Comparison between the effect of using of lincomycine and normal saline as irrigations in outcome of surgical removal of impacted mandibular third molar.

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Abstract:

Surgical removal of impacted mandibular third molars is the most common surgical procedure in oral and maxillofacial surgery and it is often complicated by the trismus, swelling, pain, infection of the wound, and alveolar osteitis. The current research includes a close correlation between dental and oral surgery with dental panoramic tomography for each patient involved in the study. The objective of the study is to compare the effectiveness of normal saline alone with lincomycine in distilled water, as irrigating solutions on the (pain, swelling, trismus, alveolar osteitis, and infection) as complications after surgical removal of the impacted mandibular third molar. The total number of patients was: 42 patients, 22 male, (52.3%), and 20 female, (47.3%), and their ages were ranged between (21-29), these patient samples were divided into two groups: Group-A included 21 patients, 12 males and 9 females, Group- B included 21 patients, 10 were males and 11 females. All third molars of lower jaw affected in one side. These affected third molars were classified according to the winter classification. The site of the surgical operation was irrigated by lincomycine and normal saline to remove debris, foreign matter, and blood clots containing the bacteria. In this study the use of the topical antibiotic as irrigation instead of antiseptic solutions alone. The using of small amounts of antibiotic (lincomycin) were applied to reduce the incidence of complications of surgical extraction of wisdom tooth like alveolar osteitis.

Keywords: lincomycine, normal saline, irrigations, third molar

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Introduction

The steady flow of a solution across the surface of the open wound is considered as wound irrigation. The advantages of wound irrigation are: maintenance of wounding hydration, help in the visual examination and help in removing deeper ruins. The irrigation by the solution means the removal of the surface pathogens and cellular ruins that contained in residue from topically applied wound care products or wound exudates. In comparison to the bathing, or swabbing, the wound irrigation is considered the most consistent effective method for cleansing of the wounds (1).

Surgical removal of impacted mandibular third molars is the most common surgical procedure in oral and maxillofacial surgery, and it is often complicated by the trismus, swelling, pain, infection of the wound, and alveolar osteitis (2). The postoperative alveolar osteitis and infection are considered the most common complications that occur when the impacted third molars are surgically removed. Alveolar osteitis (dry socket) affects about (25 to 30%) of patients (3). Other complications included trismus, characterized by the obvious mouth opening difficulty, tenderness on the mandibular angle (anteromedial part), pharyngeal pain, difficulty in the swallowing and swelling (4,5).

The most common complication following surgical removal of mandibular third molar is the alveolar osteitis (AO), with a reported incidence of (1–37%) (6). The etiology of (AO) is not completely identified, but the blood clot destruction that result in the invading of oral bacteria is generally accepted as an important etiological factors (7). The tooth socket may become packed with debris and food remnants after destruction of the thrombus, which lead to further disturbed wounding heal (6, 8).

The using of irrigation solution that is used during the surgical removal of the impacted mandibular third molar does not only prevent injury to the bone but it also help in the improvement the vision of the surgeon. In the previous studies that was done on animals, it was shown that the bone, when is cut without using of water spray had importantly increase intensity of inflammatory exudates and cellular debris at the margins of the defect compared with those in irrigation, when viewed under light microscope (9). The commendation mentioned that normal saline is the best cleansing solution for the wounds of human body (10,11). On the other hand, there is another commendation mentioned that the using of normal saline and sterile water, as the irrigating solutions during surgical removal of impact wisdom tooth (12), both irrigations are sterile and have ability to reduce the heat that was generated during the surgical procedures, these irrigations can also keep or maintain the cleaning of surgical fields. Petrisur et al (2012) had confirm that normal saline is preferred than sterile water, because it is isotonic with physiological properties of human body, and therefore it is safer to the body (13).

The effectiveness of the topically use of antibiotics on the wound infection rate has been studied in traumatized patients and following surgical wounds in either clean or clean contaminated conditions. Lindsay et al found that the additional irrigation with penicillin-containing solution was superior (p < 0.001) to irrigations with saline alone (14). In different intraoral surgical procedure, the chlorhexidine has antiseptic effectiveness against bacteria, (10,15,16).
The objective of the study is to compare the effectiveness of normal saline alone and lincomycin with distilled water as irrigating solutions on pain, swelling, trismus, alveolar osteitis, and infection after surgical removal of the impacted mandibular third molar.

