CASE STUDY

Management of dry socket using ozone gel vs. Alvogyl – prospective clinical trial

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Abstract

Aim: The aim of this pilot study was to estimate the clinical efficiency of the ozone gel therapy in patients with dry socket.

Objective: the objective of this study is to investigate the effect of ozone on dry socket/alveolar osteitis as it has remarkable healing properties with its spontaneous and catalyzed breakdown of the molecule it is suitable for use in the mouth during surgical interventions

Method: 5 patients were chosen with ozone and 5 patients with alvogyl as a control. 1ml syringes were filled with ozone olive oil for the experiment. This Ozone was placed in the same way as alvogyl which includes placing alvogyl in the socket after irrigation and debris removal. After the placement, the socket was observed for 2 days and the patient is called for follow up. These patients will be medically fit, adult male or female in age range of 15-60 who have undergone non-surgical extraction, not taking analgesic, antibiotic or oral contraceptive, and who does not smoke.

Results: Fisher Exact Test was used to analyze the clinical signs and severity of pain.

Conclusion: Over the years little progress has been made in establishing firm conclusions as to how best dry socket should be managed. Our recommendations are based on a review of the literature, being the best available evidence on which to base our clinical practice.

Keywords: ozone therapy, dry socket, alveolitis, ozone gel

Introduction

Alveolar Osteitis (AO) is a known complication after extraction or surgical removal of tooth. It is commonly known as dry socket and remains a common postoperative problem that results in pain of severe intensity and repeated practice/hospital visits. The exact pathogenesis of AO is not well understood and most concepts are still subject to significant controversy.[1]

The blood clot which forms after tooth extraction is essential for complete healing of the underlying tissue. Absence of blood clot prevents essential healing and causes alveolar osteitis. There are many reasons why the initial blood clot gets destroyed prematurely. It is important to minimize risk factors such as local infection, inflammation, trauma, bacteria and estrogen because the body reacts to these factors and destroys the clot.[2]

Incidence of dry socket is only 1% to 3% of all tooth extractions, though lower third molar has a higher rate than the rest of the extractions. In lower impacted (both soft tissue and hard tissue) wisdom teeth, chances are about 25% to 30% of cases resulting in a dry socket.

Dry socket symptoms occur after 2-3 days of extraction following mild swelling and redness of the gingiva, bone exposure, halitosis, and severe tenderness on examination. [3]

Streptococci and staphylococci are anaerobic bacteria which plays an important role in the mixed infection. Treponema Denticola is the most common organism found in the dry socket. If a culture from dry socket is grown, it shows large number of Vincent's spirochetes (treponema denticola) and fusiform bacilli.

General Treatment of dry socket includes non-steroidal anti-inflammatory drug (NSAID), such as aspirin or ibuprofen, to decrease the discomfort. Sometimes these over-the-counter drugs do not function well and a nerve block is given. Socket is cleaned prior to insertion of a medicated dressing to promote healing. Patient comes back every day for a dressing change until the socket starts to heal and the pain subsides. Dentists prescribe antibiotics to prevent the socket from infection. Management of dry socket at home includes rinsing with salt water or a special mouthwash every day. Dry socket healing can take up to two weeks.

Ozone has a long history of usage in public health, and was used for purification of water supplies due to its efficiency of work and lack of side effects .Ozone gas is an effective surface disinfectant for implants,

instruments and prostheses. It is also suitable for use in the mouth during surgical interventions because of its positive biophysical properties which promotes wound healing and epithelization.[4]

Materials and Methods

Materials

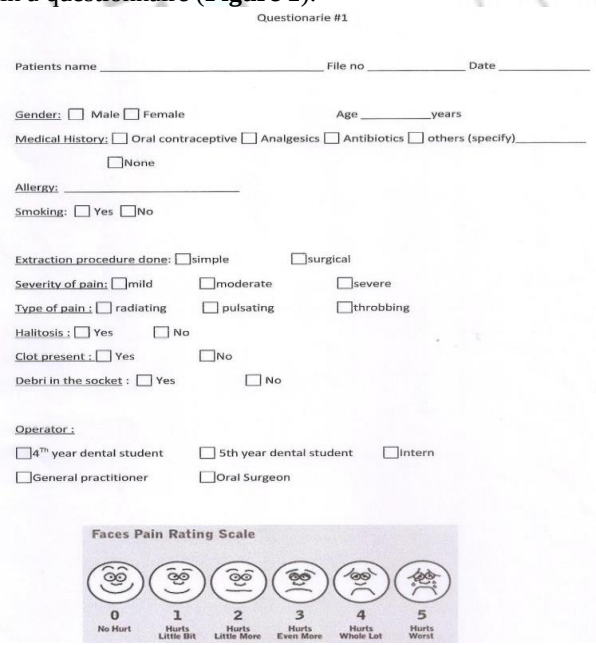
For the study group Ozone gel was taken from Rashid hospital ozone clinic, Dubai ,U.A.E, and was filled in 1ml disposable syringe ,kept refrigerated .A disposable blunt ended endodontic syringe tip was used to place the gel in the extraction socket. For the control group alvogyl was used. Other materials used for this research included saline and sterile gauge.

