Efficacy of Chlorhexidine Gel vs Chlorhexidine Rinses in Reducing Incidence of Dry Socket in Mandibular Third Molar Surgery

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ABSTRACT

Objective of this study was to highlight the efficacy of chlorhexidine gel in prevention of dry socket in the post-operative period of mandibular third molar surgical extraction in comparison to chlorhexidine rinses. One hundred patients seen at the department of Oral and Maxillofacial Surgery, Institute of Dentistry, CMH Lahore Medical College, were included in this study. The study was conducted from July 2012 to June 2013.

The trial group (n=50) was instructed to apply 0.2% chlorhexidine gel to the extraction wound during the first postoperative week, while the control group (n=50) was prescribed a 0.2% chlorhexidine rinse for the same period.

Results of this study revealed a 67% reduction in postoperative dry socket in the gel group (P < 0.05). The incidence of postoperative dry socket in the gel group was 6% (3/50) as compared to 18% (9/50) in the mouthwash group.

It was concluded that topical application of chlorhexidine gel to the extraction wound significantly reduced the incidence of dry socket.

Key Words: Chlorhexidine gel, dry socket, chlorhexidine rinses.

INTRODUCTION

Dry socket (DS) is one of the most feared complications after extraction of a tooth, especially in mandibular third molar surgery. Initially described by Crawford in 1896, over the years different names attributed to dry socket are: alveolar osteitis, alveolitis sicca dolorosa, alveolalgia, osteomyelitis or fibrinolytic osteitis, postextraction osteomyelitis syndrome, fibrinolytic alveolitis, and localized alveolar osteitis.1,2

Blum described it partial or total disintegration of the intra-alveolar blood clot, and which may be accompanied by pain and halitosis.3

Literature shows frequency of dry socket from 1% to 70%. According to most of the studies the average incidence of dry socket post extraction is around 5%, other than mandibular third molars, for which incidence ranges from 20 to 30 %, about 4 to 6 times more than associated with all other teeth.3,4,5,6,7

The probable risk factors to develop dry socket described by various studies are; difficulty of extraction, surgeon’s inexperience, use of oral contraceptives, advanced age, female gender, smoking, immunosuppression, and trauma from surgery.5,9,10
Different medications have been used for its prevention including saline rinses, topical antiseptic rinses, antibiotics, and antifibrinolytic agents. Antiseptics and antibiotics have been demonstrated to be the most effective, but the latter are expensive, have significant side effects and may create resistant bacterial strains. Among the antiseptics, chlorhexidine (CHX) mouthwash has proved to be a good prophylactic agent for dry socket. Chlorhexidine is effective against both aerobic and anaerobic organisms and yeast.1,4,11,12

The availability of 0.2% Chlorhexidine in the market in the form of a gel and its intra-alveolar placement allows a more direct and prolonged therapeutic effect.13

The aim of this study was to compare the efficacy of Chlorhexidine in its 2 available forms, i.e. 0.2% gel and 0.2% mouth wash (topical application and rinse for one minute 6 hourly, for 7 days) in prevention of postoperative dry socket following mandibular third molar surgery.

METHODOLOGY

This study was a randomized controlled prospective clinical trial in a single centre, carried out at the department of Oral and Maxillofacial Surgery and Medicine, Institute of Dentistry, CMH Lahore Medical College. The study was conducted from July 2012 to June 2013.

All patients requiring the removal of mandibular third molar under local anesthesia, who were not to take antibiotics in the 7 days preceding the surgery, were included in the study after taking the informed consent. Patients suffering from systemic disease which relatively contraindicate oral surgery, known immune-compromised patients, pregnant or lactating women, patients with known allergy to local anesthetics, antibiotics, Chlorhexidine and analgesics (also the patients with acid peptic disease; who needed modification of the analgesic), patients requiring more than one extraction in a single sitting, patients requiring extraction of third molar associated with bone pathology, patients taking oral contraceptives; and mentally handicapped patients were excluded.

