

CLOSURE OF INTRA-ORAL SURGICAL INCISIONS: A COMPARISON BETWEEN SUTURING AND TISSUE ADHESION

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الخلاصة

هدفت هذه الدراسة الى المقارنة بين الخياطة واستخدام لاصقات الانسجة في إغلاق الشقوق الجراحية داخل الفم. **المرضى و الطرق المستخدمة:** شارك في هذه الدراسة عشرون مريضاً والذين كانوا يراجعون عيادات جراحة الوجه والفكين الخارجية في كلية طب الأسنان بجامعة الملك سعود. عشرون مريضاً تم تقسيمهم عشوائياً الى مجموعتين متساويتين على حسب المادة المستخدمة في إغلاق الشقوق الجراحية. المجموعة الأولى: عشرة مرضى ممن شملوا بإغلاق الشقوق الجراحية بواسطة الخياطة. المجموعة الثانية: عشرة مرضى ممن شملوا بإغلاق الشقوق الجراحية بواسطة لاصقات الانسجة (cyanoacrylate). **النتائج:** أظهرت النتائج أن الاختلاف في المضايقة بين الخياطة ولاصقات الانسجة هو ذو قيمة احصائية ($P<0.05$). أيضاً أظهرت النتائج أن الاختلاف في التهيج بين الخياطة ولاصقات الانسجة هو ذو قيمة احصائية ($P<0.05$). بينما الاختلاف في الشعور بالألم بين الخياطة ولاصقات الانسجة هو ليس ذو قيمة احصائية ($P>0.05$). **الاستنتاج:** تستنتج الدراسة بأن استعمال N-butyl Cyanoacrylate (Glubran 2) هو سهل و فعال في إغلاق الشقوق الجراحية بينما التمام الجرح لا يختلف عن الخياطة. من ناحية اخرى، استخدام لاصقات الانسجة يقلل بشدة من الضغط النفسي والقلق عند المرضى مقارنة باستخدام الخياطة، بالإضافة الى إزالة احتمالية الإصابة بحوادث غرز الإبر الذاتية. العيب الوحيد في في هذه المادة هو قيمتها الشرائية، حيث أنها أكثر تكلفة مادية من الخياطة (حوالي خمسة أضعاف) والذي يجب أن يكون في الحسبان قبل استخدامها.

Abstract

Objective: the aim of the study was to compare the routinely used 3/0 black silk suture material with one of the most recently used tissue adhesives (N-butyl Cyanoacrylate) in intra-oral surgical incisions closure and until complete wound healing is clinically evident. **Patients and Methods:** Twenty patients who attended the Oral and Maxillofacial Surgery Outpatient Clinics, College of Dentistry, King Saud University, were included in this study. Those patients were divided randomly into two equal groups according to the material used for flap (incision) closure. **Group I (suture group):** comprised 10 patients in whom the incisions were closed using 3/0 black silk sutures in a 3/8 circle cutting needle **Group II (cyanoacrylate group):** comprised 10 patients in whom the incisions were closed using synthetic cyanoacrylic surgical glue (Glubran 2). **Result:** The clinical results revealed that, the difference in discomfort score of the suture and the cyanoacrylate sites was statistically significant ($P<0.05$). Also, the difference in irritation score of the suture and the cyanoacrylate sites was statistically significant ($P<0.05$). While, the difference in pain score of the suture and the cyanoacrylate sites was not statistically significant ($P>0.05$). **Conclusion:** The use of (Glubran 2) in closure of intra-oral surgical incisions is an easy and effective way in tissue adhesion. The wound healing is not different from using suturing. On the other hand, it greatly reduces the patient psychological stress and anxiety during suturing, plus eliminating the possibility of self injury. Patients and surgeons were completely satisfied by using this material in incision closure. The only disadvantage of this material is its high cost in comparison to black silk sutures (about 5 folds) which should be kept in mind before its use.

Introduction

Surgical sutures have been used for a long time for approximating wound margins. But tissue incompatibility of the suture material may give rise to foreign body reaction and granulations which may result in fistulisation. Also tight sutures may cause tissue ischemia and necrosis (Matras, 1985). These factors are more important in patients with compromised healing (Yucel et al, 2003).

