reveals that a previously infected posterior tooth has an equivalent risk in both genders. Males had poor oral hygiene and traumatic extractions in a mandibular tooth were more, whereas females

had extractions conducted between days 1 and 22 of the menstrual cycle.

4 out of 12 articles observed the effect of smoking, surgical trauma, single extractions, age, sex, medical history, systemic disorder, extraction site, amount of anesthesia, operator experience, antibiotics use prior to surgery, difficulty of the surgery in the incidence of dry socket.

Bortoluzzi MC et al., [4] observed the incidence of dry socket and they reported that there were higher pain levels and pain persisting longer than two days were observed with more traumatic surgeries, or associated with postoperative complications. Smoking was found to be statistically associated with the development of postoperative complications.

Mohammed H Abu Younis and Ra'ed O Abu Hantash [5] reported that Smoking, surgical trauma, and single extractions are considered risk factors for dry socket; however, age, gender, medical history, extraction site, amount of anaesthetic, and operator experience have no effect on the observation of dry socket. Dry socket occurred 3.2% of the time. The prevalence of dry socket after nonsurgical extractions was 1.7%, but it was 15% after surgical extractions. Dry socket was substantially more common in smokers (12%) than in non-smokers (4%). There is, however, a substantial link between the amount of smoking and the occurrence of dry socket. The frequency of dry socket was significantly higher in single extraction patients (13% vs. 5%), regardless of age, gender, or medical history, Extraction site, amount of local anesthesia and experience of operator play no role in the occurrence of dry socket.

Two studies were done by Eshghpour M et al., [6] and Hasan Momeni, et al., [7] to identify the risk factor & the risk group of dry socket. Eshghpour M, et al., [5] reported that the incidence of Dry Socket was 19.14%, age, gender, systemic disorder, and antibiotics use prior to surgery revealed no significant associations with Dry Socket and the incidence of Dry Socket was significantly relevant to smoking, difficulty of the surgery according to pre-surgery radiograph evaluation and perception of surgeon post-surgery, length of surgery, and number of capsules used to reach anesthesia, Hasan Momeni, et al., [7] reported that the incidence of dry socket was 0.6% and females were more common involved than males (0.08% versus 0.04%). The ratio of mandible to maxilla was 2.5 to 1 and mandibular third molars were more often involved than other teeth, trauma, poor oral hygiene and smoking had increased the incidence of dry socket.

➤ *Previous surgical site infection, traumatic extraction, and tobacco smoking:*

1 article out of 12 reported the effect of previous surgical site infection, traumatic extraction, and tobacco smoking in the occurrence of dry socket [8].

Halabí D et al., [9] reported that the previous surgical site infection, traumatic extraction, and tobacco smoking are associated with an increased risk of alveolar osteitis, a statistically significant association between traumatic

extraction, tobacco smoking after extraction, previous surgical site infection and the development of alveolar osteitis

– Al-Sukhun J et al., [10] compare the efficiency of pain control in the patients who use the selective cyclooxygenase-2 (COX-2) inhibitor celecoxib, pre-emptively, and the patients who use the ibuprofen, and he reported that the ibuprofen group had a significantly higher alveolar osteitis incidence than the celecoxib group and the placebo group.

➤ *The role of microorganism:*

2 articles out of 12 studied the role of microorganism in the incidence of dry socket

– Rodrigues MT et al., [11] studied the effect of experimentally induced infection (the inoculation material contain *Capnocytophaga ochracea*, *Fusobacterium nucleatum*, *Prevotella melaninogenica*, *Streptococcus anginosus*, *Treponema socranskii* and *Streptococcus sanguis*) in the rat sockets, they reported that, it produced higher levels of serum C- reactive protein and showing the potential of disseminated infection and disturb in the alveolar repair process in an interesting experimental model for alveolitis studies.

– Krakowiak PA [12] reported that; in certain patients, the normal process of healing can be delayed in some cases, because the sites was previously affected by osteomyelitis

➤ *Immediate post-extraction socket irrigation with normal saline:*

1 article of 12 studied the effect of the immediate post-extraction socket irrigation with normal saline in the occurrence of dry socket.

