

A Review of Wound Closure Technique-Patient Morbidity Relationship After Wisdom Tooth Surgery

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ABSTRACT

Background: Surgical removal of impacted mandibular third molars is associated with various postoperative complications like pain, swelling and trismus. These complications influence the patients' quality of life in the week following surgery. Many surgical interventions had been attempted to limit these complications, among them is the wound closure techniques. This study carry out a literature review to evaluate the impact of these techniques on patient morbidity following LM3 surgery.

Materials and method: The MEDLINE and PubMed database was searched for the related studies. Twenty-one randomized prospective clinical trials, that measure part or all of the immediate outcomes, were included.

Results: Twenty-one randomized prospective clinical trials were evaluated. They described the partial wound closure modalities, including single suture technique, the excision of mucosa immediately distal to the second molar, the placement of drain, and a "sutureless" technique.

Conclusion: The role of wound closure techniques on immediate postoperative sequelae revealed a varied opinion among researchers.

KEYWORDS:

Wisdom tooth surgery, wound closure, pain, swelling, and trismus.

المستخلص

الهدف من الدراسة: القلع الجراحي للأرحاء السفلية الثالثة المطمورة يرتبط بمضاعفات ما بعد الجراحة مثل الألم والتورم ووضرر نوعية حياة المرضى في الأسبوع التالي للعملية جراحية. وقد حاولت العديد من المداخلات الجراحية للحد من هذه المضاعفات، من بينها تقانة إغلاق الجرح. هذه الدراسة تشمل مراجعة للبحوث ذات الصلة لتقييم تأثير هذه التقانات على إعتلال المرضى بعد الجراحة المذكورة اعلاه.

المواد والأسلوب: تم تفتيش قاعدة بيانات MEDLINE و PubMed للدراسات ذات الصلة، أدرجت واحد وعشرين تجربة سريرية عشوائية والتي تعنى ببعض أو كل مضاعفات ما بعد الجراحة.

النتائج: تم تقييم واحد وعشرون من التجارب السريرية العشوائية والتي درست عدة طرائق إغلاق جزئية للجروح، بما في ذلك تقانة الخياطة الواحدة، واستئصال الغشاء المخاطي بعد الأرحاء الثانية، ووضع هجرة، وتقنية «انعدام الغرز».

الخلاصة: دور تقانات إغلاق الجروح على المضاعفات المباشرة ما بعد الجراحة كشفت عن وجود رأي متنوع بين الباحثين.

INTRODUCTION

The removal of impacted mandibular third molars (LM3) is the most performed procedure in oral and maxillofacial surgical practices⁽¹⁾. It involves trauma to the soft and hard tissues, which results in various postoperative complications like pain, swelling and trismus. These complications considered as immediate postoperative outcomes that influence the patients' quality of life in the week following surgery⁽²⁾. Therefore, reducing these complications becomes imperative.

The severity of pain usually peaks within several hours after surgery and may last for several days or more. Facial swelling may also alarm patients and typically peaks at around one or two days before subsiding over the subsequent days. Trismus results from inflammation of the muscles that move the jaw and may persist for more than a few days causing concern and difficulty in eating for about two weeks or more⁽³⁾.

Many surgical interventions had been attempted to limit these complications^(4, 5, 6, 7, 8, 9, and 10). Among them is the wound closure technique that present with different modalities regarding primary and secondary closure techniques. Primary closure of third molar flaps, the socket is covered and sealed hermetically

by a mucosa flap. In the secondary closure technique, the socket remains in communication with the oral cavity to facilitate drainage of inflammatory products. Conflicting opinions have been expressed in published researches concerning these two types of healing⁽¹¹⁾.

This study carry out a literature review to evaluate the impact of these modalities on patient morbidity following LM3 surgery.

MATERIALS AND METHOD

The MEDLINE and PubMed database was searched for the related studies using the following keywords: wisdom tooth surgery, wound closure, patient morbidity, pain, swelling, and trismus. Twenty-one randomized prospective clinical trials, that measure part or all of the immediate outcomes, were included.

RESULTS

The partial closure technique is also described as, secondary closure, and secondary healing by different investigators. Several methods had been described to achieve partial closure, including single suture technique^(12, 13, 14, 15 and 16), the excision of mucosa immediately distal to the second molar^{(6, 8, 11, 17, 18, 19,}

and 20), the placement of drain (7, 21, 22, 23, 24, and 25), and a “sutureless” technique in which no form of suturing is performed (26, 27, and 28).

