



Comparison of Two Irrigation Solutions in the Surgical Removal of the Mandibular Third Molars- A Randomized Trial

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Authors' contributions

This work was carried out in collaboration among all authors. Author PAR designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors PUAW and VJ managed the analyses of the study. Author PSM managed the literature searches and helped in drafting of study. All authors read and approved the final manuscript.

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ABSTRACT

Aim: To evaluate the effect of postoperative irrigation with chlorhexidine saline irrigation and metronidazole saline irrigation on non-inflammatory complications after the extraction of lower third molar under local anesthesia.

Materials and Methods: In this study a total of 120 patients with age range 18-80 years who had impacted tooth which required surgical removal were included. The patients were separated into two groups using Block Randomization to avoid sampling bias. Group A and Group B had 60 patients each. Group A patients were irrigated with 1% Chlorhexidine Saline and Group B patients were irrigated with 1% Metronidazole Saline during the surgical removal of their mandibular third molars. The patients were measured for the pain, swelling and checked for dry socket after 7 days of procedure.

Results: The mean age of the patient was 28.08 + SEM years. Out of three parameters (Pain, Swelling, Dry Socket) assessed, only alveolar osteitis showed a statistical significant difference

between 1% Metronidazole and 1% Chlorhexidine with p value 0.041(>0.05). Trismus and pain did not differ significantly (p>0.05) in the two groups with p-values of 0.431 for trismus and 0.750 for pain.

Conclusion: Metronidazole had better efficacy in alveolar osteitis, while in the other parameters viz, pain and mouth opening there was no difference in the two treatments.

Keywords: Complications; dry socket; impacted teeth; irrigation; trismus.

1. INTRODUCTION

Removal of impacted wisdom tooth is the most common dental surgical procedure performed in dental surgery. Pain, trismus, swelling, or anatomical variation after the removal of a third molar can make the maintenance of oral hygiene difficult, and the accumulation of food debris around the surgical site increases the risk of infection and dry socket particularly when lower wisdom teeth have been removed because of the effects of gravity [1]. Irrigation solutions also play an important role in the surgical removal of impacted teeth. Cooled irrigation solutions allow the guttered and recipient bone to cool thereby preventing thermal necrosis. Irrigating solution that is used during surgical removal of the wisdom tooth does not only prevent injury to the bone but also irrigates the working field and improves the vision of the dentist. In previous animal studies, it was shown that cutting the bone without water spray produced a greater width and intensity of inflammatory exudates and cellular debris at the margins of the defect compared to those with irrigation when viewed under the microscope [1,2]. Normal saline is preferred than sterile water because it is isotonic [3-14]. Adding antibiotics to the normal saline irrigation during surgical guttering of the bone when surgically removing the third molar may help in the removal of iatrogenic microbes. In this study we aimed to compare the efficacy of 1% metronidazole saline irrigation and 1% chlorhexidine saline irrigation after surgical removal of the mandibular third molar.

2. MATERIALS AND METHODS

2.1 Study Setting and Sampling

The present study was a double-blinded randomized study, conducted in Saveetha Dental College and Hospital, Chennai from June 2019 to March 2020. A total of 120 patients [males (66) Females(54)] referred to the Department of Oral and Maxillofacial Surgery were recruited for the study.

2.2 Study Design

A panoramic radiograph was taken to assess the position of impacted teeth and to include mesioangular impaction according to Pell Gregory's class-I.

2.3 Inclusion and Exclusion Criteria's

The following categories of patients were included in the study;

1. Patients who were systematically fit (ASA-I and ASA-II)
2. Patients who are indicated for impaction with mesioangular impaction, class-I, and
3. Type-A or B
4. Patients who are not under any systemic antibiotics one week before procedure 4. Patients are not allergic to any medications.

The excluded patients were

1. Those who had previously had radiotherapy to the head and neck.
2. Those with diabetes mellitus or organ transplants, or who used bisphosphonates steroids.
3. Patients who were pregnant or lactating, and those with an allergy to chlorhexidine and metronidazole.
4. Patients who didn't attend follow-up appointments.
5. Patients with cellulitis, abscess, Pericoronitis.

The 120 patients were randomly allocated by using a sealed envelope method to reduce the selection bias. Patients were divided equally into two Groups: Group A irrigation with 1% chlorhexidine saline solution and Group B irrigation with 1% metronidazole saline solution.

