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REVIEW ARTICLE

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A Review on Primary versus Secondary Closure Techniques for Prevention of Post-Operative Complications after Third Molar Surgery

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ABSTRACT

The aim of our review is to evaluate the consequence of primary and secondary closure techniques for preventing complications following surgical removal of third molar as there is lack of review articles on which closure techniques are effective in reducing complications in patients undergoing third molar surgery.The literature was searched from the year of 1960 to 2017 studies in order to understand the effect of these closure techniques in third molar surgery in earlier to latest. The Data Bases of PubMed, Cochrane and Google scholar were searched for similar topics along with a complimentary manual search of all oral surgery journals.Among the articles collected relevant to our topic we noticed that majority of the authors revealed the secondary closure is effective one than the primary closure for complications preventions post-operatively in third molar surgery.Many of the surgeries in the third molar are done without more severe complications. Anyhow, there may be some severe complications to the patient such as swelling, dysphagia, alveolar osteitis, infection, periodontal pocketing postoperative pain, trismus, bleeding, nerve injury, and delayed healing. Generally, they are considered as short-term consequences of the surgery in the third molar; at the same time, they are supposed to cause damage to job disruption and quality of life. Tissue damage and inflammatory response are rare but serious complications associated with a number of dental procedures. In context to the closure techniques affecting the patient's day to day activities postoperatively the review findings show the secondary closure techniques have less post-operative pain complications among patients reporting for surgical removal of impacted third molar.

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INTRODUCTION

The lower wisdom tooth removal is the most frequent intervention in maxillofacial surgery [1] many of the surgeries in the third molar are done without more severe complications. Anyhow, there may be some severe complications to the patient such as swelling, dysphagia,[2] alveolar osteitis, infection, periodontal pocketing,[3,4] postoperative pain, trismus, bleeding, nerve injury, and delayed healing. Generally, they are considered as short-term consequences of the surgery in the third molar; at the same time, they are supposed to cause damage to job disruption and quality of life. Tissue damage and inflammatory response are rare but serious complications associated with a number of dental procedures.[5,6]

The frequency with which third molar extraction is performed leads inevitably to an increased risk of damage to nerve structures.[5] Acute edema and postoperative pain can occur as a result of surgical procedure particularly the inflammatory process is an early and immediate reaction to injury.[7,8] Some

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other causes are patient's gender and age, oral hygiene, administration of postoperative or preoperative medications, patients willingness to follow postoperative instructions, the presence of earlier periapical or periodontal pathology.[7,9] and structural and functional elements like surgery duration, osteotomy magnitude and surgical difficulty [10]. The rate of complication for extraction of the third molar may vary within 2.6 and 30.9 %.[11]

Different strategies have been adopted by the surgeons to lower this complication rate. The basic surgical principle lies in the closure of the surgical defect promoting primary healing of the socket, in this technique the socket is closed and secured by a soft tissue flap. Some investigators suggested that the postoperative infection risk can be decreased by this method.[12,13] The secondary closure or secondary intention technique means the process of a wound healing to produce scar tissue, from the tissue base to the upper face. In secondary healing, the socket is allowed to be open to the oral cavity [14,15] also the investigators suggested that this approach reduces pain and swelling to a significant extent in the postoperative period by allowing inflammatory exudates to drain. Several randomized controlled trials (RCTs) have been conducted by the investigators to ascertain which of the technique is related to small and less complex postoperative addendum. Therefore, the focus of our paper is to review the impact of primary and secondary closure techniques to prevent the postoperative complications after the surgery of the third molar.

METHADOLOGY

The review paper collects the relevant articles as related to primary and secondary closure techniques for the reducing the postoperative complications following wisdom molar impaction from 1960 to 2017. The reason for choosing these years is to understand is there any variations in the findings of researchers from earlier to latest in terms of the effect of primary and secondary closure techniques. Therefore, the study fixed some criteria to include the relevant papers in the same concept, the study excluded the unpublished research papers and the included only published research articles that discuss the effect of primary and secondary closure techniques for the prevention of post-operative complications like pain, difficulty in mouth opening, and facial edema among wisdom molar surgery patients.

