Review Article

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Dentistry Section

Systemic Review of Dry Socket: Aetiology, Treatment, and Prevention

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ABSTRACT

Our systemic review is to make a comprehensive review about the aetiology, treatment and the prevention of dry socket, the inclusion criteria were all the studies that discuss the dry socket and its etiology, treatment and prevention and exclusion criteria were all the studies that discuss the other complications of tooth extraction, the materials and methods used for this systemic review was to search in the Pub Medline database between 2008 to 2013, using specific words "dry socket, aetiology, treatment and prevention" and published in the English language, the articles were screened by abstract for relevance to aetiology, treatment and prevention of dry socket, 82 papers were identified in pub med but a total of 36 out of Publications were included in the final systemic review according to the specific keywords and materials mentioned above. The occurrence of dry socket in an everyday oral surgery or dental practice is unavoidable. The risk factors are smoking, surgical trauma, single extractions, age, sex, medical history, systemic disorder, extraction site, amount of anaesthesia, operator experience, antibiotics use prior to surgery, difficulty of the surgery and the previous surgical site infection in addition to oral Contraceptives, menstrual cycle and immediate postextraction socket irrigation with normal saline. The traditional options of treatment are directed toward palliative care, such as the irrigation of the surgical site, avoiding curetting the extraction socket, Packing with a zinc oxide– eugenol paste on iodoform gauze can be considered to relieve acute pain episodes, there is also new agents in the market can accelerate the healing of the socket such as PRGF and GECB.

The prevention methods include avoiding smoking before and after surgery and a traumatic surgery, the use of antibiotics, such as, azithromycin, can be considered, the other preventive measures such as chlorhecidine rinse or gel can be effective in the reduction of dry socket incidence.

Keywords: Dental practice, Oral surgery, Tooth extraction

INTRODUCTION

In this review we will discuss the dry socket and its pathogenesis, treatment and prevention method, the Alveolar osteitis (AO) is one of the extraction wound healing disorder [1], Commonly known as "dry socket" which is one of the common postoperative problem that results in severe pain "postoperative pain" inside and around the extraction site, which increases in severity between the first and third day after the extraction, usually caused by a partial or total disintegrated blood clot within the socket [2], this type of extraction complications usually associated with the extraction of impacted 3rd molar teeth and mandibular molar teeth [3].

Pathogenesis

Of 36, 12 articles discussed the pathogenesis of dry socket.

1-Flap Design: Haraji et al., [4] 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.

2-Oral Contraceptives and Menstrual Cycle: 2 articles out of 12 studied the association between the menstrual cycle and the frequency of alveolar osteitis.

Another study was done by Eshghpour M et al., [5] 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

Oginni FO [6] reported that control of preoperative infection, persistence on good oral hygiene, avoidance of trauma, and avoidance of surgery on days 1 to 22 of the menstrual cycle in non-menopausal women may reduce the incidence of dry socket in the study population, The use of an oral contraceptive was elicited in 25% of the females, and extractions were performed between days 1 and 22 of their menstrual cycle. Extraction was traumatic in 66.2% of cases, a ranking of the elicited risk factors suggests that a previously infected posterior tooth involves an equal risk in both genders. Poor oral hygiene and traumatic extraction in a mandibular tooth were prominent in males, whereas extractions performed between days 1 and 22 of the menstrual cycle were significant in females.

3-Smoking, surgical trauma, single extractions, age, sex, medical history, systemic disorder, extraction site, amount of anaesthesia, operator experience, antibiotics use prior to surgery, difficulty of the surgery: 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., [7] 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 [8] reported that smoking, surgical trauma and single extractions are considered predisposing factors in the occurrence of dry socket, on the other hand, factors like: age, sex, medical history, extraction site, amount of anesthesia, and operator experience have no effect on the observation of dry socket. The overall frequency of dry socket was 3.2%. The incidence of dry socket following non-surgical extractions was 1.7% while it was 15% following surgical extractions. The incidence of dry socket was significantly higher in smokers (12%) than in non-smokers (4%). However, there is a strong association between the amount of smoking and the incidence of dry socket. The incidence of dry socket was significantly higher in the single extraction cases (13%) than in the multiple extraction cases (5%), age, sex, 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., [9] and Hasan Momeni, et al., [10] to identify the risk factor & the risk group of dry socket. Eshghpour M, et al., [9] 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 carpules used to reach anesthesia, Hasan Momeni, et al., [10] 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 to1 and mandibular third molars were more often involved than other teeth, trauma, poor oral hygiene and smoking had increased the incidence of dry socket.