Surgical protocol: All patients who underwent surgical removal of mandibular third molars were selected randomly in group A and group B. Patients were are informed about the

complications of the surgery before the procedure. Local anesthesia was performed via inferior alveolar nerve block with lignocaine 1:2,00,000 dilution of adrenaline. A standard mucoperiosteal flap was elevated, and using a round bur, bone trimming was done with copious saline mixed with 1% chlorhexidine solution for Group-A and 1% metronidazole for Group-B patients. The tooth was sectioned and removed. Wound closure was done with 3-0 silk sutures. After surgical procedure patients were prescribed piroxicam 20 mg twice daily for pain control. Patients were evaluated for a complication after 7-day post-operation. Post extraction like pain, trismus and dry socket were evaluated.

2.4 Evaluation Protocol

All patients were recalled 7-days after the procedure. Three parameters pain, alveolar osteitis and trismus were evaluated.

2.5 Pain

Evaluation of pain was done using a Visual analog scale (VAS), with 0 being the absence of pain to 10 being intolerable pain. Patients were asked to fill according to their experience on the respective evaluation days.

2.6 Alveolar Osteitis

Alveolar osteitis was measured by presence of pain, halitosis, and clot dislodgement after 3 days of surgical procedure.

2.7 Trismus

Trismus was evaluated by measuring the amount of mouth opening, measured as interincisal opening.

2.8 Statistical Analysis

Independent t-test was used to evaluate pain and trismus, while alveolar osteitis was evaluated using Chi-square test. p-value of less than 0.05 was considered as statistically significant.

3. RESULTS

In the studied population, 68 patients were males and 52 were females (Fig. 1). Participants age ranged from 17 to 57 years with mean age is 28.08 SEM years. The results indicated that the right mandibular lower third molar teeth(50.43%) were more than the left mandibular third molar(49.57%). The pain visual analog scale (VAS)score for Group-A for most patients was 3(22.41%) and 2(18.97%) after one week of procedure with mean VAS score of 2.84±1.776. Pain score for Group-B showed that 25.42% of patients had zero (0)VAS score and 22.03% patients had VAS score of one (1)with mean score of 2.19±1.719). Mouth opening for Group-A 32 mm in 22.41% of patients followed by 35 mm in 13.79% of patients. Mouth opening for Group-B was 35 mm of mouth opening for 16.95% of patients with mean opening of 32.1 mm. For alveolar osteitis 17.24% of patients in Group A had alveolar osteitis (dry socket), while 6.78% patients in Group B had alveolar osteitis after one week of procedure.

Correlation between tooth extracted and alveolar osteitis indicated that the presence of alveolar osteitis was more in the left lower mandibular third molar(6.84%) than right mandibular lower third molar (5.13%).The Relationship between pain and type of irrigation showed that VAS pain score of 0 and 1 was predominant in Group-B (12.82%) whereas in Group-A, it was5.98%. Pearson chi square was5.068, df was 8 and p value was0.750(>0.05) which is statistically insignificant (Fig. 3). Maximal mouth opening of 38 mm was more in Group-B than Group-A. (Fig. 4). The presence of alveolar osteitis was more in Group A (8.55%) than Group-B (3.42%).(>0.05). (Fig. 5).

4. DISCUSSION

The term impaction refers to the failure of a tooth to erupt in its original position in expected amount of time, which is caused by many