Braided silk is the most common suture used for closure of oral wounds. It has the phenomenon of "wicking" which makes it a site for retention and ingress of bacteria into the tissues and thus a reservoir of secondary infection. It has been found that the silk has maximum amount of inflammatory tissue response (Posthelwaite, 1974). So, in order to overcome these difficulties, a need for alternative to sutures is always felt (Levin, 1980 and Sachs et al, 1984).

Cyanoacrylates are tissue-adhesive materials that were synthesized in 1959 by Coover et al. The cyanoacrylate material have a chemical formula $H_2C = C(CN)COOR$, where R-can be substituted for any alkyl group ranging from methyl to decyl. The earlier methyl homologues were found to be histotoxic and thus were discontinued in clinical practice (McGraw and Caffess, 1978, Levin, 1980, and Herod, 1990). N-butyl cyanoacrylate (NBC) is biocompatible tissue adhesive and is hence used for closure of wounds (Kulkarni et al, 2007).

According to Coulthard et al (2002), tissue adhesives offer the advantages that there are no sutures to be removed later for the patient and no risk of needle-stick injury to the surgeon. However, in our Oral and Maxillofacial Surgery Clinic, we do not have enough experience neither with the use of tissue adhesives nor with their effects on clinical tissue healing events.

So, in this study, we will compare the routinely used 3/0 black silk suture material with one of the most recently used tissue adhesives in intra-oral surgical incisions closure and until complete wound healing is clinically evident. The advantages and disadvantages of each material will be recorded in order to determine the most suitable material for wound healing, for patients, and surgeons to be routinely used in our clinics.

Patients and Methods

Twenty patients who attended the Oral and Maxillofacial Surgery Outpatient Clinics, College of Dentistry, King Saud University, were included in this study. Those patients were divided randomly into two equal groups according to the material used for flap (incision) closure.

Group I (suture group): comprised 10 patients in whom the incisions were closed using 3/0 black silk sutures on a 3/8 circle cutting needle.

Group II (cyanoacrylate group): comprised 10 patients in whom the incisions were closed using

synthetic cyanoacrylic surgical glue (*Glubran 2, GEM S.r.l. Italy*).

The criteria of patient selection were: adult patients (20-40 yrs), with no history of systemic and/or local diseases, with good oral hygiene, and non-smokers. Any intra-oral incision site with nearly symmetrical length and design was used in this study for comparing the 2 different tissue closing materials during the healing period. After obtaining informed consent, the different materials were applied during incision closure and the following parameters were noticed and recorded for comparison: 1- During the application; pain or discomfort, length of time of application, occurrence of needle stick injury in cases of suturing and surgeon satisfaction (ease of closure and time saving). 2- During the healing period; presence of wound dehiscence, wound infection, scar formation, and patient general satisfaction (pain or irritation from the material). Finally, the relative cost of the material was considered in this comparison.

A visual analog scale from 0 to 10 centimeters was also used to subjectively assess the pain, irritation, or discomfort during and after surgery. Patients were followed up weekly for 4 weeks until complete healing of the surgical site. The results of this randomized double-blind clinical study were obtained and the data was collected and statistically analyzed.



Figure 1: cyanoacrylate material package used in the study.



Figure2: The disposable syringe used to applying the material.

Result

Twenty patients were included in this study. There were 9 males and 11 females, their ages ranged from 20-38 years (mean 25 years).

In the comparative analysis done between the suture and the cyanoacrylate (Glubran®) sites the following results were obtained.

1- During application, the wound closure time was similar in both materials. There was no incidence of needle stick injury to the surgeon when using the silk suture.



Figure 3-A: closure of incision using cyanoacrylate (Glubran 2).

The clinical results revealed that, the difference in discomfort scores of the suture and the cyanoacrylate sites was statistically significant ($P < 0.05$), as shown in Table 1. The difference in irritation scores of the suture and the

cyanoacrylate sites was also statistically significant ($P < 0.05$), as shown in Table 1.