Smokers were advised not to smoke for up to 5 days postoperatively. Patients in whom the extraction of the retained third molar lasted for more than 45 minutes were not included. The principles of the Helsinki Declaration were followed during all the study period and protocols.

Patients were randomly divided into two groups, using simple lottery method; one group was to use Chlorhexidine 0.2% gel and the other, 0.2% mouth wash, with the aim to compare the incidence of post-surgical dry socket.

All patients were operated by single operator under local anesthesia (i.e. inferior alveolar, lingual and long buccal block) using 2% lignocaine with epinephrine. Gingival sulcular incision with distal release was given (envelope flap raised) for the exposure of the impacted tooth. Bone grinding and tooth sectioning were done where needed. After extraction, bony edges were smoothened and debris cleaned from the socket and under the flap with normal saline irrigation.

Finally the socket of extracted tooth in trial group was filled with Chlorhexidine gel and that in the control group was flooded with 1 to 2 mL of Chlorhexidine mouth wash and wound closed with 3/0 silk suture. For post-operative pain control all patients were advised tablet Flurbiprofen 100 mg in bid dosage, initially for 3 days (till 1st recall). The surgery took from 25 to 40 minutes in all the included cases. The patients in the gel (trial) group were advised to apply 0.2% Chlorhexidine gel to the surgical wound 4 times a day for one week from very that day of surgery. The patients in the rinse (control) group were advised gentle rinses with 10 mL of 0.2% Chlorhexidine for 1 minute, 4 times a day, from the day of surgery to one week post operatively (strict advise not to rinse vigorously was given). The main outcome variable was the appearance of postoperative dry socket, as per Blum’s standardized criteria.

The patients were recalled for evaluation at 3rd and 7th day postoperatively to assess condition of the extraction wound. Dry socket was declared when there was history or complains of increased severity of pain from first postoperative day onwards, along with the total or partial loss of clot from the healing socket and fetid odour.

All the patients were evaluated at their follow-up/recall visits by a single investigator, trained by the principal investigators for the healing of extraction sockets and/or development of dry socket, if any. All the subjects confirmed the complete following of the advised/prescribed regimen and instructions postoperatively.

The chi square test was applied for the comparison of the proportions of postoperative dry socket between the 2 groups (gel and rinse), and student t test for the comparison of the mean values in quantitative variables.
All clinical assessment was carried out by a single blind investigator, trained by the directors of this study in previous studies sharing the same dry socket criteria. All study subjects reported using the medication prescribed to them.

RESULTS

Age range in gel group was 17-32 years with mean 23.46±5.06 and in mouthwash group it was also 17-32 years but with mean 22.86±5.16. Results of this study revealed a 67% reduction in postoperative dry socket in the gel group (P < 0.05). The incidence of postoperative dry socket in the gel group was 6% (3/50) as compared to 18% (9/50) in the mouthwash group.

DISCUSSION

Currently there are 2 main etiopathogenic theories about dry socket; Birn’s fibrinolytic theory and the bacterial theory.14 With respect to these etiopathogenic theories, the prevalence of one theory over the other has not been generally accepted, as there is no conclusive data to definitively reject or accept.

Chlorhexidine (CHX) is a bisdiginamide antiseptic with antimicrobial properties. The use of Chlorhexidine as a mouth-rinse and as a preoperative irrigant of the gingival crevice has been shown to significantly reduce the quantity of oral microbial populations. Several studies have reported that the pre or postoperative use of Chlorhexidine mouthrinse significantly reduces the incidence of dry socket after the surgical removal of mandibular third molars. A 50% reduction in the incidence of dry socket was observed in patients who pre-rinsed for 30 seconds with a 0.2% Chlorhexidine solution. Use of 0.2% Chlorhexidine gel reduced incidence of dry socket in percent similar to use of 0.2% Chlorhexidine mouthwash. No adverse effects were observed. Incidence of dry socket in smokers was reduced who rinsed with Chlorhexidine. Preoperative use of Chlorhexidine can reduce the incidence of dry socket by approximately 40%.11,15