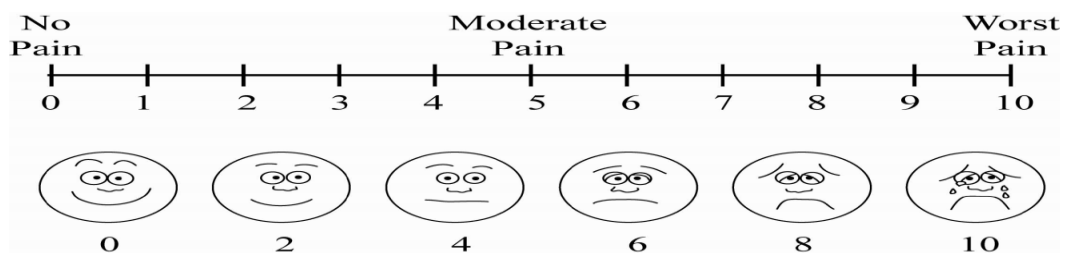


Photo A. The figure showing pain-scale in the range of 0-10

systemic and local factors. Most commonly mandibular molars are involved in impaction [15], and this study was based on the impacted mandibular molars. Based on the position of the impacted molars, various classification systems have been proposed. Pell Gregory classification was on the depth level with respect to the occlusal surface of second molar vertically and to the body of the ramus horizontally [16]. Winter's classification was based on the angulation of the third molar with respect to the second molar [17]. This study used both Pell Gregory and Winters classification systems to classify types of impactions for the subjects, and only mesioangular impaction according to winter's classification, type- A or B form, and Pell Gregory's class-I were included in the study. Most common such complications include pain, oedema, trismus, infection, dry socket, haemorrhage, nerve injury [18]. In our study we have discussed most common complications such as trismus, alveolar osteitis and pain by using two types of irrigation medicaments. Irrigation is typically performed with regular saline during wisdom teeth removal helps to minimize the heat produced by the straight hand piece, and it often helps to better see the surgical site by minimizing blood, bone debris and foreign bodies. Using irrigation with some antibiotic properties helps in better healing and to counteract the postoperative complications. Chlorhexidine is known intra-oral rinse which is bactericidal against gram positive and gram negative microorganisms [19]. Properties of

chlorhexidine are not affected and remains unaltered even under extreme conditions like heat produced during drill [20]. It has an additional value of residual effect or substantively present there over 48 hrs.' which proves its longer duration of action [21]. On the other hand metronidazole has rapid onset of action and is active against all anaerobic infections [22]. In this study, metronidazole group had significantly reduced alveolar osteitis when compared to chlorhexidine group, whereas in other parameters such as pain and trismus it did not exhibit any added advantage over chlorhexidine group. Ritzau [23, 24], reported that metronidazole failed to produce satisfactory result on alveolar osteitis which is in contrast to our result. Another study (Refs) reported that chlorhexidine irrigation had significant effect on mouth opening and control of pain, which is similar to our findings. Mouth opening and trismus among our study population were comparable in the two groups, however alveolar osteitis differed significantly in metronidazole group. In another studies [24, 25] chlorhexidine was compared with superoxide solution, their results showed that trismus and control of pain was effective in both the groups [24, 25]. Kaziro G conducted a study by comparing the effect of metronidazole to an herbal arnica Montana and a placebo among 118 patients, he found that metronidazole group had better effect on control of pain and swelling when compared to arnica and placebo [26]. In a systematic review by Yengopal et al. found that four out

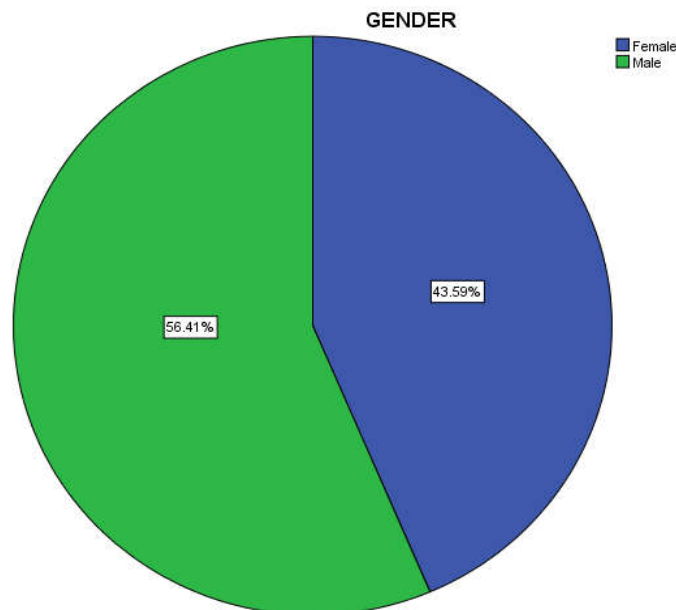


Fig. 1. Pie chart represents gender distribution of the study population

of six studies comparing the efficacy of chlorhexidine has failed its effectiveness against alveolar osteitis. He concluded that there was no sufficient evidence to prove chlorhexidine against alveolar osteitis [26]. In most of the articles mentioned here 1% metronidazole was not used locally after procedure, contradictory results may be due to the different route of administration,

dosage of metronidazole whereas chlorhexidine has been used locally in many articles. Metronidazole although used in severe infection situations it has adverse effects like nausea, abdominal pain, diarrhea and metallic taste. To avoid such adverse effects in our study we used metronidazole as local irrigation.