**Materials and methods**

The current study was done in the oral surgery clinic (College of Dentistry University of Karbala) and in the specialized dental health center in Karbala city, from the (1st) of March – 2018, to the end of April - 2019. This study includes the following procedures: initial screening, taking informed consent, surgical procedures to remove the impacted tooth and reviewing of patient on Day (1,3), and Day (7) after surgery. Dental panoramic tomography, was taken for every patient who participated in the study before surgical procedure for classification of impaction of the mandibular third molar in same concept of Winter’s classification.

**Classification of winter:**

The Winter’s classification is based on the inclination of the impacted third molar tooth to the long axis of the adjacent mandibular second molar.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mesioangular.</td>
<td>The tilting of the impacted tooth is in mesial direction toward the adjacent mandibular second molar.</td>
</tr>
<tr>
<td>Distoangular.</td>
<td>The long axis of the impacted mandibular third molar, is angled posteriorly or distally, to the adjacent mandibular second molar.</td>
</tr>
<tr>
<td>Horizontal.</td>
<td>The long axis of the impacted mandibular third molar in the horizontal direction.</td>
</tr>
<tr>
<td>Vertical.</td>
<td>The long axis; of the mandibular third molar, is in parallelism to the adjacent mandibular second molar.</td>
</tr>
<tr>
<td>Lingual, or buccalobliquity.</td>
<td>The wisdom tooth: is either tilted buccally, toward the cheek) or tilted lingually toward the tongue.</td>
</tr>
<tr>
<td>Transverse.</td>
<td>The impacted wisdom tooth: is in the horizontal direction, but it is either in lingual or buccal direction</td>
</tr>
<tr>
<td>Inverse.</td>
<td></td>
</tr>
</tbody>
</table>

The informed consent was prepared and signed by each patient participated in this study, that include the using of local anesthesia in the surgical removal of impacted (3rd) molar and using the irrigation solutions.

**The patient selection (study design):**

*The study included the patient, with following criteria:*

1. Patient with the negative past medical history, healthy patients, and without any systemic diseases.
2. Patients with the impacted mandibular (3rd) molars, indicated for surgical removal, (NICE, 2000).
3. No antibiotic, or anti-inflammatory medication were taken at (least 7 days) prior to surgery.
4. Patient who was able to give voluntarily consent.
Patients: were excluded from this study:-

1- Patients with history radiotherapy to the head and neck.
2- Patient who had organ transplant
3- Diabetic, pregnant, lactating mother, smokers, and patient on steroid treatment.
4- Patient with history of allergy to lincomycine.

The same surgical technique (procedure) for removal of mandibular third molar was done for all patient. The irrigating solution was delivered as continuous stream during the surgery for bone removal via low speed surgical hand piece.

Participant:-

The total number of the patient that participated in this study was 42 patients (22 male, 20 female), their ages were ranged from (21-29) years. These patients were divided into two group, group A: the irrigating solution was normal saline (only), the content of normal saline solution is: 0.9 of sodium chloride, (9g/L) of sodium chloride (NaCl), contains (154 mmoles/L) of sodium, and (154 mmoles/L) chloride, water for injection, and osmolarity(308 mOsmo/L). Group B: the irrigating solution was lincomycine(600 mg lincocinTM) sterile solution (2ml), each ml contain lincomycine hydrochloride (300 mg), benzylealchohol(9 mg), and water for injection was diluted in (100 ml) of distilled water; so each patient of this group, was tested for allergy of lincomycine, through taking history from patient; this is according to the case sheet prepared for this study, and by skin test for allergy of lincomycine. Written informed consents of both the study and surgery were taken from all the patients prior to surgery. Here all patients were treated with the same surgical procedures. Group A included 21 patients, (12 males and 9 females), group B included (10 males and 11 females).

