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THIRD MOLAR SOCKET IRRIGATION FOR PREVENTION OF POST EXTRACTION COMPLICATION - WHICH AGENT IS BEST?

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ABSTRACT

Third molar surgery or surgical removal of the impacted maxillary or mandibular third molar is one of the most common dental surgical procedures performed in oral and maxillofacial surgery. The incidence of postoperative complications is more with third molar surgery when compared to normal extraction and thus, procedural induced and post extraction infections creates complex and difficult scenarios. Post extraction complications following third molar surgery include pain, swelling and alveolar osteitis can impact significantly on the quality of life. Irrigating agents are often found to reduce post extraction infections and complications. The most common irrigating agents used today include products containing iodophors or chlorhexidine gluconate. The aim of this review is to enumerate various irrigating agents that reduce postoperative complications with an assessment of currently available irrigating agents and their applications to oral and maxillofacial surgery.

Keywords: Third molar surgery, irrigating agents, chlorhexidine, povidone iodine, normal saline

INTRODUCTION

Third molar surgery is considered as one the most common dental procedures performed in oral and maxillofacial surgery **[1]**. Failure in the eruption of the third molar is the most common cause for its removal **[2, 3]**. Post-operative pain **[4–6]**, swelling and trismus are the most common complications after third molar surgery **[7–11]**. Alveolar osteitis which usually starts 2-3days following tooth removal is another complication experienced following tooth extraction **[12–14]**.

In normal healing, post-operative complications like swelling and pain usually subsides within 2 or 3 days after extraction. Inflammatory phase, proliferative phase and remodeling phase are the three interrelated phases of wound healing **[15]**. Presence of wound debris can impede the healing process and thus wound irrigation plays an important role in facilitating the healing process **[16]**. Surgical wound lavage is the steady flow of irrigating solution across the wound surface to remove wound debris and surface pathogens present in wound exudates **[17–19]**. Wound irrigation also aids in better visual examination of the tooth socket and is considered as an effective method of wound Cleansing **[20]**.

Thus, ideal requirements of an irrigating agent are,

1. Act as a coolant to reduce the heat generated during bone guttering by the rotary bur
2. Provide better visualization, by douching the surgical site during bone guttering
3. Cleaning the remnant wound debris or the remnant infectious particle from the surgical site

An irrigating agent should possess the following characteristics such as biocompatibility to tissues, economical ease of use and ability to reduce bacterial contamination in wounds. There are various studies that compared different irrigating agents for surgical wound lavage in various surgical fields **[21–26]**.

Wound irrigation is usually accomplished by conventional hand syringe and mechanical pulsed type lavage instrument **[27]**. Sweet J B et al found no statistically significant difference between the use of mechanical irrigator and conventional hand syringe, except that sterilization procedure which was more difficult with mechanical irrigator (gas sterilization) than conventional syringe which is disposable.

This article focuses on irrigating agents that reduces postoperative complications with an assessment of currently available irrigating agents and their applications to oral and maxillofacial surgery.

HISTORY

In general surgery, Chlorinated lime, soda, potash solutions (eusol) was routinely used in wound debridement until early 1980's for chronic ulcers. Then in the late 1980's eusol solution because of its disadvantages, fell out of use **[20, 28, 29]**. As a result, normal saline came into use as a cleanser in chronic wounds in various parts of the body **[30, 31]** and also in the oral cavity. However, the incidence of postoperative complications have been drastitically reduced following the adoption of advanced antiseptic techniques, sterilization of instruments, sterile patient preparation, use of personal protective equipment including sterile Surgical scrubs and gloves and use of effective irrigating solutions following third molar surgery **[32]**.

KEY CONSIDERATIONS IN SELECTING AN IRRIGATING AGENT

Wound debridement follows the wound irrigation. The most commonly used irrigating solutions used in third molar surgery are normal saline, chlorhexidine and betadine solution. There are also studies where normal tap water **[21]**, distilled water, cold saline **[33]** being used as an irrigating agent.

Choosing the right irrigating solution plays an important role in surgical wound lavage. An irrigating solution that possesses all viable characteristics is yet to be discovered. Some of the most commonly used aqueous based irrigating solutions with its characteristics are listed in **Table 1**.