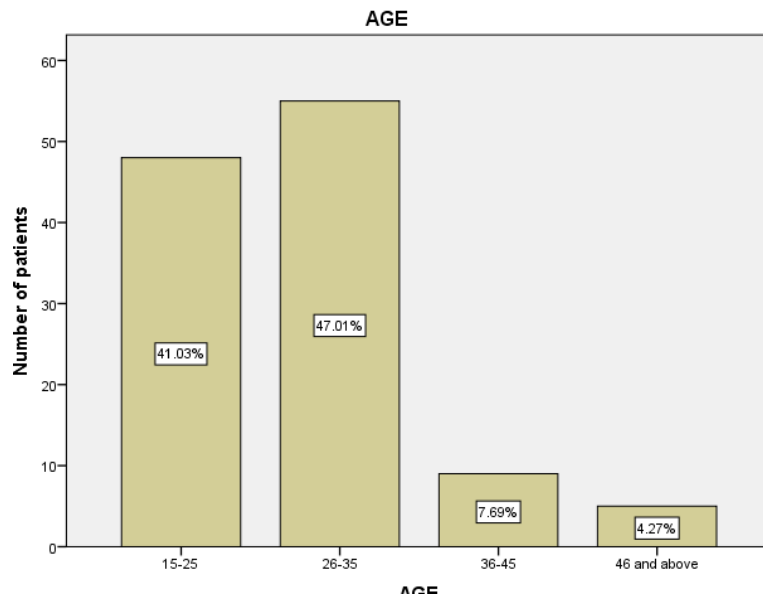


Fig. 2. Distribution of the population. From the above bar chart it mean age is 28.08 years with a minimum of 17 years and maximum of 57 years

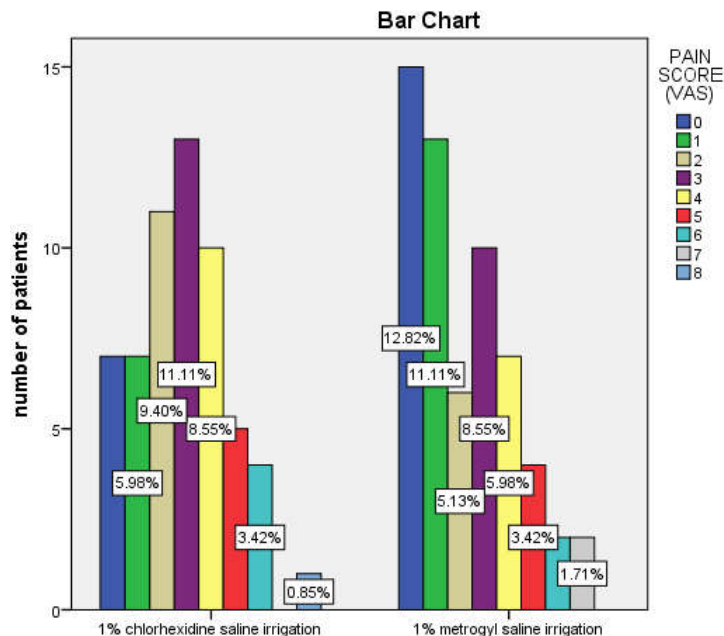


Fig. 3. the above chart shows the relation between type of irrigation and pain score in visual analog scale. The presence of pain is more in 1% chlorhexidine saline irrigation than 1%metrogyll saline irrigation as pain score of 0(blue) and 1(green) is predominant in 1% metrogyll saline irrigation(12.82%) when compared to 1% chlorhexidine saline irrigation (5.98%)

