

Review Article**Clinical Aspects of Dry Socket**

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**ABSTRACT:** Alveolar Osteitis commonly known as dry socket is a very debilitating, severely painful but relatively common complication following dental extractions. The incidence of which is approximately 3% ranging from 1% to 4% of all routine extractions, reaching up to 30% for mandibular third molars. It is one of the most studied complications in dentistry. Although this condition is self limiting but to ensure patient comfort various treatment modalities are advised by various authors. The aim of this paper is to provide a review of the literature on dry socket.

**Key words:** Alveolalgia; Alvogyl; Dry socket; Fibrinolytic alveolitis; Sicca dolorosa.

**INTRODUCTION**

Dry socket is a debilitating, severely painful but relatively common postoperative complication following dental extractions. It was first described by Crawford in 1876 as, the most common postoperative complication after tooth extraction, with an onset at 2 to 4 days after surgery.<sup>1</sup> It has also been referred to as alveolar osteitis, localized osteitis, alveolalgia, sicca dolorosa, septic socket, necrotic socket, localized osteomyelitis, fibrinolytic alveolitis etc. The incidence of dry socket is approximately 3% which ranges from 1% to 4% of all routine extractions, reaching up to 30% for mandibular third molars.<sup>2,3</sup>

Blum in 2002 described it as being the presence of "postoperative pain in and around the extraction site, which increases in severity at any time between one and three days after the extraction, accompanied by a partially or totally disintegrated blood clot within the alveolar socket, with or without halitosis".<sup>2</sup> Hansen in 1960 described dry socket as, featured by accidental loss of the clot and the absence of pain.<sup>4</sup>

Hermesch et al classified it into 3 types: superficial alveolitis marginal, suppurative alveolitis, and dry socket. In marginal alveolitis, the perialveolar mucosa becomes inflamed and gets partially covered by granulomatous tissue which is painful on mastication. In suppurative alveolitis, the clot becomes infected, covered by a grayish green membrane and it may consist of dental fragments or osseous sequestrum. Pain is medium in intensity, accompanied by fever. In dry socket, the osseous walls of alveolus are exposed, with total or partial clot loss, dark in color which is often

accompanied by fetid odor. Pain is continuous, intense, and frequently radiating that cannot be relieved by analgesics. Local hyperthermia and lymphadenopathy may also accompany in this type of alveolitis.<sup>5</sup> According to Fazakerley and Field, the alveolus empties, the alveolus osseous surroundings are denuded and often covered by a yellow-gray necrotic tissue layer, with surrounding erythematous mucosa.<sup>3</sup> Oikarinen in the year 1989 classified this post operative complication as real alveolitis and nonspecific alveolitis. Real alveolitis results in the typical symptoms of dry socket and hence, it requires professional follow-up. In contrast, nonspecific alveolitis, with an onset between 3 to 4 days after extraction, is more common form and it does not require any professional care despite the painful symptoms.<sup>6</sup>

Recently, dry socket is defined as following: postoperative pain surrounding the alveolus that increases in severity for some period from 1 and 3 days after extraction, followed by partial or total clot loss in the interior of the alveolus, with or without halitosis.<sup>2,7</sup> Microscopically, dry socket is characterized by the presence of inflammatory cell infiltrate, which includes numerous phagocytes and giant cells in the remaining blood clot, associated with the presence of bacteria and necrosis of the lamina dura.<sup>8</sup>

**ETIOPATHOGENESIS**

In dry socket, there is increased fibrinolysis which leads to disintegration of clot i.e. conversion of plasminogen into plasmin. The plasmin which is produced dissolves fibrin crosslinks into soluble fragments. Along with the production of plasmin, kinin is also produced from the kininogen, which is

responsible for the pain produced in dry socket. The plasminogen pathway activation is responsible for the fibrinolysis, which can be accomplished via two routes i.e. Direct (physiologic) or indirect (nonphysiologic) activator substances. Direct activators are released from the alveolar bone cells after trauma namely Urokinase and Tissue activators whereas, indirect from the bacteria namely Streptokinase and Tissue kinase.<sup>9</sup> Nitzan et al (1983) proposed the role of anaerobic bacteria especially *treponemna denticola*.<sup>10</sup>

