

Effectiveness Of Metrogyl, Chlorhexidine And Betadine As An Irrigant During Surgical Extraction Of Impacted Mandibular 3rd Molars

Research Article

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Abstract

Background: The present study was conducted to assess the effect of irrigation with three different irrigants, namely metrogyl, chlorhexidine, and betadine on pain, alveolar osteitis, swelling, trismus, infection, and food impaction during surgical extraction of impacted mandibular third molar.

Aim: To evaluate the effectiveness of Metrogyl, Chlorhexidine and Betadine as an irrigant during surgical extraction of impacted mandibular 3rd molars and also to evaluate the potent topical antimicrobial agent that minimizes the incidence of postoperative transient bacteremia following lower third molar surgery and to suggest prophylactic use of effective antibiotic for commonly isolated bacteria.

Materials and Methods: Thirty patients, aged between 18 and 25 years that includes 15 males and 15 females, fulfilling criteria for inclusion in this study were divided into three groups: group I where irrigant used was povidone iodine group, group II as metrogyl, and group III as chlorhexidine.

Results: The pain was significantly more in groups I and III in 24 hours and 7th day as well. Alveolar osteitis was noted in groups III and I, nil in group II. Trismus was significantly more in group I and group III than in group II (with $p < 0.01$) on 7th day.

Conclusion: It is concluded that metrogyl significantly reduces bacteremia and is effective in reducing pain, alveolar osteitis, swelling, and trismus when used as an irrigant following surgical removal of impacted third molar.

Clinical significance: Metrogyl as irrigating solution helps in reducing the postoperative consequences after third molar surgery. Further studies are required using large sample size.

Keywords: Metrogyl; Chlorhexidine; Povidone Iodine; Mandibular Third Molar.

Introduction

Removal of impacted third molar is the most consistently performed procedure in oral and maxillofacial surgery [1]. An array of complications have been found associated with lower third molar removal for instance pain, swelling, trismus, inflammation, infection, nerve damage [2]. Accumulation of food debris around the surgical site increases the risk of infection and dry socket particularly when lower wisdom teeth have been removed. The com-

plication of utmost concern is "Dry socket" which has its onset between 2-4 days after surgery. Alveolar osteitis and postoperative infection are the most common complications associated with the extraction of impacted third molars. Alveolar osteitis affects 25 to 30% of patients. Alveolar osteitis (AO), commonly referred to as dry socket, is identified as a severe pain in or around the site of an extracted tooth, intensifying any time between the first and third postoperative days, accompanied by partial or total blood clot loss in the alveolar socket. Microorganisms have been found associated

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with dry socket such as streptococcus alpha and beta haemolyticus and treponema denticola, 70% of them are aerobic and 30% anaerobic. This mixed anaerobic and facultatively anaerobic flora with large number of spirochetes, porphyromonas species and other Gram-negative bacteria, and similar flora have also been found. These bacteria produce proteases, have fibrinolytic activity, invade the surrounding tissue, and have other metabolic activities.

Irrigation solutions also play an important role in the surgical removal of impacted teeth. After extraction of a tooth, the socket is irrigated and suctioned with copious amounts of normal saline (NS). This technique enables the removal of debris from the socket. It is believed that by exclusion of debris, the healing can progress normal. 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. Cooled irrigation solutions allow the guttered and recipient bone to cool thereby preventing thermal necrosis. The chlorhexidine is an antiseptic effective against bacteria in different intraoral procedures, whereas the povidone iodine is proved to be broad spectrum microbial agent.

The purpose of the present study is to compare the effectiveness of normal saline, povidone iodine, and chlorhexidine irrigating solutions on pain, alveolar osteitis, swelling, trismus, infection, and food impaction after surgical removal of lower wisdom teeth.