Study design

This prospective study was conducted on a total of 10 patients who attended Ajman University of Science And Technology Dental clinic for the treatment of dry socket. In order to determine the effect of ozone gel on dry socket 5 patients were chosen with ozone gel (study group) and 5 with alvogyl as a control.1 ml syringes were filled with ozone olive oil for the experiment. This ozone was placed in the same way as alvogyl in the socket after irrigation and debris removal. After the placement, the socket was observed for 2 days and the patient is called for follow-up. These patient were medically fit, adult male or female within the range of 15-60, who have undergone non-surgical extraction, not taking analgesic, antibiotic or oral contraceptive and who does not smoke.

Method

Once the patient with dry socket was diagnosed, a written informed consent was taken from the patient to be the part of our study. At this time the patient's name, gender, medical history, type of pain was noted in a questionnaire (**Figure 1**).


Questionarie #1

Patients name _____ File no _____ Date _____

Gender: ☐ Male ☐ Female Age _____years

Medical History: ☐ Oral contraceptive ☐ Analgesics ☐ Antibiotics ☐ others (specify)_____

☐None

Allergy: _____

Smoking: ☐ Yes ☐No

Extraction procedure done: ☐simple ☐surgical

Severity of pain: ☐mild ☐moderate ☐severe

Type of pain : ☐ radiating ☐ pulsating ☐throbbing

Halitosis : ☐ Yes ☐ No

Clot present : ☐ Yes ☐No

Debri in the socket : ☐ Yes ☐ No

Operator :

☐4th year dental student ☐ 5th year dental student ☐Intern

☐General practitioner ☐Oral Surgeon

Faces Pain Rating Scale

0 No Hurt 1 Hurts Little Bit 2 Hurts Little More 3 Hurts Even More 4 Hurts Whole Lot 5 Hurts Worst

Figure 1: first visit questionnaire

After debridement of the socket and irrigation with saline, and making sure that no food particle is present in the socket, ozone gel was gently placed in the dental socket using a sterile disposable 1 ml syringe with a blunt ended endodontic irrigation needle (**Figure 2**).

Figure 2: Injecting the gel into the socket.

The gel was syringed into the socket by inserting the needle tip until it contacted the base of the socket. The gel was injected slowly while withdrawing the needle until it reached the gingival level. Sterile gauze was placed on the socket and patient was instructed to keep it for 10 minutes to help retain the dressing. This method of applying the gel was found to be simple and convenient for the students doing the treatment. The patients were advised to call the student doctor if they still experienced pain or felt no reduction in pain. Patients were given appointment after 2 days for follow up procedure. For the patients who rejected the consent form for placement of ozone gel, Alvogyl (**Figure 3**) was placed after debridement of the socket and irrigation with saline.

Figure 3: Placement of Alvogyl in socket

In the follow up appointment a second questionnaire (**Figure 4**) was filled by the patient asking about the pain and its characteristics along with clinical diagnosis of the surrounding tissue and the socket.

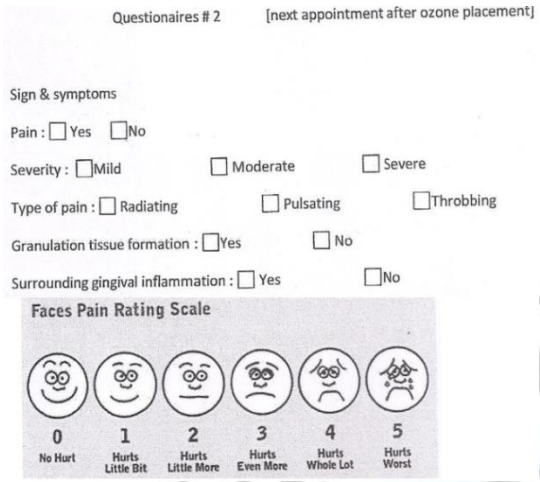


Figure 4: Follow up visit questionnaire

Results:

All the data from the questionnaire was tabulated in Microsoft Office Excel worksheet to present the demographic data. Later the statistical analysis test was done on the data using graph pad software. To see the result for the study done, Fisher Exact Test is used. **Fisher's Exact Test** is a statistical significance test used in the analysis of contingency tables. Although in practice it is employed when sample sizes are small, it is valid for all sample sizes. Fisher's test is the best choice as it always gives the exact P value [5].