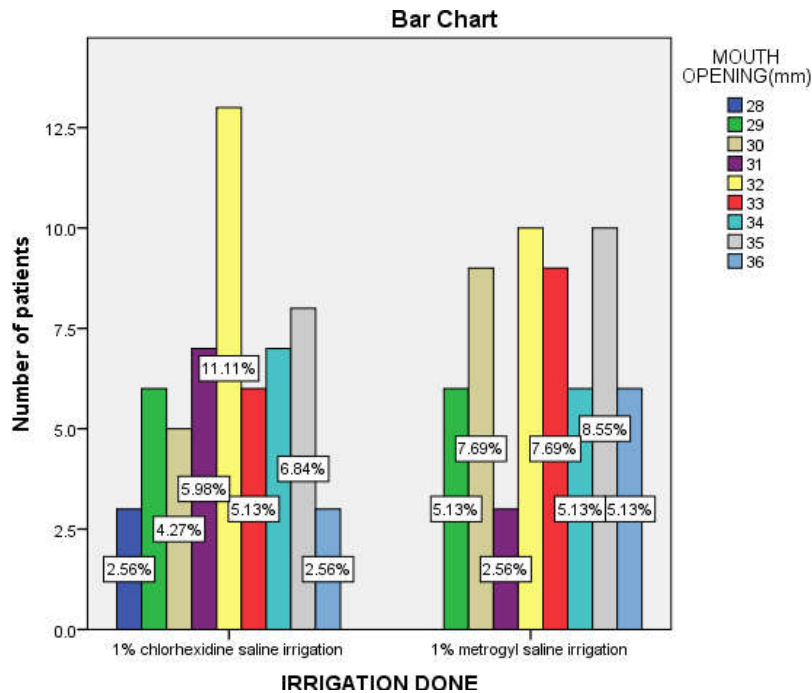


Fig. 4. The above chart shows the relation between type of irrigation and mouth opening of the patients. X axis type of irrigation and Y axis represents number of patients. Pearson chi square is 8.025, df is 8 and p value is 0.431(>0.05) which is statistically insignificant. The maximal mouth opening of 36 mm is more in 1% metronidazole saline irrigation than 1%chlorhexidine saline irrigation

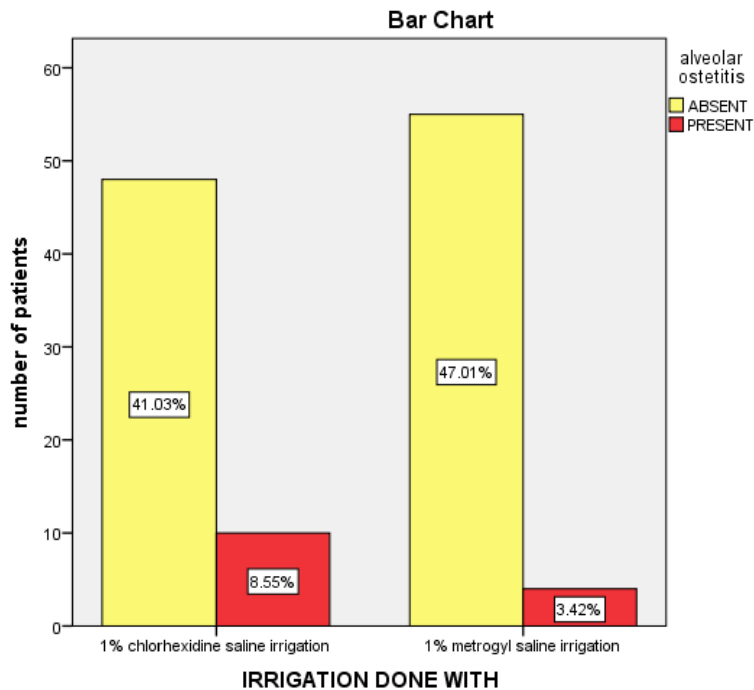


Fig. 5. the above chart shows the relation between type of irrigation and alveolar osteitis. X axis type of irrigation and Y axis represents number of patients. Pearson chi square is 3.039, df is 1 and p value is 0.041(>0.05) which is statistically significant. The presence of alveolar osteitis is more in 1% chlorhexidine saline irrigation with 8.55%(red color) than 1%metrogyll saline irrigation which has 3.42%

5. CONCLUSION

From the above results it is evident that metronidazole has better significance towards alveolar osteitis when compared to chlorhexidine irrigation. Although metronidazole has better efficacy towards alveolar osteitis, in other parameters such as pain and mouth opening, there is no much difference between metronidazole and chlorhexidine. Further studies are required in the larger population to evaluate the efficacy of these drugs for better treatment.

CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

Ethical approval was obtained before the study from Saveetha institute of medical and technical sciences.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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