There are several other contributing factors which precipitate dry socket, such as, trauma, lack of operator experience, gender, oral contraceptives, oral micro-organisms, smoking, systemic diseases, age, excessive irrigation, flap designs, sutures, radiotherapy, vasoconstrictors, etc. Incidence of alveolar osteitis increases with excessive trauma during extraction, especially when the extraction is performed by a less experienced operator and involve procedures such as reflection of flap and excessive removal of bone.<sup>11</sup> Mandibular third molar surgery is a relatively difficult procedure as the mandibular bone is dense and therefore the third molar area is the most common site of dry socket occurrence. Excessive trauma causes compression of the bone lining the socket compromising vascular penetration leading to the thrombosis of the underlying vessel.<sup>2</sup>

Dry socket affects women more when compared to men in a ratio of 5:1.<sup>7,11</sup> This is due to the presence of endogenous estrogens which activate the fibrinolytic system in an indirect way (increasing factors II, VII, VIII, X, and plasminogen) and therefore increase lysis of the blood clot. Hence, menstrual cycle should be taken into consideration before scheduling extraction and so, is the history of taking oral contraceptives.<sup>11,12</sup>

Smoking pipes or cigarettes may increase the risk of dry socket following the extraction of mandibular molars.<sup>13</sup> As there are chances of removal of the blood clot through suction and negative pressure during smoke inhalation.<sup>12,14</sup> Smoking has also been shown to reduce neutrophil chemotaxis and phagocytosis, and hamper the production of

immunoglobulin. Nicotine is found to be absorbed through oral mucosa acting as a vasoconstrictor. Incidence of dry socket increases to 40% if the patient smokes either on the day of the surgery or one day after the surgery.<sup>9</sup>

## PREVENTION

Dry socket prevention is determined by the medical and dental history of the patient, physical examination findings, laboratory examination results, and the presence of contributing factors.<sup>15</sup> In 2002, Blum suggested that the factors which are inherent to the patient must also be considered as risk factors for dry socket. These includes a history of dry socket, deep osseous impaction of mandibular third molars, poor oral hygiene, a recent history of pericoronitis, ulcerative gingivitis or active illness associated with the tooth to be extracted, smoking (in particular more than 20 cigarettes daily), oral contraceptive use, and immunocompromised patients.<sup>2</sup> As there is still uncertainty surrounding the aetio-pathogenesis of dry socket and for this reason the condition is difficult to prevent. The dentist should ask preoperatively if the patient has had a history of dry socket. The patient should also be advised not to smoke for at least 48 hours following extraction.<sup>16</sup>

It was postulated that the use of gauze soaked in Whitehead's varnish sutured into the socket post extraction would reduce the incidence of postoperative discomfort, haemorrhage and swelling, which is then removed one week postoperatively.<sup>17</sup> Unfortunately, if this practice is routinely carried out then a large number of patients would end up receiving unnecessary treatment.<sup>16</sup>

There are also evidence supporting the use of a 0.12% chlorhexidine rinse prior to the extraction and one week post extraction to prevent the occurrence of dry socket. In a study performed by Larsen et al (1991), it was found out that, this regime was associated with a 50% reduction in alveolar osteitis compared to the control group.<sup>18</sup> Field *et al.* (1987) conducted a similar study, they reported a significant reduction in the incidence of dry socket following irrigation of the gingival crevice and a two-minute

mouth rinse with 0.2% chlorhexidine digluconate immediately prior to removal of the tooth, in comparison to no irrigation or the use of saline as the irrigant.<sup>19</sup> On the lines of the earlier studies, yet another study was conducted by Bonine FL in a private practice setting to determine the effect of a 0.12% chlorhexidine gluconate rinse (Peridex, Proctor and Gamble, Cincinnati, Ohio) on the incidence of dry socket after removal of impacted mandibular third molars. It was concluded that the group which used Peridex twice daily for 2 weeks after surgery showed a significant reduction (56%) in the incidence of dry socket when compared with either the group that did not rinse or the group that rinsed only once just before surgery.<sup>20</sup> The study performed by Torres L et al also showed that the placement of 0.2% chlorhexidine gel in the socket at the time of surgery reduces the incidence of dry socket.<sup>21</sup>