Surgical procedure:-

The local anesthesia was used in surgical operation for removal of impacted mandibular third molar and under aseptic precaution. In all patients, we used local anesthesia with (2%) lidocaine and (1:80,000) adrenaline (Lignospan®, Septodont). The surgery of removing mandibular 3ed. molar tailed the standardized technique. A full thickness mucoperiosteal (L-shaped) flap was raised and bone removal was done with an stainless steel bur with the low speed surgical hand piece under abundant irrigation of (normal saline), and (lincomycine) diluted in distilled water, after completing the surgical procedure, the roughness of the socket is smoothed and irrigated with the same solution for each group, then the flaps were closed (with 3/0 Vicryl) absorbable suture. Group A: antibiotic was prescribed, oral antibiotic (Amoxiclav, 625mg), three times a day, oral analgesic (menefnamic acid 500mg), each 6-8 hrs, for 5 days. Group B: oral antibiotic, lincomycine cap. 500mg, twice daily begun in 24 hrs. postoperative day, with oral analgesic (menefnamic acid 500mg) each 6-8 hrs for 5 days.

The participated patients in this study were reviewed on (Day 1, Day 3 and Day 7), post operatively for complications that include swelling, pain, infection, dry socket, (alveolar ostitis), and delayed wound healing.
Pain measurement:-

The pain intensity that measured by using (Visual Analogue Scale) (VAS), (17). 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. Combined numerical and descriptive scale was used to measure the pain intensity.

Swelling measurement:

All clinical measurements is performed by a single examiner prior to surgery (baseline) and after (24 hours, 72 hours and, 7th day respectively) postoperatively. A 2-0 silk (suture) thread and a millimeter ruler are used to take the facial measurements. The pen was used as a permanent marker for markings the landmarks, before extraction of the mandibular 3ed molar, on the angle of the mandibular bone, the soft pogonion, and the outer corner of mouth and the tragus. The single value was calculated to every patient and making sum of three values : a\ distance (mm) between outer corner of the mouth and tragus, b\ distance (mm) between angle of the mandible and lateral corner of the eyes , and c\ distance (mm) between soft facial pogonion and tragus .

There were differences between the measurements that were taken postoperatively after; 24 hours, 72 hours and on 7th day and the value of baseline, was regarded as the swelling of that day. The increasing in the measurement in regarding preoperative and postoperative measurements, (2-4 mm) considered as mild swelling , (5-9 mm) considered as moderate swelling, and more than (9 mm) is considered severe or intense swelling.

Mouth opening measurement (presence of trismus):-

The measurement of mouth opening was done by using a millimeter ruler, which used to take the facial measurement. The markings with a permanent marker pen were made before the extraction of the mandibular 3ed molar on the tip of the nose and lower border of the chin at the midline which was considered as baseline measurements, and repeated it at day 1, day 3, and Day 7, and calculated the differences to detect of the presence of trismus. We can classify the patients according to decrease in the mouth opening that less than; (10 mm) and more than (10 mm).
**Infection measurement: either generalized or localized (alveolar ostietis or dry socket):**

The measurement of the infections were depend on the presence of the systemic effects after surgical procedures such as; fever, sore throat, or lymphadenopathy. The presence of empty socket after surgical removal of the mandibular 3ed molar and other signs or symptoms like fitted odor and severe pain.

**Wound healing:**

Delayed wound healing was judged by whether there was any wound dehiscence at the time of suture removal, which was done at seven days after the surgery.

**Results**

The total number of the patients that included in this study was 42 patients, 22 males (52.3%) and 20 females (47.3%), ages of them were range from (21-29) years the main age was 22.8 (youngest was 21 years and oldest was 29 years). These samples of patients was divided into two groups: group-A included 21 patients, 12 males and 9 females, group-B included also 21 patients, 10 males and 11 females. All impacted mandibular 3ed molar where in one side, one impacted wisdom tooth was surgically removed for each patient. About 16 patients requested the removal of mandibular 3ed molar because of recurrent pericoronitis, 8 patients because they were partially erupted and carious teeth, 18 patient for the requirements of orthodontic treatments.