Table 1: table showing total number of patients who received either ozone gel or Alvogyl.

	Pain	No pain	Total
Ozone	2	3	5
Alvogyl	4	1	5
	6	4	10

Fisher's Exact Test: The two-tailed P value equals 0.5238 .The association between rows (groups) and columns (outcomes) is considered to be not statistically significant [6].

As P value is more than alpha there is no difference in the healing effect of both on dry socket. The major findings which we have got between "no pain" showed that more 60 percent of ozone controlled patients found ozone a pain reliever, compared to 20 percent of patients getting pain relieved from alvogyl. If we compare the ozone pain and no pain **(Figure 5)**, we found that the ratio comes out to be 2:3 and the pain being mild. We can also take the ratio between Alvogyl patients which showed pain and no pain ratio to be 4:1 with the pain being moderate in severity **(Figure 6).**

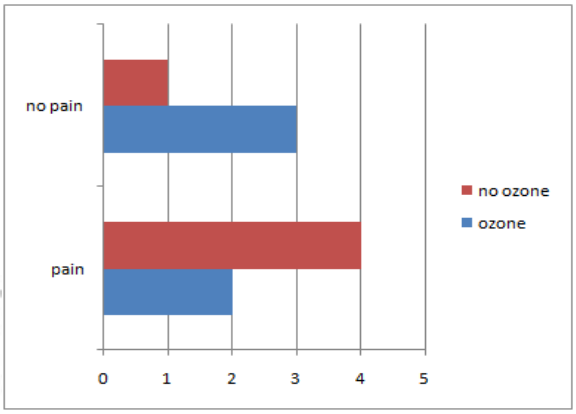


Figure 5: Comparison of ozone and Alvogyl with pain and no pain.

Out of 10 patients, 5 came with mild pain (50 %), 1 came with severe pain (10%) and 4 came with no pain (40%)

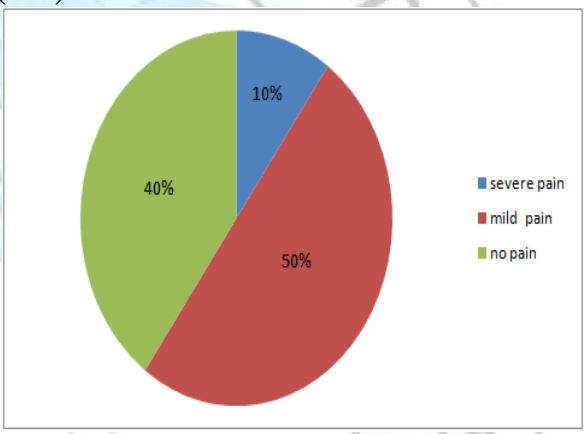


Figure 6: This figure shows the pain severity in the sample

A total of 6 female and 4 male took part in the study. These were the people who came with complication of dry socket **(Figure 7).**

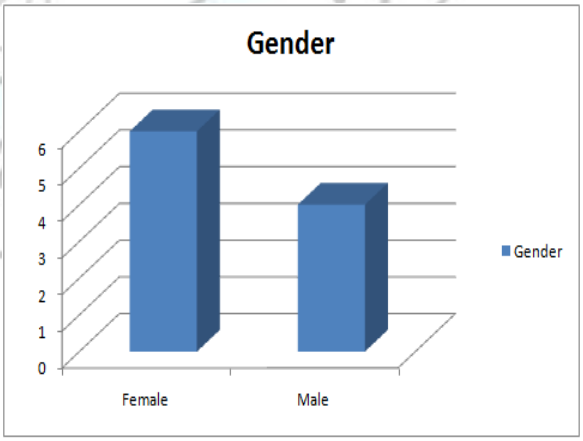


Figure 7: It shows that there were more female than males.

Prevalence of dry socket was seen in age group of 30-49 **(Figure 8).**

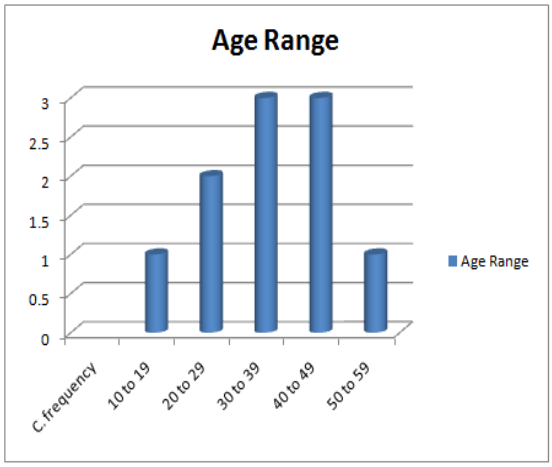


Figure 8: Range of age in the patients having dry socket.