Table 1: Characteristics of Irrigating Agents

Irrigating Agent	Mechanism of Action	Concentration used	Effect	Onset of Action
Betadine	**Damage DNA**	**0.02%**	**Effective against gram-positive and gram-negative bacteria, virus and fungi.Good effect against mycobacterium tuberculosis**	**Intermediate in action**
Chlorhexidine Gluconate	**Disrupts cell membrane**	**0.5%**	**Effective against gram-positive and gram-negative bacteria, virus and fungi.Poor effect against mycobacterium tuberculosis**	**Intermediate in action**
Normal Saline (NaCl)	**Physical action (Cold or Normal temperature)**	**0.9%**	**Reduces heat generated and clears surgical field. No antimicrobial action**	**Immediate in action**
Sterile Water	**Physical action**	**-**	**Reduces heat generated and clears surgical field. No antimicrobial action**	**Immediate in action**

NORMAL SALINE

Normal saline is an isotonic solution that is most commonly used in wound lavage **[34–36]** due to its low toxic physiological properties to human body **[31]** and it not only prevents injury to bone by reducing the heat generated during bone removal but also improves vision of the dentist by irrigating the working field in their molar surgery **[37]**. A disadvantage is that it does not possess any antimicrobial characteristics and acts only as a flushing solution. There are incidences of bacterial growth in saline within 24 hours of opening the saline container therefore, it is important to note the date of opening of the container.

STERILE WATER

It is a hypotonic solution which is prepared by distillation and it does not possess antimicrobial properties. Since it is a hypotonic solution it's readily absorbed by tissues which results in hemolysis and water toxicity when excess volumes are used. In a study conducted by Koerner in 1994, emphasized that both sterile water and normal saline reduce the heat generated during third molar surgery and also keep the surgical site clean **[38]**.

BETADINE SOLUTION

Betadine irrigating solution possess broad spectrum anti-microbial activity and is effective against various pathogenic microorganisms including *staphylococcus aureus*. Cytotoxic properties to healthy cells and granulation tissue, discoloration of skin on drying, local irritation are some of the disadvantages of this solution. Yaghmaee M *et al* found no statistical difference between normal saline and betadine solution on considering swelling, intensity of pain and alveolar osteitis **[25]**.

CHLORHEXIDINE

Chlorhexidine, a known antiseptic is found to be safe and effective in various intra oral procedures as it possesses bactericidal property **[24, 39, 40]**. It is effective against both gram positive and gram-negative bacteria and is also a biocide against fungal organisms. Presence of body fluids such as blood and saliva does not affect its mechanism of action. It acts by disrupting the cell membrane of the microorganism and it possesses the effect of substantivity for over 48 hours which allows longer duration of action of this antimicrobial agent **[41]**. Chong *et al*, within the limitations of his study found no statistically significant difference between normal saline, sterile water and chlorhexidine gluconate irrigating solutions **[37]**. In a study concluded by shah Urvi *et al*, 0.02% chlorhexidine was found to be more effective in postoperative pain control and alveolar

osteitis than 0.5% povidone iodine solution following third molar surgery but the amount of swelling did not differ between the two irrigating solutions **[42]**.

In addition to an efficacy analysis, ease of use, cost effectiveness, and user satisfaction are important considerations when choosing an irrigating agent. However, reduction in cost should not jeopardize the quality of life and patient's health status. Significant expenditure is the main drawback of chlorhexidine not being used as an irrigating agent on a regular basis. Review of literature reveals that the use of antiseptic solutions as an irrigating agent might compromise the healing process of wound **[35, 43, 44]** and this could be an another reason why chlorhexidine is not in use as an irrigating solution.

BEST IRRIGATING AGENT AVAILABLE FOR SURGICAL REMOVAL OF THIRD MOLARS

There are various irrigating agents available for lavage during surgical removal of third molars as discussed in this article but lack of sufficient evidence in literature has led us to an inconclusive state in determining the best irrigating agent among others. It is prudent to consider that based on the facts and evidence provided from literature it is upon the surgeon to determine the better choice of irrigant considering its positives and negatives along with the individual's comfort to make a preference on the best irrigant.

CONCLUSION

The goal of using an effective irrigating solution is to reduce the incidence of post extraction complications in a safe, cost effective and user-friendly manner. Because oral and maxillofacial surgeons routinely perform third molar surgery, a Standard irrigating agent is unlikely to be uniformly optimal. Though normal saline is considered as the gold standard irrigating agent during third molar surgical procedures, more such research studies are required with larger groups to evaluate the efficacy of other irrigating solutions in order to reduce the postoperative morbidity.

CONFLICTS OF INTEREST

The authors have no conflicts of interest

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