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Comparative Evaluation Of Efficacy Of Bioadhesive Cynoacrylate With Conventional Sutures In Primary Wound Closure After Surgical Extraction Of Mandibular Third Molars

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Abstract

Objective: To compare the efficacy of cyanoacrylate bioadhesive with conventional sutures in primary wound closure after surgical removal of impacted mandibular third molars.

Materials and Methods: Twenty patients with bilaterally impacted mandibular third molars were studied in this controlled clinical trial. On the study site cynoacrylate was used for closure and on control side conventional sutures were used.

Results: The data analysis showed that postoperative bleeding with cyanoacrylate method was less significant than with suturing on the first after surgery.There was no significant difference in the severity of pain
between the two methods. Dehiscence was seen in 1 case on study side.

Conclusion: This study suggested that the efficacy of both, cyanoacrylate and suturing in wound closure were similar in the severity of pain, degree of inflammation but use of cyanoacrylate showed better hemostasis.

Keywords Cynoacrylate, tissue adhesive, Polymerization, Hemostasis, Polymeration

Introduction

Wound Closure techniques have evolved from the earliest development of suturing materials to resources that include synthetic sutures and adhesive compounds. The ideal method of wound closure should be simple, rapid, painless, and bactericidal and should achieve optimal cosmetic results. Suturing is the most common and age old method of wound closure. Suturing generally requires injection of local anesthesia , is time consuming requires specialized instruments, carries a risk of needle stick injury to the practitioner and usually requires patient to return for suture removal. Suturing also requires considerable time.

COOVER et al discovered tissue adhesive in 1959 and reported its use in surgical procedures [1].Tissue adhesive for wound closure are fast and easy to use. It can be applied painlessly, results in excellent cosmetic outcome, do not require a follow up procedure to remove them after their purpose has been achieved, and are relatively inexpensive. The topical adhesives (or glues) are liquid cynoacrylate monomers that polymerizes into long solid chains upon contact with blood and wound, thus sealing and bridging the wound edges together[2]. The introduction of new surgical adhesives allows surgeons to perform operations using smaller incisions with less tissue trauma. Their use will decrease bleeding and improve outcomes. This should result in improved cost effectiveness as well.

In the maxillofacial field, it has been used for sinus lift procedures[3],cleft surgeries[4], gingivectomy[5], mucogingival flaps, biopsy, superficial oral ulcerations, recurrent multiple aphthous ulcers and leukemia[6], wound closure, skin graft, face lifts, brow lifts, and other cosmetic surgeries, after multiple extractions, the removal of bony prominences for prosthetic rehabilitation is a common procedure[7].

This study compares 3.o silk with cyanoacrylate for wound closure after the removal of mandibular impacted third molars, which evaluates the incidence of postoperative sequelae. In this study we compared the conventional suturing technique with the application of Cynoacrylate Bioadhesive.

Material and Methods

Twenty Patients both (women and men); age ranging from 20-45 yrs with bilateral impacted mandibular molars requiring surgical extraction were included in this clinical trial.

Panoramic radiographs were taken to assess the third molars agulations.

INCLUSION CRITERIA:

1. Patients with age group of 12-55 years.
2. Patients who will be available for assessment up to 7 days post operatively
3. Patients where closure is possible without tension across the incision line.
4. Patient willing to participate in study.

EXCLUSION CRITERIA:

1. Medically compromised patients
2. Patients with any drug or metal allergy which would affect soft tissue

wound healing is excluded from the criteria.

3. Previously diagnosed peripheral vascular disease.

Written consent was obtained from the patients and relatives. Every patient included in this study undergone an adequate presurgical preparation consisting of case history and radiographic examination with OPG

The procedure was explained to the patient. Regional anesthesia was achieved by 2 % lignocaine with epinephrine 1: 2,00,000.

All the procedures was done by same operator in the department of oral and maxillofacial surgery. A full-thickness Ward's incision was raised and flap was reflected. After adequate bone removal, the tooth was removed followed by curettage and toileting of the socket. The flap was repositioned and isolated with sterile dry gauze. After the 1st layer of adhesive put on the incision line by droplet method, followed by another layer after 20 s. All the patients were given postoperative instructions along with application of ice packs at the operated site extra orally. Patients were advised to maintain oral hygiene from the day after surgery and mouthwash with 0.12% chlorhexidine twice daily. All patients were given similar postoperative antibiotics and analgesic (Cap. Amoxicillin 500 mg BD for 5 days and Tab. Diclofenac Sodium 50 mg BD for 3 days). Patients were kept on 7 days follow up.

TABLE 1: Pain (*will be evaluated using Visual analogue scale (VAS) on 1^{s}day 7th days postoperatively*)**.**

SCORING	PATTERN OF PAIN	SCORE
No Pain:	The patient feels well	0
Slight Pain:	If the patient is distracted he or she does not feel the pain	1
Mild Pain:	The patient feels the pain even if concentrating on some activity	2
Severe Pain:	The patient is very disturbed but nevertheless can continue with normal activities	3
Very Severe Pain:	The patient is forced to abandon normal activities	4
Extremely Severe Pain:	The patient must abandon every type of activity	5

TABLE 2: Inflammation *(will be evaluated on 1st day, 7th days postoperatively*)**.**