Single suture technique

In the single suture technique, a single suture was placed at the distal relieving incision while in multiple suture technique; the sutures were placed at the interdental papilla between the second and third molars and at the distal relieving incision (Fig.1 and 2).

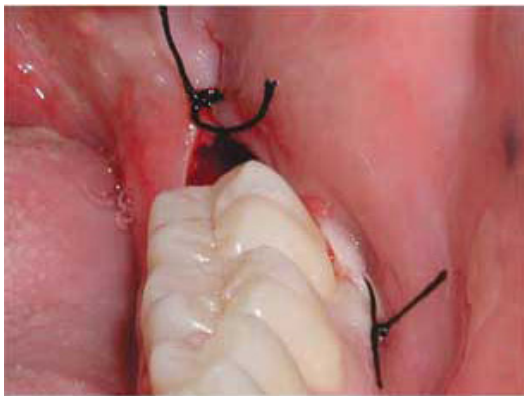


Fig.1: Wound closure by single suture technique: Healing by second intention (14).



Fig.2: Wound closure by multiple suture technique: Healing by first intention (14).

Five studies were included. Researchers (12, 13, and 14) founded a significant difference in term of pain, swelling and trismus between the two techniques favoring the single suture techniques. In another study, researchers revealed no statistical significant difference between the two techniques (15). Anighoro et al. (16) showed a significant reduction in postoperative pain and trismus in single suture technique, however, no difference in the values of facial swelling when compared with multiple suturing technique. The summery of the above studies seen in table (1).

Table 1. Influence of suturing technique on postoperative secondary outcomes.

Study	Study design	Sample size	Age (Mean)	Technique	Outcomes	Results
Osunde OD et al. (12)	Parallel group RCT	25	18-38 (26)	Single/ Multiple suture	Pain	Significant (Favor gp.I)
					Swelling	
					Trismus	
Refo'a Y et al. (13)	Parallel group RCT	16	>18	Single/ Multiple suture	Pain	Significant (Favor gp.I)
					Swelling	
					Trismus	
Sanchis-Bielsa JM, et al. (14)	Split-mouth RCT	25	18-31	Single/ Multiple suture	Pain	Significant (Favor gp.I)
					Swelling	
					Trismus	
Gay-Escoda C et al. (15)	Split-mouth RCT	40	18-45 (25.2)	Single/ Multiple suture	Pain	Not significant
					Swelling	
					Trismus	
Anighoro EO et al. (16)	Parallel group RCT	60	18-40 (26.8)	Single/ Multiple suture	Pain	Significant (Favor gp.I)
					Trismus	
					Swelling	Not significant

Distal mucosal excision

In this technique, partial wound closure was

achieved by cutting a wedge of mucosa; width 5–6 mm, distal to the second molar, allowing secondary

wound healing (Fig.3).



Fig.3: Distal mucosal excision: Healing by second intention (6).

Seven studies were included. Researchers (6, 8, 11, 17, 18, 19, and 20) founded a significant reduction in postoperative pain, swelling when this technique was used as compared with complete closure technique. In addition, Bello et al, (8) revealed a significant reduction in term of postoperative swelling favoring distal mucosal excision technique, however; its effect in reducing postoperative pain and trismus were not significant. In contrast, two studies (17 and 19) showed that trismus was reduced significantly utilizing the distal mucosal excision technique. Table (2) summarizes the included studies that evaluate the effect of mucosal excision technique on postoperative secondary outcomes.

Table 2. Influence of distal mucosal excision on postoperative secondary outcomes.