Materials And Methods

The present study was a double-blinded randomized study, conducted in Saveetha Dental College and Hospital, Chennai from Oct 2020 to Jan 2021. A total of 30 patients [males (15), Females (15)] referred to the Department of Oral and Maxillofacial Surgery were recruited for the study. The samples were patients with indication for surgical removal of impacted lower wisdom tooth (NICE, 2000). The study comprised of initial screening, taking informed consent, surgical procedures to remove the impacted tooth and review of patient on Day 1 and Day 7 after surgery.

Prior to the surgical procedure, dental panoramic tomography was taken for every patient who participated in the study for classification of impaction according to Winter's classification and to exclude any other pathologies.

Inclusion criteria

- (1) Healthy patient or patient with mild systemic disease only according to American Society of Anaesthesiologists (ASA) Physical Status Classification System - Only patient with ASA I and ASA II were accepted.
- (2) Patient whose impacted wisdom tooth is indicated for surgical removal. Patients who are indicated for impaction with mesioangular impaction, class-I and type A and B.
- (3) Patient who agreed to treatment carried out under local anaesthesia.

(4) Patient is not allergic to any of the medication that would be used/prescribed in the study.

(5) Patient does not take any antibiotic or anti-inflammatory medication in 7 days prior to the surgery.

Exclusion criteria

- (1) Patient with ASA PS Classification above II.
- (2) Impacted teeth that were indicated for removal under general anaesthesia.
- (3) Patient who presents with acute infection at the operating site 7 days prior to surgery.
- (4) Patient who was not able to give voluntarily consent.

A total of 30 patients were randomly divided into 3 groups (A, B and C). Patients in group A was treated with betadine as an irrigant, Metrogyl was used in group B and chlorhexidine gluconate 0.12% was used in Group C. Written consents for both the study and surgery were taken from all the patients prior to surgery.

Surgical Protocol

All patients who underwent surgical removal of mandibular third molars were selected randomly in group A and group B. Patients were informed about the complications of the surgery before the procedure. Local anaesthesia 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. The irrigating solution was delivered as continuous stream during the surgery via low speed hand piece. After removal of the wisdom tooth, the socket was cleaned and rinsed with the respective irrigating solutions. Patient was given standard post-operative instructions after the surgery. After surgical procedure patients were prescribed piroxicam 20 mg twice daily for pain control.

Assessment protocol

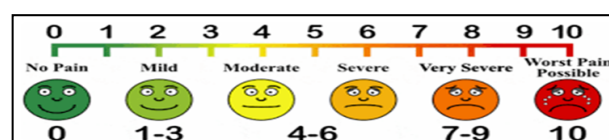
All the patients were reviewed on Day 1 and Day 7 post-operatively for complications in terms of pain, swelling, infection and delayed wound healing.

Pain

Intensity of pain is measured by using Visual Analogue Scale (VAS) (McCormack et al., 1988) whereby the intensity of pain is divided into 10 scales with 0 indicates no pain at all and 10 as the most severe pain that the patient has ever suffered. Patients were asked to fill according to their experience on the respective evaluation days.

Alveolar Osteitis

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



Trismus

Trismus was evaluated by measuring the amount of mouth opening, measured as inter-incisal opening.

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. The null hypothesis of the present study was there would be no statistically significant difference in postoperative clinical complications among the 3 different types of irrigating solutions used in the study.

Results

A total of 30 patients, 15(50%) males and 15(50%) females, with mean age of 18.8 (the youngest at 18 and oldest at 25) took part in the study (Flow chart 1). All patients have moderate to good oral hygiene. All the samples presented with swelling on Day 1 after operation (Table 1). However, only two patients continued to have swelling on Day 7 after operation (Table 2). Decreased of pain on postoperative Day 7 is seen in all cases except 2 cases that presented with increased of pain score. Only one case presented with postoperative infection but there is none for delayed wound

healing. No statistically significant ($p < 0.05$) post-operative complications found between the groups (Table 3).

Discussion

This study was designed to evaluate the efficacy of metrogyl, povidone iodine, and chlorhexidine as irrigating solutions on impacted mandibular third molar surgery. An ideal irrigating solution for surgical removal of wisdom tooth should be easily available or prepared, isotonic, nonirritant, nontoxic, nonhemolytic, antiseptic, and yet economical. (Urviet al., 2014)[15].