The total number of impacted teeth that surgically were removed are 42 teeth, 18 (42.8%) teeth are totally impacted and 24 (57.2%) teeth were partially erupted, these impacted mandibular 3ed molars were classified according to Winter classification, 23 (54.7%) cases were mesioangular, 8 (19.2%) cases were horizontal, 6 (14.2%) cases were vertical, and 5 (11.9%) cases were distoangular. As shown in table (3-1)

<table>
<thead>
<tr>
<th>Impaction Types</th>
<th>Number.</th>
<th>Percentage.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-Mesioangular.</td>
<td>23</td>
<td>54.7%</td>
</tr>
<tr>
<td>2-Distoangular.</td>
<td>5</td>
<td>11.9%</td>
</tr>
<tr>
<td>3-Horizontal.</td>
<td>8</td>
<td>19.2%</td>
</tr>
<tr>
<td>4-Vertical.</td>
<td>6</td>
<td>14.2%</td>
</tr>
<tr>
<td>5-Lingual buccal obliquity.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6-Transverse.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>7-Inverse.</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Table (3-1)

In the group A, 6 patients presented with severe swelling in comparison with the group B, 3 patients presented with severe swelling. Only one patient presented with mild edema in day seven of surgery in group A. As shown in table (3-2).
In the measurement of pain, 6 patients presented with severe pain at day 1 of surgery in group-B, while 4 patients in group-A presented with severe pain at the same day of surgery. In the day 7 of surgery 2 patients of group-A presented with moderate pain, and 1 patient of group-B give the description of moderate pain at the same day of surgery. As shown in table (3-3)

Table (3-2) \(\text{Chisq} = 108.11, \text{p}<0.001\)

<table>
<thead>
<tr>
<th>Day</th>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
<td>Mild (2-4mm)</td>
</tr>
<tr>
<td>Day 1</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Day 3</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Day 7</td>
<td>20</td>
<td>1</td>
</tr>
</tbody>
</table>

In the relation to the systemic infection and presence of alveolar ostitis or wounding dehiscence, we found in group-A, 1 patient with the fever (systemic infection) in day 1. Dry socket (acute alveolitis)
or alveolar osteitis; in group A, 4 patients presented with this clinical condition at day 3, and 3 patients presented at day 7 of surgery; also in group A, 2 patients presented with wounding dehiscence at day 7, while in group-B, only 1 patient presented with history of dry socket (acute alveolitis). As shown in table (3-4).

Trismus or limitation mouth opening, 5 patients in group-A presented with normal opening of mouth, and 6 patients in the group-B presented with normal mouth opening in day 1. In day 7 only 1 patient in group-A presented with limitation mouth opening less than (10 mm), while all patients in group-B presented with normal opening. As shown in table (3-5).

<table>
<thead>
<tr>
<th>Day</th>
<th>Systemic infection, dry socket and wound dehiscence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group A</td>
</tr>
<tr>
<td></td>
<td>Systemic infection</td>
</tr>
<tr>
<td>Day 1</td>
<td>1 (fever)</td>
</tr>
<tr>
<td>Day 3</td>
<td>-</td>
</tr>
<tr>
<td>Day 7</td>
<td>-</td>
</tr>
</tbody>
</table>

Table (3-4)

<table>
<thead>
<tr>
<th>Day</th>
<th>Measurement of limitation mouth opening (Trismus)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group A</td>
</tr>
<tr>
<td></td>
<td>Normal mouth opening</td>
</tr>
<tr>
<td>Day 1</td>
<td>5</td>
</tr>
<tr>
<td>Day 3</td>
<td>10</td>
</tr>
<tr>
<td>Day 7</td>
<td>20</td>
</tr>
</tbody>
</table>

Table (3-5) \( \text{Chisq}=46.07, p<0.001 \)
Discussion

The antimicrobial agents sometimes are used locally at the site of minor or major surgical procedures, which help in the prevention of surgical site infection. Although the irrigation with normal saline succeeded in removing foreign material, blood clots which often contain bacteria and debris from a surgical wound, it does not suffice to eliminate contamination with bacteria or bacterial contamination. For this purpose, the wounds have been instilled directly with antibiotics, or used as irrigation solution. The antibiotics were used topically instead of antiseptic solutions, which had the advantages of avoiding tissue destruction that caused by processes of antiseptic (18). In current study, we found in group-A, patients whom their surgical field was irrigated with the normal saline, there were 4 patients presented, with history of acute alveolitis in day 3, (P…), and 1 patient with history of systemic infection in day 1, while only 1 patient with history of acute alveolitis that presented in the day 7 from all patient participated in group-B in current study, whom surgical field, after removal of impacted 3ed molar was irrigated with; lincomycine. A small amounts of antibiotics used topically, like lincomycin or tetracycline, decrease the incidence of alveolar osteitis. A topical antibiotics such as; metronidazole, may hasten resolution of the alveolar osteitis (dry socket) (19).