4-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.

Halabí D et al., [11] 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.

5-The use of analgesic: 1 article out of 12 reported the effect of the use of analgesic in the incidence of dry socket.

– Al-Sukhun J et al., [12] 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 ibuprufen, and he reported that the ibuprufen group had a significantly higher alveolar osteitis incidence than the celecoxib group and the placebo group.

6- The role of microorganism: 2 articles out of 12 studied the role of microorganism in the incidence of dry socket

– Rodrigues MT et al., [13] 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 [14] reported that; in certain patients, the normal process of healing can be delayed in some cases, because the sites was previously affected by osteomyelitis.

7- 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 [15] studied the role of socket irrigation with a normal saline solution that routinely used at the end of extraction on the development of alveolar osteitis (AO) after removal of impacted mandibular third molars and he noticed that there is difference of dry socket incidence (77.8% on the irrigated versus 22.2% on non-irrigated side) which demonstrated between the traditional extraction protocol versus modified approach without the end-of-surgery irrigation. The study demonstrated that the postextraction socket bleeding is very important for the proper uncomplicated socket healing. If it's not washed away with irrigation solution at the end of extraction, the normal blood clot has a higher likelihood to form, and therefore, can potentially lead to an uncomplicated socket healing without development of alveolar osteitis.

The Options of Treatment

To describe the options of treatment in our research we evaluated 9 articles.

1- The role of antibiotics: 2 articles out of 9 studied the role of antibiotics in the treatment of dry socket.

Vessal G et al., [16] and Bezerra TP et al., [17] studied the use of antibiotics in the management of dry socket, and they reported that the most commonly used antibiotics is amoxicillin.

2- The use of sutures and local haemostatic: 2 articles out of 9 reported the effect of the use of sutures and local haemostatic in the treatment of dry socket.

– Osunde OD et al., [18] reported that the operation time was found to be significantly longer in the multiple sutures group, there was significantly less pain, swelling and trismus in the suture-less group, and there was no significant difference between the two treatment groups in terms of pain, swelling and trismus.

– Svensson R, Hallmer F et al., [19] showed that the use of (local hemostatic, primary closure, sutures and tranexamic acid) the risk of postoperative bleeding after tooth removal in patients on continued warfarin medication is low.

3- Low level laser, alvogyl and the Salicept patch: 1 article out of 9 reported the effect of Low level laser alvogyl and the Salicept patch in the treatment of dry socket.

– in other study Kaya G. et al., [20] compare the effects of alvogyl, the SaliCept patch, and low-level laser therapy in the management of alveolar osteitis and he found that no significant differences in the management of alveolar osteitis between the patients that treated by curettage and irrigation followed by alvogyl applied directly to the socket and the patients that treated by curettage and irrigation followed by a SaliCept patch applied directly to the socket, but the management of alveolar osteitis was significantly better in patients treated by curettage and irrigation followed by continuous-mode diode laser irradiation more than the patients who treated by curettage and irrigation alone- curettage and irrigation followed by alvogyl applied directly to the socket- curettage and irrigation followed by a SaliCept patch applied directly to the socket.

4- The use of eugenol on a gauze strip and a thermosetting gel containing 2.5% prilocaine and 2.5% lidocaine: 1 article out of 9 assessed the efficacy of the use of eugenol on a gauze strip and a thermosetting gel containing 2.5% prilocaine and 2.5% lidocaine in the treatment of dry socket.

– Burgoyne CC et al., [21] assessed the efficacy of pain control for post-extraction alveolar osteitis comparing the use of eugenol on a gauze strip versus a thermosetting gel containing 2.5% prilocaine and 2.5% lidocaine and he reported that the efficacy of the two preparations was not significantly different.

5-The use of pastille GECB: 1 article out of 9 investigated the efficacy of the use of pastille GECB in the treatment of dry socket.

Abbas Haghighat et al., [22] investigated the efficacy of pastille GECB (3% Guaiacol, 3% Eugenol, 1.6%Chlorobutanol), compared to ZOE and he found that GECB showed more significant efficacy in reducing complications after tooth extraction.