Irrigating during surgical removal of impacted lower wisdom tooth has been a standard practice. It helps clinician to have a better view of surgical site by removing blood, bony debris and foreign bodies. At the same time, it also reduces heating effects from the rotating instrument that used to cut the bone and bacterial load at the surgical site which contributes to a more promising healing (Kumaret al., 2011)[3].

Chlorhexidine is recognized as antiseptic and has been revealed to be safe and effective against both grampositive and gram-negative bacteria in different intraoral procedures. Moreover, chlorhexidine acts quickly and its action is not exaggerated by the presence of body fluids, such as blood. In addition, chlorhexidine has the advantage of residual effect over 48 hours, providing longer

Flow chart 1. Patients with demographic data.

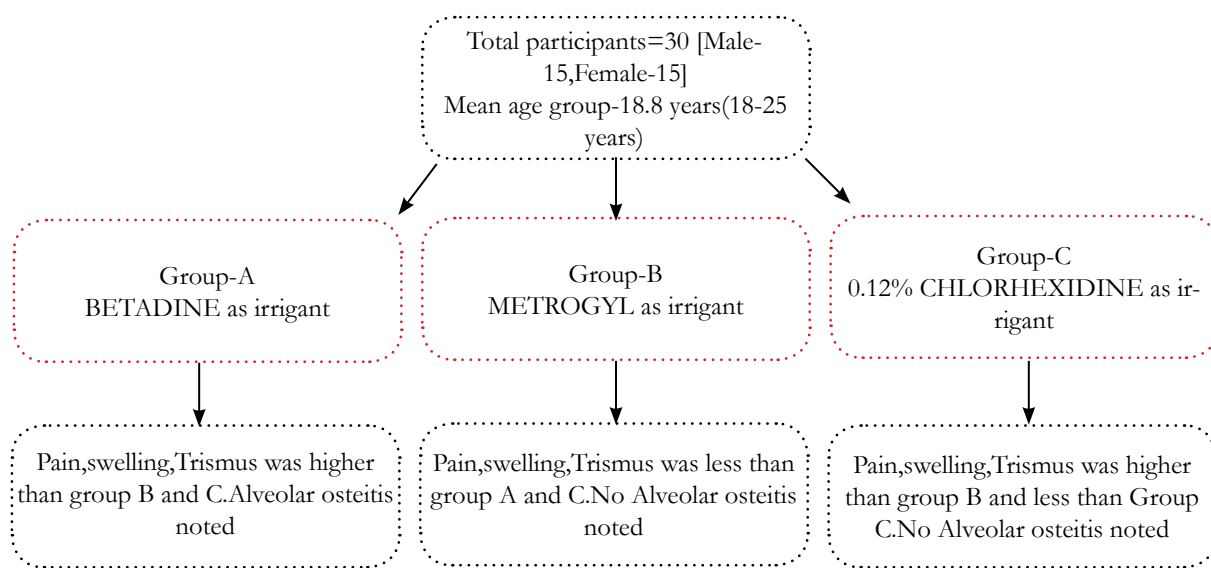


Table 1. Day 1 Post-operative clinical complication of surgical removal of lower wisdom tooth Post-operative clinical complication [Day 1].

	Pain	Swelling	Fever	Sore throat	Lymphadenopathy	Wound Dehiscence
Number of sample	15 (Grade 0-4) 10 (Grade 4-7) 5 (Grade 8-10)	23	-	-	-	-

Table 2. Day 7 Post-operative clinical complication of surgical removal of lower wisdom tooth Post-operative clinical complication [Day 7].

	Pain	Swelling	Fever	Sore throat	Lymphadenopathy	Wound Dehiscence
Number of sample	21 (Grade 0-4) 9 (Grade 4-7)	2	-	1	-	

Table 3. ANOVA for the post-operative complications on Day 1 and Day 7.