The topical antibiotics effect on the wounds infection rate, has been studied in traumatized patients, and after surgical wounds in either clean, or clean contaminated wounds. Lindsey et al., found that additional irrigation solution with penicillin, which superior (p<0.001), to irrigation with saline alone and respect to the prevention of infection, as an estimated by a single observer, in a control, double blind trial of (260) lacerations, that required suturing(20). The topical use of antibiotic may be beneficial after clean surgical procedure in oncological surgery was reported by (Bozetti et al.) (21).

The application of minocyclin; [10 mg, in bioresorbable poly (D, L – lactide – co – glycolide)lactide sustained-release microspheres], topically (endoalveolar) after third molars extraction, the risks of postoperative infection were significantly reduced (22). The surgical removal of impacted lower 3ed molars; is considered one of the most common procedure in maxillofacial surgery. Which result in production of a range of characteristic symptoms including swelling and pain, which result from of histological damages, and the organism’s natural repair mechanisms (23,24,25). The main symptom after surgery of impacted 3ed molar, is post-operative pain, but its depend on the individual perception, the pain sensation being subject to both psychic and somatic components. As it is difficult to objectify a sensation, no uniform criteria exist for collecting data for the pain, because of pain measurement is always subjective (26).

In the current study we used visual analogue scale, combined numerical, and descriptive scale was used to measure the pain intensity. The results of this study showing in group-A only 1 patient presented in day 1 without pain, while all patients in group-B presented in day 1 with different level of pain severity, 6 patients in group-B presented with history of severe pain in day one while 4 patients with severe pains in group A presented in day 1 (p<0.001), all patients in group-A that presented with
severe pain, their wisdom tooth impaction were horizontal (4 cases), and distoangular (cases), that their surgical procedure need more time, and long incision or flap.

The incision extension, as well as length of surgery and tissue manipulation, could affect the swelling entity. In relation to previously published data, a smaller incision has significant effect in lowering postoperative pain and swelling (27,28,29). The most habitual consequences of third molar extraction is swelling (30).

The surgical trauma in the oral cavity, always result in the injury of tissue which characterized by vasodilatation, increased capillary permeability, with accumulation of liquids in the interstitial space, and monocyte and granulocyte migration (31,32), because of the increasing in osmotic pressure in capillaries (Starling law).

The expression of exudates, or transudation is defined by edema, and in surgery, the both events probably occur (33, 34).

After third molar surgery, the postsurgical edema; is an expected complication, trauma and response of tissue to the manipulation during surgery can also cause postsurgical edema. The onset of the post surgical edema is gradually, and maximum of the swelling is reached during (48 hrs.) following surgery (35). The swelling regression; is expected by the fourth day, and in seven days completely resolution occurs for post-surgical edema (36). Only 1 patient in this study presented with very mild edema, at day seven of follow up. A good control of postoperative swelling resulted from the topical application of covomicyn D in a study carried out in the same patients treated for surgical removal of the impacted third molars (with or without) antibiotic therapy (37). A positive results were obtained on postoperative swelling when covomicyn D, and minocyclin have been administered topically and endoalveolarly (37,38).

In this study, and during the follow up of the patients in (day 1 and day 3), we found that, in group-A their were 4 patients with mild edema, and 9 patients in group-B with mild edema in day 1, severe edema was reported in 6 patients, and in three patients in (group-A and group-B), respectively (p < 0.001), 3 patients with history of severe edema in group-A remained with the same history at day 3 of follow up, while no patient with sever edema in group-B presented at day 3.

In relation to the trismus, we found 5 patients in group-A with severe limitation mouth opening (>10 mm), difference in mouth opening before and after surgery, while 3 patients in group-B presented with same condition, (p< 0.001).

**Conclusion**

Irrigation of surgical site after removal of the impacted mandibular third molar by lincomycine as topical antibiotic was significant in reduction of dry socket (acute alveolitis), swelling and limitation mouth opening (trismus), while the effect of irrigation of normal saline was significant in reduction of pain.

**References**