Study	Study design	Sample size	Age (Mean)	Technique	Outcomes	Results
Maria A et al. ⁽¹⁷⁾	Parallel group RCT	30	18-40	Mucosal excision/ No mucosal excision	Pain	Significant (Favor gp.I)
					Swelling	
					Trismus	
Chaudhary M et al. ⁽¹⁸⁾	Split-mouth RCT	12	20-30	Mucosal excision/ No mucosal excision	Pain	Significant (Favor gp.I)
					Swelling	
Khande K et al. ⁽¹⁹⁾	Parallel group RCT	30	25-30	Mucosal excision/ No mucosal excision	Pain	Significant (Favor gp.I)
					Swelling	
					Trismus	
Danda AK et al. ⁽¹¹⁾	Split-mouth RCT	93	18-31 (24.3)	Mucosal excision/ No mucosal excision	Pain	Significant (Favor gp.I)
					Swelling	
Kareem JJ ⁽²⁰⁾	Parallel group RCT	50	19-27	Mucosal excision/ No mucosal excision	Pain	Significant (Favor gp.I)
					Swelling	
Pasqualini D et al. ⁽⁶⁾	Parallel group RCT	100	19-27	Mucosal excision/ No mucosal excision	Pain	Significant (Favor gp.I)
					Swelling	
Bello SA et al. ⁽⁸⁾	Parallel group RCT	40/42	21-32 (26.8)	Mucosal excision/ No mucosal excision	Pain	Not significant
					Swelling	Significant (Favor gp.I)
					Trismus	Not significant

Placement of drains

In this technique, a tube drain or gauze drain partially submerged into the extraction socket to secure more drainage and to attain secondary wound healing.

Many studies founded no effect on drain placement in postoperative pain reduction (7, 21, 22 and 23), but one study (24) revealed positive drain effect in pain reduction when compared with wound healing without

drain placement. When swelling complication was considered, the use of drain was seen to be beneficial through many studies (7, 21, 23, 24, and 25). However, Akota et al, (22) recorded a non-significant effect of drain in reducing postoperative swelling. The effect of drain in the reduction of postoperative trismus was conflicting. Researchers documents its validity (7, 23 and 24) and others are not (21, 22 and 25). The summery of the above studies seen in table (3).

Table 3. Influence of drain placement on postoperative secondary outcomes.

Study	Study design	Sample size	Age (Mean)	Technique	Outcomes	Results
Obimakinde OS et al. (24)...	Parallel group RCT	40	>18	Tube drain/ No drain	Pain	Significant (Favor gp.I)
					Swelling	
					Trismus	
Chukwuneke FN et al. (7)	Parallel group RCT	50	18-40 (26)	Tube drain/ No drain	Pain	Not significant
					Swelling	Significant (Favor gp.I)
					Trismus	
Cerqueira PR et al. (21)	Split-mouth RCT	35	>18	Tube drain/ No drain	Pain	Not significant
					Swelling	Significant (Favor gp.I)
					Trismus	Not significant
Sağlam AA (25)	Split-mouth RCT	13	18-39	Tube drain/ No drain	Swelling	Significant (Favor gp.I)
					Trismus	Not significant
Akota I et al. (22)	Split-mouth RCT	26	>18	Gauze drain/ No drain	Pain	Not significant
					Trismus	
					Swelling	
Rakprasitkul S and Pairuchvej V (23)	Split-mouth RCT	23	>18	Tube drain/ No drain	Pain	Not significant
					Swelling	Significant (Favor gp.I)
					Trismus	

Sutureless technique

In the sutureless technique there is free flow of inflammatory exudates from the extraction sockets and allowing the wound to heal secondarily (26).

Three studies were included and the results

Table 4. Influence of sutureless technique on postoperative secondary outcomes.

Study	Study design	Sample size	Age (Mean)	Technique	Outcomes	Results
Hashemi HM et al. (26)	Split-mouth RCT	30	19-24 (22)	Sutureless/ Multiple suture	Pain	Significant (Favor gp.I)
					Swelling	
Osunde OD et al. (27)	Parallel group RCT	40	18-38 (27.1)	Sutureless/ Multiple suture	Pain	Significant (Favor gp.I)
					Swelling	
					Trismus	
Kaskos HH (28)	Parallel group RCT	20	(25.05)	Sutureless/ Multiple suture	Pain	Significant (Favor gp.I)
					Swelling	

DISCUSSION

Swelling, trismus and pain are the most important indicators following surgical extraction of impacted lower third molars (8, 9 and 11). Wound closure technique is an operative factor that could influence the immediate postoperative pain, swelling, and trismus. It could therefore contribute to the patients' quality of life after surgical operations (8). However, this observation is controversial issue between researchers. The reason for this discrepancy is unclear (16) and might be resulted from variations in the individual inflammatory response (12). In addition, the ability of the surgeon (29) and the difficulty of the operation might influence the outcome of the surgery.