The use of both systemic antibiotics (penicillins, clindamycin and metronidazole) and topical antibiotics (topical tetracycline powder in the form of powder, aqueous suspension, gauze drain and Gel foam sponges) has been shown to reduce the incidence of dry socket.<sup>2,22,23,24</sup> In the various studies conducted it was found out that the preoperative administration of antibiotics is more effective in reducing the incidence of dry socket than when given postoperatively.<sup>22,23</sup>

The reason for the reduction in the incidence of dry socket following preoperative administration of antibiotics is unclear, as infection is not believed to be a significant factor in the pathogenesis of dry socket. Although with the use of antibiotics a reduction in bacterial count was seen which does decrease the incidence.<sup>16</sup> Due to the potential for development of resistant strains to the antibiotics and other side effects such as hypersensitivity, antibiotics should not be used in preventing or treating dry socket in a non-immune-compromised subject.<sup>2,22,23,25</sup>

Antifibrinolytics like tranexamic acid have been reported to be used to prevent incidence of Alveolar osteitis as it interfere with the formation of the fibrinolytic

enzyme plasmin from its precursor plasminogen by plasminogen activators.<sup>11</sup>

The use of antimicrobial photodynamic therapy seems to be a new and promising possibility for the prevention of dry socket.<sup>26</sup>

Low level laser therapy has also been shown to be effective in the prevention of dry socket as it increases the speed of wound healing and reduces inflammation. It should be used after the irrigation of socket as a continuous mode diode laser irradiation (808 nm, 100 mW, 60 seconds, 7.645/cm).<sup>27</sup> Biodegradable polymers such as Polylactic acid, a biodegradable ester acts as a clot supporting agent by providing a stable support for blood clot.<sup>11</sup> The use of haemostatic such as Oxidized Cellulose Foam in the prevention of dry socket has been studied. It was shown that the incidence of dry socket in patients treated with Oxidized Cellulose Foam was found to be as low as 5% which was significantly lower than in patients who were not treated with OCF.<sup>28</sup>

## MANAGEMENT

Dry socket is a self-limiting condition. However, due to the severity of pain, it often requires some symptomatic treatment.<sup>16</sup> Traditionally, it was believed that bleeding should be encouraged in the socket; however, this is no longer practised as it only serves to increase pain.<sup>17,29</sup>

The treatment for a dry socket include treatments directed locally to the socket, which includes irrigation of the socket with a 0.12-0.2% chlorhexidine rinse; placement of a dressing such as Alvogyl (containing eugenol, butamben and iodoform); placement of an obtundant dressing such as zinc oxide, eugenol and lidocaine gel; or, a combination of these therapies and, whenever required, the prescription of systemic antibiotics.

The Royal College of Surgeons in England formulated National Clinical Guidelines in 1997, which were reviewed in 2004, on the management of dry socket. They suggested the following:

1. When a new patient presents with symptoms of dry socket, a radiograph should

be taken to eliminate the possibility of retained root or bony fragments as a source of the pain.

2. To remove the necrotic tissue or any food debris socket should be irrigated with warmed 0.12% chlorhexidine digluconate. Local anaesthesia may be required for this.

3. The socket then lightly packed with an obtundant dressing to prevent food debris entering the socket and also to prevent local irritation of the exposed bone. This dressing should be antibacterial and antifungal, resorbable and not cause local irritation or excite an inflammatory response.

4. Patients should be prescribed non-steroidal anti-inflammatory drug (NSAID) analgesia provided there is no contra-indication in their medical history.

5. Patients should be reviewed and steps 2 and 3 to be repeated until the pain subsides and the patient can then be instructed on how to irrigate the socket with chlorhexidine digluconate 0.2% with a syringe at home.<sup>16,30</sup>

It is widely accepted that systemic antibiotics should not be prescribed for the treatment of a true dry socket as they serve no additional advantage over local treatments directing to the socket in a nonimmune-compromised patient.<sup>3,11,31</sup>

The aim of placing an obtundant dressing, made up of a cotton pellet, zinc oxide powder, eugenol and lidocaine 5% topical gel, is to ease the pain experienced by the patient.<sup>31</sup> However, it is important to note that such a nonresorbable dressing is a foreign body in the socket which will delay healing.<sup>2</sup>