Tolstunov L [13] studied The role of socket irrigation with a normal saline solution that is routinely used at the end of extraction on the development of alveolar osteitis (AO) after removal of impacted mandibular third molars was studied, and he discovered a difference in dry socket incidence (77.8% on the irrigated side versus 22.2% on the non-irrigated side) that demonstrated the difference between the traditional extraction protocol versus the modified approach without end-of-surgery. The study found that post-extraction socket bleeding is critical for adequate simple socket repair. If it is not washed away with irrigation fluid at the end of extraction, a normal blood clot is more likely to form, which could lead to easy socket healing without the development of alveolar osteitis.

➤ *Clinical features*

Dry socket, also known as alveolar or fibrinolytic osteitis, is a common complication that occurs after tooth/teeth extraction in oral surgery [2]. It is an acute inflammation of the alveolar bone around the extracted tooth, characterised by extreme pain, breakdown of the clot produced within the socket, leaving the socket empty (clot-free), and frequently loaded with food debris [3].

On inspection, there is mild gingival edema and redness, halitosis, bone exposure, and significant discomfort.

The pain from the extraction should have lessened significantly by the third day, but if the pain worsens and remains for one week after the treatment and the socket does not appear to be healing, the incidence of dry socket can be established. Incidence of dry socket has been reported in literature to be about 0.5–5.6% and following surgical extraction of third molars, it has been found to be up to 30% [4–8]. Several factors have been reported in literature to be responsible for the occurrence of dry socket; these include traumatic, difficult and prolonged extraction, pre- and postoperative infection at the site, smoking, oral contraceptives, bone disorders and underlying pathologies, irradiation, systemic illness such as diabetes mellitus, clotting problems, and failure to comply with post extraction instructions [9–12]. Other possible risk factors include periodontal diseases and previous dry socket with past extractions [14]. This is the first time a research on this disease will be conducted in the 12 years of establishment of our dental centre and it will be relevant in order to contribute to existing literature and also to see any recent changing trend. Therefore, the aim of this study was to clinically investigate the incidence of dry socket complicating exodontias in our centre.

➤ *Old treatment modalities*

Remedies for dry socket has established its ground for centuries in wound healing management and has become a common prescription in the field of allopathic and alternative medicine too.

Honey, turmeric and aloe vera are herbal in origin and use as part of [nutritional supplement](#). Honey is derived from nectar gathered and modified by the honeybee, *Apis mellifera*. It is a carbohydrate rich syrup derived from floral and other plants nectars and secretions [15]. Honey has been used in folk medicine since ancient times and has more recently been rediscovered by medical researchers for its use in dressing acute and [chronic wounds](#) [9]. Turmeric is a perennial plant from India and South East Asia that has found medicinal values in wound infection Aloe vera is a xerophytic, green shrub that grows primarily in the dry regions of Africa, Asia, Europe, and America. It is a necessary food that contains antioxidant vitamins A (beta-carotene), C, and E [17]. Calcium, copper, magnesium, potassium, and zinc are all found in aloe vera and are required for the normal functioning of several enzyme systems in diverse metabolic pathways[18].Honey, turmeric and aloe vera are [analgesic](#), anti-inflammatory, antioxidant, antibacterial and promotes immunomodulation for the body to fight infection. Vitamin C gel is a potent antioxidant placed in socket that also promotes [tissue regeneration](#) through stimulation of [collagen synthesis](#) [7,13]. Being non-toxic and no known allergy are the strength of remedies compared to other pharmacological therapeutics. In addition, remedies described in our review are basically food supplement that can be purchased over the counter and showed high efficacy in supporting dry socket. However, the clinical use of remedies in dry socket will require the appropriate clinical and scientific investigations to ensure safety, quality assurance and professional licensing requirements.