Wound closure technique does not appear to have an influence on the amount of chemical mediators or their stimulation of nerve endings or the interpretation in the central nervous system, which could explain

showed that patients had significantly less postoperative pain, swelling, (26, 27 and 28) and trismus (26) when no sutures were used. Table (4) summarizes the included studies that assess the impact of sutureless technique on postoperative secondary outcomes.

the lack of positive influence of the wound closure technique on pain perception (8). Nevertheless, the accumulation of inflammatory exudate and/or hematoma increases pressure on nerve endings resulting in more pain perception.

Pain assessment is subjective and influenced by many factors such as the patient's age, sex, and previous experience of pain, pain threshold and tolerance, therefore, assessment of pain may be difficult (30).

Facial swelling could be due to accumulation of inflammatory exudate within facial tissues, hematoma collection (31), or both. Partial wound closure, which ensures drainage, appears to minimize immediate postoperative edema, thereby contributing to a reduction in patient discomfort (32). Facial swelling could be measured by different methods like flexible tape, photograph, and the visual analog scale.

Although they are simple, cost-effective and time-saving methods, but not as accurate as magnetic for the measurements of facial soft tissue volume ⁽³³⁾.

Primary closure of the flap avoids suture dehiscence and improves wound healing ^(34 and 35). In contrast, Pasqualini et al, ⁽⁶⁾ and Dubois et al, ⁽³²⁾ wound dehiscence occurred within the first 1 week postoperatively, more frequently in sockets with total closure. Researchers founded a significantly higher incidence of reactionary bleeding was observed with partial closure when compared the total wound closure ⁽⁸⁾. It has been postulated that total wound closure will be associated with a higher incidence of dry socket because of the non-self-cleansing nature of the socket. It acts like a 1-way valve that allows food debris to enter the socket but does not allow it to escape from the socket ⁽³²⁾.

The possible reason for the lower pain, swelling, and trismus values recorded for the single suture technique might be differences in the retention of the inflammatory exudates which is less in the partial (single suture) closure, because more room is present for the release of the inflammatory exudates compared with the multiple suture technique ⁽¹²⁾.

Although mucosa excision found to improve patients' quality of life ^(17, 18, 19, and 20), it prolongs the duration of surgery and may cause more trauma to the patient ⁽³⁶⁾ and this may have negative impact on periodontal healing in the distal surface of second molar.

Many studies showed the advantage of drain placement in reducing post-operative swelling ^(7, 21, 23, 24, and 25). Chukwunke et al, ⁽⁷⁾ recorded a greater pain score for patients who had undergone surgical closure with the insertion of drain, probably because of the irritating effect. In addition, the overall cost of surgery could be increased because of the additional cost of purchasing rubber drains. Insertion of a drain could prolong the duration of surgery and may present with more discomfort to the patient due to the presence of a foreign body in form of a tube or gauze inside the mouth for a varying period of 48 to 72 hours after surgery ⁽³⁶⁾.

Waite and Cherala has described this technique ⁽⁹⁾. They reported less pain because of free flow of inflammatory exudates from the extraction sockets ⁽²⁷⁾. The benefits of this technique are the lower cost, less operative time, less manipulation of soft tissue and hence, less postoperative morbidity. Moreover, it does not require additional hospital visits for removal of sutures ^(9 and 27). A sutureless technique might, however, be limited to cases in which minimal incisions are used for third molar surgery ^(9 and 34). The

main drawback of suture-less is that healing may be delayed. In addition, there may be high potential for the formation of a periodontal pocket in relation to the adjacent second molar ⁽²⁷⁾. However, Hashemi et al, ⁽²⁶⁾ showed, after 6-month follow up, that secondary wound healing through sutureless technique did not increase the depth of the pocket around the second molar.

CONCLUSION

The role of wound closure technique on immediate postoperative sequelae revealed a varied opinion among researchers.

Single suture technique and the distal mucosal excision may be valuable in reducing some of postoperative complications.

A sutureless technique might be advantageous in cases in which minimal incisions are used.

However, a recent meta-analysis concludes that there are no significant differences on the outcome between complete and partial wound closure and it refers that the available studies are heterogeneous and do not produce high level of scientific evidence ⁽³⁷⁾.

CONFLICT OF INTEREST

The authors declare there is no conflict of interest.

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