LITERATURE REVIEW

Primary exhibitors of patient's inconvenience after the third molar surgery, in general, are trismus, the severity of pain and the swelling. Affected third molar surgery is a standout amongst the most incessant systems in oral and maxillofacial surgery which can prompt quick and post-agent inconvenience.[16,17] After the surgery of third molar, swelling, trismus and pain are leading sequelae and prompt a temporary utilitarian change in the rumination work.[18-20] Trismus was estimated after impacted third molar extraction in centimetres.[21] Different modalities are to be kept in mind to minimize post-operative sequelae. Restorative modalities incorporate organization of anti-infection agents like Non-Steroidal Anti-Inflammatory Drugs (NSAIDs), sub-mucosal injections of dexamethasone and triamcinolone,[22] amoxicillin-clavulanic corrosive 2000mg/125mg[23] steroids[24] and compounds. Different modalities incorporate utilization of suture methods that prompt an essential secondary closure[25] or primary intentional healing[19,20] beside it is accounted that the post-operative uneasiness can be reduced by applying drain in the impacted third molar surgery. Use of drains in the socket following tooth removal doesn't result in improving the healing time but to some extent it helps to reduce the body fluid located between the tissue spaces.[17]

Seymour.[26] Expressed that there will be more serious pain during the post-operative period, later then reduction happens progressively. Cerqueira.[15] and Saglam AA[26] whereas Brabander and Cattaneo [27]marked no noteworthy differences in swelling of two groups.

Several types of research have been performed regarding post-operative assessment, surgical technique and antibiotic theory to assess wound healing and patient comfort, though there is no clear opinion about third molar surgery till now. To evaluate the post-operative complications reliefs, many anti-bacterial and analgesic drugs are being used following wisdom molar surgery.[28-34] Though one such confusion with respect to third molar surgery is various opinions with respect to wound closure technique. Hence, the objective of this research was an evaluation of the adverse effects on closure techniques.

For many years, there exist several diverse opinions about the advantages and disadvantages of primary closure in contrast with secondary closure method. Some authors compared cones [35] or drains[27,36] impregnated with antibiotic within the third molar socket and found that most author feel there was a significant decrease in postoperative discomfort in the medication impregnated group. The authors concluded that the discomfort following surgery may be based on the closure techniques used.[14,27,37] Most of the clinicians allowed the socket to heal by secondary intention. The severity of pain and swelling extent causing incapability to work temporarily are the reasons for the increase of total expenditure after third molar surgery by

25%.[38,39] Other than economic cases, removal of the third molar causes the prevalence or incidence of a disease acquainted with swelling, pain, and trismus which may be more severe to intrude with day to day activities. Minimizing or reducing the abnormal condition resulting due to the surgical procedure of the third molar is the most important aim for any surgeon.[32] However, the intensity of pain would be higher during the surgery but later on, it will decrease subsequently. It is stated that open healing by secondary closure of surgical wound after surgery produces reduced post-operative pain and swelling that occurs with close healing.[14,27]

Researchers like Bourgoyne,[40] Blair and Ivy,[41] Mead,[42] and Padget[43] have proposed that primary healing prevents drainage; further, these researchers evaluated the primary closure have an higher incidence of complications postoperatively in pain severity , extent of swelling in the face, trismus than secondary closure. It is now generally accepted by many researchers that closure by secondary intention appears to reduce the complications post thereby improving patients comfort. Thus the patients under secondary closure technique are managed more easily than the patients with primary closure.

Earlier researchers performed by Danda.[7] Pasqualini.[14] Chukwuneke.[36], Rakprasitkul and Pairuchvej[16] and Bielsa.[44] while Dubois.[37] Holland and Hindle [45] and Cerqueira.[15] Declared that serious swelling will occur in Primary healing only during immediate post-operative period.

Ordulu.[46] compared the effects of methylprednisolone (MP single dose) and tube drainage for facial swelling, pain and maximal mouth opening was compared in wisdom tooth removal. Limitation of mouth opening is one of the common problems which occur following the surgery; this could be related to the inflammation of masticatory muscles. Therefore the patients were assessed for swelling, pain and maximal mouth opening at the pre-operative time and immediately after the surgery of 2nd, 5th, and 7th days. No statistical significant difference was observed in pain and facial swelling of both drain group and MP group, but statistically, asubstantial difference was found in mouth opening at the time of fifth and seventh days.