In a recent meta-analysis by Caso et al on the use of Chlorhexidine rinse after impacted third molar surgery, the authors concluded that the use of Chlorhexidine mouth rinse from the day of intervention and during the postoperative period produces a decrease in dry socket incidence. The minimum postoperative period of time during which mouthwash should be applied could not be determined in this study.7

In literature among the antiseptics, chlorhexidine has shown good results as prophylactic agent for dry socket. According to Ragno and Szkutnik, Chlorhexidine 0.2% mouthwash produced a considerable decrease of alveolar osteitis after impacted 3rd molar removal, i.e. up to 17.5%. After one week post-extraction Larsen found 16% cases of dry socket in the control group (placebo), whilst 8% reduction in chlorhexidine (0.12%) group. Up to 50 % reduction was observed by Ragno, Bonine and Hermesch et al, using the same study groups. On the contrary Berwick and Lessin found no difference in the incidence of dry socket in the comparative groups of 0.12% chlorhexidine and 0.05% cetylpyridium.14

Torres et al discovered an 11% decrease of dry socket in the experimental group (intra-alveolar bio-adhesive 0.2% Chlorhexidine gel) after the removal of retained mandibular third molars, compared with 30% in the experimental group (intra-alveolar medication versus placebo).11

### TABLE 1: DISTRIBUTION BY GENDER

<table>
<thead>
<tr>
<th>Sex of the patient</th>
<th>Patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>29</td>
<td>58%</td>
</tr>
<tr>
<td>Female</td>
<td>21</td>
<td>42%</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100%</td>
</tr>
</tbody>
</table>

### TABLE 2: DISTRIBUTION BY GENDER

<table>
<thead>
<tr>
<th>Sex of the patient</th>
<th>Patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>31</td>
<td>62%</td>
</tr>
<tr>
<td>Female</td>
<td>19</td>
<td>38%</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100%</td>
</tr>
</tbody>
</table>

### TABLE 3: DISTRIBUTION OF DRY SOCKET

<table>
<thead>
<tr>
<th>Dry Socket</th>
<th>Patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>41</td>
<td>82%</td>
</tr>
<tr>
<td>Yes</td>
<td>09</td>
<td>18%</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100%</td>
</tr>
</tbody>
</table>

### TABLE 4: DISTRIBUTION OF DRY SOCKET

<table>
<thead>
<tr>
<th>Dry Socket</th>
<th>Patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>47</td>
<td>94%</td>
</tr>
<tr>
<td>Yes</td>
<td>03</td>
<td>06%</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100%</td>
</tr>
</tbody>
</table>
The number of patients in this study was sufficient to assess the main variable: appearance or absence of dry socket post-extraction. In other studies, this number ranges between 20 and 67 per group. The average age of the patients was higher than that obtained by other authors. With respect to the proportion of males/females, there are studies such as those by Torres et al which coincide with the data, while other authors had a similar proportion of males/females in their studies.

In the experimental group (gel) statistically significant decrease was found (67%, P < 0.05) in the incidence of postoperative dry socket compared with the mouthwash group. These results may be explained by the properties of the gel, which prolong the release of Chlorhexidine at the application site. No adverse effect was recorded in the patients treated, as referred to in other similar studies.

The envelop flap design (gingival sulcular incision with distal release) used for the exposure of the impacted third molar in the current study was the operator’s preference. This also showed that the level of difficulty for the removal of all the third molars was almost the same.

The results of this clinical study show that the application of 0.2% Chlorhexidine gel to the postoperative wound after the removal of retained mandibular third molars decreases dry socket incidence significantly when compared with the application of 0.2% Chlorhexidine mouthwash under similar circumstances.

CONCLUSION

It was concluded that topical application of chlorhexidine gel to the extraction wound significantly reduced the incidence of dry socket.

REFERENCES