Few studies reported that the use of eugenol causes local irritation and bone necrosis.<sup>32</sup> A similar dressing which is available commercially is Alvogyl (nonresorbable) containing eugenol, butamben and iodoform. The eugenol acts as an obtundant and butamben is a topical local anaesthetic, while the iodoform, an antimicrobial, aims to eliminate any low-grade infection that may be present in the socket. Alvogyl is reported to be self eliminating, as it does not adhere as tightly to the socket as the most commonly used obtundant dressing. However, if any such dressing is to be used the patient must be recalled at least every two days to assess the pain, to replace the

dressing and ultimately remove the dressing when the symptoms subside sufficiently.<sup>33</sup>

**CONCLUSION:** Dry socket is a self-limiting condition, the cause of which are difficult to track down. Management is aimed at relieving the patient's pain by ensuring the facilitation of healing. Healing is facilitated and accelerated through reducing the exposure of the wound to food debris and microorganisms, by irrigation of the socket with chlorhexidine digluconate, followed by placement of obtundant or Alvogyl dressing and the prescription of potent oral analgesics (NSAID's). The patient should be kept under regular check-ups to ensure that the socket is healing, especially if a dressing has been placed.

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#### REFERENCES:

1. Crawford JY. Dry sockets. Dent Cosmos 38: 929, 1896.
2. Blum IR. Contemporary views on dry socket (alveolar osteitis): A clinical appraisal of standardization, aetiopathogenesis and management: A critical review. Int J Oral Maxillofac Surg. 2002 Jun;31(3):309-317.
3. Fazakerlev M, Field EA. Dry socket: A painful post-extraction complication (a review). Dent Update. 1991 Jan-Feb;18(1):31-34.
4. Hansen EH. Alveolitis sicca dolorosa (dry socket): Frequency of occurrence and treatment with trypsin. J Oral Surg Anesth Hosp Dent Serv. 1960 Sep;18:409-416.
5. Hermes CB, Hilton TJ, Biesbrock AR, Baker RA, Cain-Hamlin J, McClanahan SF, et al. Perioperative use of 0.12% chlorhexidine gluconate for the prevention of alveolar osteitis: Efficacy and risk factor analysis. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1998;85(4):381-387.
6. Oikarinen K. True and nonspecific alveolitis sicca dolorosa related to operative removal of mandibular third