But, Zandi[47] noticed no difference at all in postoperative swelling after applying tube drain while comparing primary closure. Though Nanjappa.[48] noted the increased swelling during the time of primary healing after post-operative days, actually, it was not significant statistically.

Majority of the researchers have also pointed out the pain complications are more in patients to whom closure is done primarily than the secondary closure patients Those researchers further estimated the morbidity conditions of the selected patients [7,14,37,45,49–52] The consistent results were noticed as the primary closure group of patients has experienced relatively more pain than other group; however, there is no significance in results was noticed. Contrarily, Bello.[53] noted that heavy pain in the group of partial closure than the overall closure, but there is no statistical evidence.

On the other hand, in secondary closure technique, symptoms post operatively were comparatively less than the primary closure. The mucosa flap is used in primary healing technique whereas the extracted socket is in left open to the oral cavity in secondary healing.[14] Authors like Howe, Guralnick, thoma, Kay, Archer, Kruger and Killey preferred the primary closure technique.[37] Contradictorily, some others like Blair, Padgett, Mead, Bourgoyne and Ivy support the secondary closure to heal the wounds.[37] Also, Clark and Winter suggest that the any of the two methods can be used to treat the wounds. The surgical drain use is also suggested.[27,36] Woodward proposed the use of a small opening behind the second molar to facilitate post-operative drainage of the fluid from the surgical wound.[37] The use of visual analogue scale (VAS) was proposed by Henrikson.(54) to assess the post-operative swelling, pain and trismus after the removal of impacted lower third molar in their research to get a detailed idea of which one of the closure techniques is effective, however, there is no clear view obtained.

Some researchers stated different perceptions but noticed the same finding. For example,

Dubois[37] removed bilaterally the impacted mandibular third molars in a single visit. The closure was mostly on the left-side, on the right-side small part of mucosa distal to the second molar was removed and the flap was mobilized and reapproximated leaving the socket exposed for secondary closure. The secondary healing approach was used immediately after the surgery to reduce the pain and swelling of patients and to lessen the discomfort of patients.

Holland and Hindle[45] revealed that swelling and pain after the surgery were marked incomplete closure than in the open healing. They also found that closed socket had broken down within a week and healed by secondary intention. Also, the wound will get better soon after the surgery in closed healing.

Brabander and Cattaneo[27] estimated the two types of surgical wound closure posterior to third molar surgery effected in the mucosa. Patients are classified as the test group and control groups. To allow the socket to heal by secondary healing a small part of the soft tissue was removed for the test group and vaselined gauze an opening maintained better results in swelling and less pain in the post-operative time. They use the exact surgery

procedure for the control group except for drainage. The secondary healing method was preferred by many authors because it reduces swelling and pain after surgery, but the characteristics of vaselined gauze drain were not included.

Ayad[55] carried out the surgical study on mandibular third molar tooth removal of with and without rubber drainage (Naturallatex). The study compared closure techniques primary and secondary closure. The findings of the research concluded that the technique of secondary closure was effective than primary closure technique and the patients are more comfortable in secondary closure technique.

Rakprasitkul and Pairuchvej[16] made a comparison of primary healing with that of primary healing affiliated with small drainage tube insertion. Not much difference was found with respect to the intensity of pain among both the groups; on the other hand, theswelling was considerably less among the patients with drainage tubes inserted. The decrease in mouth opening and less bleeding was noted in the patients with drainage tube.

Saglam [15] equated test side (primary closure, 72 h drainage and surgical extraction) with that of control side (only primary closure and surgical extraction) through a split-mouth study design a popular design in health research. He concluded in the group were tube drain was used, there was a significant decrease in swelling when compared to the group were tube drain was not used. However, there was no significant difference in pain and mouth opening.

Pasqualini [14] performed a research with 200 patients (78 men and 122 women in the age group of 19 to 27 years). Their bone of the third molar is impacted partially or totally, also Class C patients with amesial inclination of impacted third molar are involved in this series. The study results showed that pain, swelling and trismus are significantly less in secondary closure group, so there will be only less inconvenience in secondary closure group of patients.

Perhaps the English dentist, Hunter[56] stated that closing the gum after surgery is a common practice, the socket was closed by hermetically suturing the flap; closure of gum is not made as the first intention.