However, the difference in pain scores of the suture and the cyanoacrylate sites was not statistically significant ($P > 0.05$), as shown in Table 1. The surgeon was completely satisfied by using this tissue adhesive material regarding the time and ease of application.

	t	Sig.
pain	1.386	.196
discomfort	2.784	.019
irritation	2.254	.048

Table (1)

2- During healing period, there was no difference between silk suture and cyanoacrylate in wound dehiscence, infection and scar formation. No cases of healing complications were recorded in both groups and the healing course during the 4 weeks of follow up was uneventful. The patients also were completely satisfied by using this material instead of suturing regarding the irritation sensation or perception.



Figure 3-B: one week follow up after surgical procedure.



Figure 3-C: two weeks follow up after surgical procedure.



Figure 3-D: four weeks follow up after surgical procedure.

Discussion:

Traditional methods of surgical incision closure have been used for many years. However, these techniques are not without some problems and it is therefore important to consider new development that may offer advantages for the patient. The most common device for incision closure is the suture (Coulthard, 2008).

The present study was carried out to evaluate the intra-oral incision sites healing after closure with silk sutures or cyanoacrylate (Glubran 2). Cyanoacrylate is a biocompatible tissue adhesive

and has good working properties like flow and fast setting. Cyanoacrylate is a good hemostat. It has good bonding properties and strength to hold tissue margins together (McGraw and Gaffesse, 1978 and Greer, 1975).

In our study, the pain scores of the suture and the cyanoacrylate sites were not statistically different. This is attributed to the profound local anesthesia given to the patients and the sympathetic psychological management.

The surgical site infection was considered to be present if any of the following were observed: swelling, purulent discharge, pain, increased skin temperature, or fever or other systemic signs of infection. No cases of infection or dehiscence were recorded in this study.

The absence of these complications of wound healing seems to be partially related to strict adherence to antiseptic surgical techniques and prophylactic prescription of antibiotics, and partially to the patient compliance with postoperative instructions and maintenance of a good oral hygiene.

Patient satisfaction is also important when comparing alternative incision closure devices providing that the primary efficacy variable of dehiscence, infection and cosmetic appearance are satisfactory. Patient satisfaction may include rating for cosmesis, overall comfort, tension in wound, hygiene problems or allergic reaction, and overall satisfaction. A further important factor that might be expected to be favor tissue adhesive is the lack of requirement for its removal (Coulthard 2008).

In this study, patient satisfaction was more obvious when using cyanoacrylate rather than suture, because of lack of requirement for its removal and less irritation during healing than suture. These findings are in conjunction with those reported by Shamiyeh (2001) and Greene (1999).



Figure 4-A: incision before closure using cyanoacrylate (Glubran 2).



Figure 5-B: four weeks follow up after surgical procedure



Figure 4-B: four weeks follow up after surgical procedure.



Figure 6-A: incision before closure using black silk suture.



Figure 5-A: incision before closure using cyanoacrylate (Glubran 2).



Figure 6-B: four weeks follow up after surgical procedure.

Certainly, there is no risk of needle stick injury to the surgeon when using cyanoacrylate rather than suture. In our study, the closure time was similar when using both materials. This finding is similar to those described in a review of tissue adhesives for closure of surgical incisions (2008) in which Coulthard et al, stated that: in practice, the reduction in wound closure time may not be great enough to permit greater number of operations in a given operating room time available. However, patients may be happy with a lengthier closure time for a technique with superior outcome.

Generally, tissue adhesives cost more than suture for incision closure. An ampoule of adhesive may be three times or more the cost of a suture required to close an incision of the same length (Coulthard et al, 2008). This statement is also true in our study which revealed that the only disadvantage of (Glubran 2) is its cost in comparison to black silk sutures (about 5 folds) which should be kept in mind before its use.

Conclusion

The use of N-butyl Cyanoacrylate (Glubran 2) in closure of intra-oral surgical incisions is an easy and effective way in tissue adhesion. The wound healing is not different from using suturing. On the other hand, it greatly reduces the patient psychological stress and anxiety during suturing, plus eliminating the possibility of needle stick self injury. The only disadvantage of this material is its high cost in comparison to black silk sutures (about 5 folds) which should be kept in mind before its use.

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