Conventional treatment' for dry socket advocate medicaments and drugs for local treatment. The [irrigation solution](#) use may comprise of only physiological saline solution or other irrigant solution such as [chlorhexidine](#) and hydrogen peroxide [19]. This is then followed by insertion of a dressing into the socket that comprise of medicaments such as alvogyl, [zinc oxide eugenol](#), oil of clove/eugenol, antihomotoxic, colloidal silver, SaliCept or antibiotic dressing such as [chlortetracycline](#), [rifampicin](#), [clindamycin](#) and [metronidazole gel](#) [15,16]. Insertion of other therapeutic dressings into the socket following 'refreshening' of the wound healing cascades is controversial with some benefits and drawbacks. This review shows alvogyl, zinc oxide [eugenol](#), eugenol and Neocone have stood the test of time as the most popular dry socket dressing. Alvogyl is an alveolar hemostatic-analgesic paste with a fibrous consistency and good adhesion from the Penghawar fibers [20]. It is a one-step, self-eliminating treatment that requires no suture and no special care [21]. Other studies have observed damage to granulation tissue within the healing dry socket when intra-socket dressings are plugged in tightly and the possible cytotoxicity effects of these materials on stem cells when introduced in high doses, preventing active [angiogenesis](#) during the proliferative phase. [22].

Antimicrobial Photodynamic Therapy (APDT) APDT seems to be a new and promising possibility for the prevention of alveolar osteitis. Certain studies showed the low occurrence of dry socket when APDT was used. With APDT dry socket occurred at one extraction site and in the control group without APDT, it occurred in 13 cases.[3].Low-Level Laser Therapy (LLLT)

After an extraction, laser irradiation will greatly reduce pain, swelling, bruising, and inflammation, resulting in a lower requirement for post-operative painkillers. The extraction site's recovery time will be ramped up, and there will be less pain. occurrence of a dry socket. In cases of a dry socket use, LLLT will dramatically decrease the pain and increase the growth of fibroblast. On comparing the efficacy of LLLT, SaliCept, and Alvogyl in the management of alveolar osteitis, it was found that LLLT increases the speed of wound healing and reduces inflammation when compared to Alvogyl and SaliCept. LLLT is applied after irrigation of socket with continuous-mode diode laser irradiation (808 nm, 100 mW, 60 s, 7.64 J/cm²)

III. RECENT ADVANCEMENTS:

❖ *Biodegradable Polymers*

➤ *Polylactic acid:*

A biodegradable ester, acts as a clot supporting agent by providing a stable support for blood clot. The use of polylactic acid granules decreases the incidence of dry socket.[12]

➤ *Oxidized Cellulose Foam (OCF):*

Oxidized cellulose form is a potent hemostatic, the use of which reduces the incidence of dry socket. The incidence of alveolar osteitis in patients treated with OCF was found to

be 5% which was found to be significantly lower than in patients who were not treated with OCF.

➤ *Platelet-rich Fibrin (PRF):*

PRF has been used successfully to treat dry socket. The benefits of this treatment, according to users, are that it is simple to conduct, and can be performed by any dentist, and has a rapid effect on pain levels, followed by a rapid epithelization of the socket. According to certain research, full epithelization was found around the eighth day following the operation was observed.

➤ *Antifibrinolytic Agents*

Tranexamic acid and para-hydroxybenzoic acid (PHBA) are both antifibrinolytic drugs that block both plasmin and plasminogen; both have been studied as potential treatments for dry socket. Tranexamic has only been observed to reduce dry socket incidence somewhat, with no substantial benefit demonstrated. Previously, PHBA was accessible in Apernyl cones, a resorbable medication that included 3 mg PHBA and 32 mg acetylsalicylic acid. Many investigations on its effect on dry socket prevention yielded positive findings. However, it has been postulated that the presence of acetylsalicylic acid may cause some confusion since it has a local anti-inflammatory action that lowers the inflammatory component of dry socket. Though antifibrinolytic agents are still available on the market, Apernyl no longer contains PHBA

➤ *Surgical Intervention*

Curettage can be used as a method of treatment for dry socket. However, it is not recommended due to the induction of more pain. Curettage involves administration of anesthesia, surgical debridement of socket, and primary closure by advancement flap. Turner stated that curettage and removal of granulation tissue resulted in fewer visits than zinc oxide eugenol or iodoform gauze with eugenol technique

IV. CONCLUSION

Dry socket is a self-limiting condition with an unknown origin. The goal of management is to relieve the patient's pain until the socket heals. Healing is aided and sped by decreasing the wound's assault from food debris and germs, irrigation of the socket with normal saline / chlorhexidine, application of Alvogyl dressing, and prescription of powerful oral painkillers. The patient should be checked on a frequent basis to ensure that the socket is healing properly, especially if a dressing has been applied.

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