Carrasco-Labra.[57] carried out the meta-analytic study to prove the effect of primary and secondary wound closure. The study considered 14 studies of comparison of two closure types and proved that there is a statistically significant difference in post-operative outcomes between primary and secondary wound closure.

Soodan[58] assessed 40 patients for the tube drain impact in association with the factors such as trismus, pain and swelling after the impacted third molar surgery. The minor contrasts in pain were observed among both the groups after the surgery on third and seventh days, but no statistically significant differences were noted. The facial swelling was severe in the control group patients (without the tube drain) during the 3rd and 7th day after surgery, but it is less among the experimental group patients employ tube drain. Also, the swelling of two groups vanished totally in 15 days. Everyone came back to the status of pre-surgery 15 days after surgery. On the day 1 after surgery using tube drain, the intrinsic opening was less on tube drain but increase during 3rd and 7th days and becomes normal on the 15th day. Anyhow, there were no statistically significant differences among both groups.

Kumar.[59] Made a comparison of post-operative conditions after the impacted mandibular third molar surgery using tube drain or without using it amongst thirty patients. The swelling, trismus and pain were assessed after the surgery of 24 hours, 72 hours, 7 days and 15 days. Analysis such as t-test and chi-square were used among the groups. Swelling among the test group patients was lesser when compared to the control group. At the 3rd and 7th day after surgery, a statistically significant difference ($p \leq 0.05$) was found in both the groups. Trismus and pain variables have no significant variations among the patients of both groups.

Anighoro[60] compared of partial and complete wound closures and postoperative disorders after the removal of impacted third molar surgery was performed among 120 patients. Depending upon the wound closure following the third molar surgery, patients were arbitrarily categorized into 2 groups. In group 1 patients, the mucosal flap completely closes the extraction sockets after the extraction of a tooth (complete wound closure, n1=60) whereas in group 2 patients, sockets are partially closed after the tooth removal (partial wound closure, n2= 60). The pain will be more immediately after the tooth extraction but the intensity will be reduced later in both the groups. In group 2 patients, the perceptions of pain were quite lower on the first and third day compared to group 1 patients but no statistically significant difference was found on day seven. The correspondence between two groups was noted, only a significant difference on day 7 between the two groups was revealed. On the third day after surgery, the swelling was maximum in both the groups. Overall review of both groups was performed by comparing the mean facial width.

Cerqueira [15] assessed the influence of tube drain amongst 53 patients in the surgery of impacted third molar. The use of drain helps to control swelling but not significant for pain and trismus. In this study, patients were categorized into experimental (with tube drain) and control groups

(no drain). Trismus, swelling and pain were assessed after the surgery of 24 hrs, 72 hrs, 7 days and 15 days. The drain was used for the patients in control group whereas the variable swelling was significant when compared with the experimental group (P<.001) after 24 and 72 hrs. Anyhow, trismus and pain have no significance at the period of evaluation.

Obimakinde [61] conducted a detailed clinical study regarding the patients who performed mandibular third molar surgery between January 2010 and December 2011. Patient's demography involving a third molar spatial relationship, surgical indications and the pain before and after surgery were analysed. The patient's demography exhibited their age 19-56 years (mean age = 27.67±7.19) and the ratio of male to female is 1:1.15. Pericoronitis was the most general surgical indication and the predominant impaction of our series was the mesio-angular variety (46.5%, N=40). Paired t-test exhibited the significant mean difference of pain before and after the surgery of the third molar between two groups (p=0.00 for the pre-operative pain & 0.01 for the post-operative pain). Post-operative infection was found among 14% patients.

CONCLUSIONS

The study concludes that secondary closure technique is superior to primary closure technique for surgical removal of an impacted wisdom tooth with respect to postoperative complications. The following findings were noted in this review article, The chief finding of the research was secondary closure technique was effective among patients who underwent third molar surgery than primary closure. This was in line with various research findings Brabander and Cattaneo [27]; Rakprasitkul and Pairuchvej,[16] Ayad.[55]

There are numerous researchers have carried out the research in analyzing the difference in primary vs secondary closure in pain complications of third molar surgery, however, those studies were prospective randomized trial studies or meta-analytic or systematic review studies Carrasco-Labra.[57]

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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