Out of all 10 patients 3 (30%) were smokers who did not smoke during the healing period. Patient who smoked during the healing pe riod were excluded from the study. Out of 10 patients, 5 patients came with complain of halitosis.

Discussion

Dry socket is usually treated with prescription such as pain-relieving medication, often in the form of medicated dressings that are applied to the socket. Antibiotics may also be prescribed to the patient. Examples of medications used for dry socket include Antibiotics namely Penicillin, Tetracycline or Erythromycin. Other over-the-counter pain-relieving and fever-reducing medications, such as ibuprofen (Advil, Motrin) or acetaminophen (Tylenol) can also be prescribed. [7]

Other treatment options include dressings with zinc oxide eugenol (ZOE) paste because it gives Symptomatic relief when packed in the socket and replaced every 3 days for a minimum of one week. ZOE contains Eugenol which acts as Analgesic.

Alvogyl paste when placed as dressing acts as a quick pain reliever. It is self-eliminating with three active ingredients: Butamben acting as an Anaesthetic, Iodoform which has antimicrobial action and Eugenol (analgesic).

Sultan Dry Socket Paste (GECB) it‘s also an alternative option for alveolar osteitis, it is applied directly to the socket and remains for 3-5 days as the socket heals. Another paste available is Bismuth Subnitrate, Iodoform and Paraffin Paste (B.I.P.P) but is less common.

Haemostatic Agents like Surgicel can be used and a gauze-like mesh is placed post extraction. The main active component of Surgicel which provides hemostatis is Oxidised Regenerated Cellulose.

Another haemostatic agent which can be used is Kaltostat which is a Fibrous mesh which works by forming Calcium Alginate along with its Antibacterial action against Staph. Aureus, and its capacity to heal a wound.

A relatively new agent Hemcon Dental Dressing is an hemostatic agent exhibiting antimicrobial and wound healing capabilities with active component Chitosan - a naturally occurring cationic polysaccharide which attracts negatively charged RBCs to create a physical barrier.

The result of the study suggests that the best form of management for a dry socket remains unconfirmed. The lack of evidence available cannot be used to support one treatment method over another.

However, a study by Guerra et al, compared the use of ozonated oil (Oleozon, Cuba) in an experimental group with a control group of alvogyl and antibiotic therapy. Patients treated with ozone healed faster without the need for systemic medication when compared to the other control group. This finding suggested that ozone gel might be an effective treatment for alveolitis [8]. In an another study, Filippi has shown that the use of ozonated water as a cooling and rinsing medium during osteotomy surgery of third molars reduced the occurrence of infection and complications post operatively [9]. Nagayoshi et al, studied antimicrobial effect of ozonated water stating that it can be used intraorally as a treatment option for chronic periodontitis, aphthae, caries and infection after tooth extractions, chronic wound healing impairments after radiotherapy, mycosis or root canal disinfection [10].

Staying within the accepted standard of care and with proper application, oxygen/ozone can enhance the outcomes in all aspects of dentistry. However, the number of samples that were available was 10, due to this limitation; there is not enough evidence to prove that the ozone gel is better than alvogyl.

Limitations

Ozone water could not be used due to its short half-life which is 10 hours at room temperature [11]. Many studies proved that aqueous ozone is essentially nontoxic and demonstrates a higher biocompatibility and antimicrobial activity compared to ozone gas and oil based forms. In contrast, the ozonated olive oil can be stored for a considerable time when specific precautions are taken. The antimicrobial effect of ozone is transient and it needs to be reapplied to achieve best results, however this was not possible because it would be difficult for the patient to reapply at home. Dry socket cases were limited to medically fit patients in Ajman university dental clinics. This inclusion criterion brought about many limitations in this study. Looking for such sample was difficult and greatly reduces sample size. Another limitation was

the time for the study. Such study at least needs 2 years to achieve enough sample size for significant results.

Conclusion

Within the limitation of this study, with regards to healing and postoperative pain the ozone group has shown promising results. Further study with larger sample size is recommended to find the statistical significance of the effect of ozonated olive oil for the treatment of alveolar osteitis.

To sum up, research is indicating that ozone has proved to be an exciting advance for the dental profession with substantial and far-reaching implications in the delivery of dental care in the 21st century. But over the years little progress has been made in establishing firm conclusions as to how best dry socket be managed. Ozone is powerful antimicrobial agent with the ability to penetrate hard and soft tissues [12]. Despite the advantages that the therapeutic use of ozone offers, reservations remain in terms of its application in oral and maxillofacial areas. Particularly, the gaseous application of ozone is critically evaluated because of its possible side effects on the respiratory system. Our recommendations are based on a review of the literature, being the best available evidence on which to base our clinical practice.

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