- molars. *Proc Finn Dent Soc.* 1989;85(6):435-440.
7. Torres-Lagares D, Serrera-Figallo MA, Romero-Ruiz MM, Infante-Cossio P, García-Calderón M, Gutiérrez-Pérez JL. Update on dry socket: A review of the literature. *Med Oral Patol Oral Cir Bucal.* 2005 Jan-Feb;10(1):81-5; 77-81.
  8. Faillo PS. Proteolytic enzyme treatment for the necrotic alveolar socket (dry socket). *Oral Surg Oral Med Oral Pathol.* 1948 Jul;1(7):608-13.
  9. Karnure M, Munot N. Review on conventional and novel techniques for treatment of alveolar osteitis. *Asian J Pharm Clin Res* 2013; 6, Suppl 3:13-17.
  10. Nitzan DW. On the genesis of 'dry socket'. *J Oral Maxillofac Surg* 1983;41: 706-710.
  11. Kolokythas A, Olech E, Miloro M. Alveolar osteitis: a comprehensive review of concepts and controversies. *Int J Dent.* 2010.
  12. Heng CK, Badner VM, Clemens DL, Mercer LT, Mercer DW. The relationship of cigarette smoking to postoperative complications from dental extractions among female inmates. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2007; 104:757-762.
  13. Tomar S. Smoking "shisha" (water pipe) or cigarettes may increase the risk for dry socket following extraction of mandibular third molars. *J Evid Based Dent Pract* 2005; 5:47-49.
  14. Noroozi AR, Philbert RF. Modern concepts in understanding and management of the "dry socket" syndrome: comprehensive review of the literature. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2009; 107:30-35.
  15. Cardoso CL, Rodrigues MTV, Ferreira O, Garlet GP, Carvalho PSP. Clinical concepts of Dry Socket. *J Oral Maxillofac Surg* 2010;68:1922-1932.
  16. Bowe DC, Rogers S, Stassen LF. The management of dry socket alveolar osteitis. *J Ir Dent Assoc.* 2011 Dec-2012 Jan;57(6):305-310.
  17. Hellem S., Nordenram A. Prevention of postoperative symptoms by general antibiotic treatment and local bandage in removal of mandibular third molars. *In J Oral Surg* 1973; 2 (6): 273-278.
  18. Larsen PE. The effect of a chlorhexidine rinse on the incidence of alveolar osteitis following the surgical removal of impacted mandibular third molars. *J Oral Maxillofac Surg* 1991; 49 (9): 932-937.
  19. Field EA, Speechley JA, Rotter E, Scott J. Dry socket incidence compared after a 12-year interval. *Br J Oral Maxillofac Surg* 1988; 23: 419-427.
  20. Bonine FL. Effect of chlorhexidine rinse on the incidence of dry socket in impacted mandibular third molar extraction sites. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 1995 Feb;79(2):154-7; discussion 157-8.
  21. Torres-Lagares D, Gutierrez-Perez JL, Infante-Cossio P, Garcia-Calderon M, Romero-Ruiz MM, Serrera-Figallo MA. Randomized, double-blind study on effectiveness of intra-alveolar chlorhexidine gel in reducing the incidence of alveolar osteitis in mandibular third molar surgery. *Int J Oral Maxillofac Surg* 2006; 35 (4): 348-351. Epub November 9, 2005.
  22. Laird WR, Stenhouse D, Macfarlane TW. Control of post-operative infection. A comparative evaluation of clindamycin and phenoxymethyl penicillin. *Br Dent J* 1972; 133 (3): 106-109.
  23. Rood JP, Danford M. Metronidazole in the treatment of 'dry socket'. *Int J Oral Surg* 1981; 10: 345-347.
  24. Sorensen DC, Preisch JW. The effect of tetracycline on the incidence of post-extraction alveolar osteitis. *J Oral Maxillofac Surg* 1987; 45 (12): 1029-1033.
  25. Ren YF, Malmstrom HS. Effectiveness of antibiotic prophylaxis in third molar surgery: a meta-analysis of randomised controlled clinical trials. *J Oral Maxillofac Surg* 2007; 65: 1909-1921.
  26. Neugebauer J, Jozsa M, Kübler A. Antimicrobial photodynamic therapy for prevention of alveolar osteitis and post-extraction pain. 2004 Nov;8(6):350-355. Epub 2004 Sep 29.
  27. Kaya GS, Yapici G, Sarvas Z, Gungormus M. Comparison of alvogyl, Salicet patch and low level laser therapy in the management of alveolar osteitis. *J Oral Maxillofac Surg* 2011;69:1571-1577.
  28. Amiya A, Neeraj S, Ankita S. Oxidized Cellulose Foam in treatment of Alveolar osteitis. *J Dent & Medi Sci* 2012;22:26-28.
  29. Cardoso CL., Rodrigues MTV, Ferreira O, Garlet GP, Perri de Carvalho PS. Clinical concepts of dry socket. *J Oral*

- Maxillofacial Surg* 2010; 68: 1922-1932.
30. Avery, B., Brown, J.S., Carter, J.L.B., Corrigan, A.M., Haskell, R., Leopard, P.J., Williams, J.L., Loukota, R.A., Lowry, J., McManners, J., Mitchell, D., Pedlar, J., Shepherd, D., Taylor, G., Whear, N., Williams, J.K., and Worrall S.F. National Clinical Guidelines 1997. Reviewed 2004 RCS England.
  31. Colby, R.C. The general practitioner's perspective of the aetiology, prevention and treatment of dry socket. *Gen Dent* 1997; 45 (5): 461-467.
  32. Seward, G.R., Harris, M., McGowan, D.A. *An Outline of Oral Surgery Part One (2nd ed.)*. Wright; Oxford, 1987.
  33. Daly, B., Newton, T., Nasser, M., Jones, K., Fedorowicz, Z. Intrasocket interventions for the treatment of dry socket. *Cochrane Database of Systematic Reviews Jan2008*, Issue 1.

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