Day 1	df	Sum of Squares	Mean Square	F	p
Between Groups	9	8.05	4.03	1.17	0.33
Within Groups	21	72.44	3.45	-	-
Total	30	80.5		-	-

Day 2	df	Sum of Squares	Mean Square	F	p
Between Groups	9	0.2	0.1	0.03	0.97
Within Groups	21	77.76	3.7	-	-
Total	30	77.76		-	-

duration of action. Further, it is stated that both these irrigants are sterile, reduce heat, and keep surgical field clean. Moreover, chlorhexidine acts rapidly and surgical infection is not affected by the presence of body fluids such as blood (Denton, 2001)[7]. On top of these, chlorhexidine has the advantage of residual effect or substantivity over 48 hours (Denton, 2001)[7]. This allows for a longer duration of antimicrobial action. Study done by Urvi et al, it is stated that chlorhexidine was found to be more effective in control of postoperative pain and alveolar osteitis than povidone iodine when used for irrigation during the surgical removal of lower third molars [15].

Povidone iodine is a soluble complex of iodine which releases free iodine slowly. It acts by iodinating and oxidizing the microbial protoplasm. Iodine is a quickly acting, broad-spectrum microbial agent active against bacteria, fungi, and viruses. When 1% povidone iodine is used as an irrigant in minor oral surgical procedure preoperatively, it is effective in reducing the oral cavity bacterial counts up to 1 hour of the surgical procedures without any local postoperative complications.

Previous studies had compared the effects between betadine with normal saline and chlorhexidine with betadine as irrigating solutions for surgical removal of wisdom tooth (Yaghmaee [23] et al., 2006; Urvi et al., 2014)[15]. Both studies show no significant difference in terms of postoperative complication and healing process between the two groups. However, Urvi et al (2014) found that chlorhexidine was more effective than povidone iodine in terms of controlling the postoperative pain and alveolar osteitis although the size of sample in the study was relatively small to give a firm conclusion [15]. Yengopal and Mickenautsch stated that the alveolar osteitis was significantly reduced with the use of chlorhexidine [21].

Metronidazole, a nitroimidazole compound, is a broad-spectrum antibiotic and exhibits activity against anaerobic bacteria and protozoa. It demonstrates effective antibacterial activity against anaerobic cocci as well as Gram-negative and Gram-positive bacilli. Metronidazole acts preferentially on anaerobic germs; it prevents hydrogen production, exercising its toxic action by depriving anaerobic microorganisms of reducing equivalents essential for certain anabolic processes. Metronidazole although used in severe infection situations it has adverse effects like nausea, abdominal pain, diarrhoea and metallic taste. To avoid such adverse effects in our study we used metronidazole as local irrigation. In this study, metrogyl group had significantly reduced alveolar osteitis when compared to other groups whereas in other parameters such as

pain and trismus it did not exhibit any added advantage over chlorhexidine group.

In the present study, it was found that the 0.12% chlorhexidine was more effective than normal saline and 0.5% povidone iodine in control of pain, swelling, trismus, and alveolar osteitis after surgical removal of impacted mandibular third molar with statistically significant difference ($p < 0.01$). Kaizaro conducted a study 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.

The VAS score is one of the most commonly used tools to assess pain intensity and has been shown to be an effective and consistent method of assessing distinct pain as well as being a simple, subtle, reproducible, and universally accepted method of assessing pain. Pain was more in normal saline and povidone iodine groups than in the chlorhexidine group with a statistically significant difference. Mouth opening and trismus among our study population were comparable in the three groups; however alveolar osteitis differed significantly in metronidazole group.

Conclusion

To conclude, on comparing three irrigating solutions, metrogyl, chlorhexidine and povidone-iodine, following the impaction of mandibular third molar demonstrated good outcome for metrogyl irrigation. Large scale studies are further needed to evaluate the most efficacy irrigating solution during surgical removal of impacted lower wisdom tooth.

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