6-The use of plasma rich in growth factors: 2 articles of 9 reported the use of plasma rich in growth factors in the treatment of dry socket.

– Afshin Haraji et al., [23] reported that the application of PRGF may significantly reduce the incidence of AO or its associated pain and may accelerate healing.

– US Pal et al., [24] compare between the zinc oxide eugenol dressing and plasma rich in growth factor (PRGF) with gelatin sponge in the treatment of dry socket and he reported that patient's healing was better in patients treated by PRGF with gelatin sponge than the patients who treated by zinc oxide eugenol group, but symptomatic pain relief was faster in the second group.

Preventive Measures

– In our research 12 articles were assessed which have described the preventive measures of the dry socket such as:

1-Antibiotics: 3 articles out of 12 reported the use of antibiotics in the prevention of dry socket. One of the Pharmacologic methods used in the prevention of dry socket have included use of antibiotic preparations after extraction and antiseptic rinses. They recommend that the use of antibiotics in the extraction socket be reserved for those with history of multiple dry sockets or for immunocompromised patients.

– Ishihama Ket al., [25] reported that there was significant effectiveness of azithromycin in comparison with other antimicrobials as prophylactic use in impacted mandibular third-molar surgery in which penicillins and cephalosporins were mainly used.

– Bezerra TP et al., [17] studied the use of amoxicillin 500 mg as prophylaxis against the alveolar ostitis, and they didn't report any difference in the incidence without the use of the amoxicillin.

– Winiewska I et al., [26], studied the effect of application of lincomycin on Beta-tricalcium phosphate (TCP) to the alveolus and they reported that Lincomycin on TCP can be used to prevent alveolar ostitis and reduces complications in the form of pain and trismus, Beta-tricalcium phosphate also prevents atrophy of the alveolar process.

2-Chlorhexidine: 8 articles out of 12 reported the effect of the use of chlorhexidine in the prevention of dry socket. In view of the hazards of random use of antibiotics, research was directed into looking at the effects of chlorhexidine rinses on dry socket, all the studies that were done to assess the efficacy of chlorhexidine for the prevention of alveolar osteitis [27-34] reported that there is significantly decrease in the incidence of Alveolar osteitis after the use of the different forms of chlorohexiden either rinse or gel form.

3-"gelatamp" colloidal silver gelatin sponge: 1 article out of 12 reported the effect of the use of "gelatamp" colloidal silver gelatin sponge in the prevention of dry socket.

– Wang YZ et al., [35] reported that that "gelatamp" colloidal silver gelatin sponge can prevent the occurrence of dry socket after teeth extraction.

DISCUSSION

The systematic review showed variety of papers including review and research papers. This study included (24 research papers and 12 review papers). These 36 articles illustrated that the dry socket is one of the most common post-extraction complications in dental practice [1-3] and the general practioners should be aware of the predisposing factors such as flap design [4], oral contraceptive pills, menstrual cycle [5,6], tobacco smoking, surgical trauma, single extraction, age, sex, medical history, systemic disorders, extraction site, amount of anesthesia, operator experience, antibiotic and difficulty of surgery [7-10], previous site infection [11], analgesic use [12] the role of microorganism [13] and postextraction irrigation [14,15]. They should have the knowledge of all the traditional methods of treatment like antibiotic [16,17], suturing, the use of local haemostatic agent [18,19] alveogel and euogenol [21]. Newer agents have been introduced to the market such as low level laser, Salicept patch [20], pastille GECB [22] and plasma rich in growth hormone [23,24]. Finally, since prevention is better than cure, therefore, all dental practioners must have a good idea about the preventive measures against the dry socket like antibiotic [17, 25, 26], chlorohexidine [27-34] and the use of gelatamp sponge [35].

CONCLUSION

The occurrence of dry socket in an everyday oral surgery or dental practice is unavoidable. The risk factors for this temporary and debilitating condition are clearly identified. Surgeons must recognize this risk factors in patients with particular medical conditions and include this information as a part of the informed consent, some of this factor could be 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 and the previous surgical site infection in addition to oral contraceptive use and menstrual cycle.

Treatment options for this condition are generally limited and directed toward palliative care. Prevention methods include avoiding smoking before and after surgery and a traumatic surgery, the use of antibiotics, such as, azithromycin, can be considered, chlorohexidine rinse or gel can be effective in the reduction of dry socket incidence.

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