Scoring	**pattern of inflammation**	**scores**
Absent	no inflammation	0
Mild inflammation	slight change in colour, oedema , no bleeding	1
Moderate inflammation	redness, oedema	2
Severe inflammation	marked redness, oedema, spontaneous bleeding	3

TABLE 3: Bleeding (*will be evaluated on 1st day, 7th days postoperatively*)**.**

Grades	**Criteria**
0 No bleeding	The patient does not detect any bleed in saliava
1 Oozing	The patient detects slight blood but it is not noticeable
2 Accidental low bleeding	The patient has low bleeding sometimes (Patient notices blood over the sutured wound which Stays all over the day but does not increase in volume)
3 Continuous low bleeding	The patient has low bleeding often (Patient notices blood with increase in volume)

TABLE 4: Dehiscence *(will be evaluated on 1st day, 7th days postoperatively*)

DEHISCENCE	**CRITERIA**
Absent	Grade 0
Present	Grade 1

OBSERVATION AND RESULTS

Cynoacrylate Bioadhesive

POD	Cynoacrylate Score 0	Suture Score 0	Cynoacrylate Score 1	Suture Score 1	P value	Significance
1st day	54.5%	45.5%	28.6%	75.4%	0.212	Not Significant

7th day	50%	50%	0	0	-	Not Significant

Study Site – Twenty sites closed randomly with cyanoacrylate bioadhesive

Control Site – Twenty sites closed randomly with 3-0 black silk

1. Assessment of pain, Inflammation, Bleeding and Infection was made clinically at the time interval of 24 hours, 7 days
2. It was then statistically analyzed using Chi-square (X2) test.

GRAPH: Statistical analysis for pain

TABLE: Statistical analysis for inflammation

POD	Cynoacrylate Score 0	Suture Score 0	Cynoacrylate Score 1	Suture Score 1	P value	Significance
1ST day	55.9%	44.1%	16.7%	83.3%	0.077	Not Significant
7th day	50%	50%	0	0	-	Not Significant

TABLE : Statistical analysis of Bleeding

POD	Cynoacrylate Score 0	Suture Score 0	Cynoacrylate Score 1	Suture Score 1	P value	Significance
1ST day	10.30%	89.70%	22.30%	88.70%	1.2	Significant
7th day	50%	50%	0	0	-	Not Significant

Fig: Cynoacrylate Bioadhesive

Fig: Conventional Sutures

Fig: Extracted Imapacted mandibular Third Molars

Fig: Orthopantamogram

Results

There was no significant difference in the severity of pain between the two methods on the right and left sides of the mandible at all times recorded ($P<0.05$).

The data analysis showed that postoperative bleeding with the cyanoacrylate adhesive method was less significant than with suturing on the first day after surgery ($P>0.05$); however, the bleeding index showed no significant difference ($P<0.05$) between the two methods on the seventh day.

Discussion

The most common method of wound closure in oral and maxillofacial surgery is suturing[8]. The origin of surgery can be traced back to many centuries. With the discovery of anaesthetics, surgery became a reality. Proper wound closure became a part of successful overall wound care. Then the hunt was on for material which would close wounds healthily. Through the ages man sought for methods of binding wounds to promote healing and have managed wounds from the beginning of civilization. In olden days, spider webs, warrior ants etc.; were used till suture materials were discovered. Suture like threads created from a wide variety of substances were used as early as the second century BC for mechanical closure of wounds.

Surgical sutures had an established place in medicine as means of uniting tissues and wound margins, but in spite of sophisticated suture materials and techniques the difficulty with suturing and need for suture removal arise as major problems. Sutures may cut through parenchyma and inflammatory tissues, absorbable suture material may disintegrate early and may produce dehiscence of the wound; and closely spaced sutures may cause tissue ischemia with resultant necrosis of wound margins. Suturing also requires considerable time[9].

Although closure of wounds with sutures enables meticulous closure, it may induce tissue reactivity and they usually require removal, therefore, research has focused on more effective

wound closure methods with better efficiency and fewer complications. Tissue adhesives offer advantages that there are no sutures to remove later for patient.

Cyanoacrylate tissue adhesives were discovered by Coover and others in 1959[1,9]. Their general formula is CH 2 =C (CN)-COOR. Iso amyl 2-Cyanoacrylate is available from Concord drug limited as 0.25 ml ampoules were used in this study. One method of synthesizing an alkyl cyanoacrylate monomer is by reacting alkyl cyanoacrylate with paraformaldehyde to form an intermediate compound. Heat applied to this intermediate compound causes de polymerization, resulting in an alkyl cyanoacrylate monomer liquid distillate. The chemical structure varying the length R in the carboxyl group of polymer results in different cyanoacrylate adhesives, each with unique structural variation that significantly influences its clinical properties[10].

There are two theories on the mechanism of adhesion of the polymer to the tissue. It is either chemical or mechanical linkage to the tissue in which the proteins of the tissue take part. The theory of adhesive action is that the alkyl-2-cyanoacrylates undergo an exothermic polymerization catalysed by the presence of small quantities of weak base such as water. This anionic polymerization is thought to provide the bonding action. The adhesive mechanism is achieved by attraction between the molecules of both the adhesive and the mucosal surfaces. Physical locking is also a factor by virtue of penetration of the adhesive into the irregularities of the tissue surface. Spreading the monomer in a thin film increases the adhesiveness and elasticity.

Conclusion

This study concluded that cyanoacrylate is a better treatment option for intaoral minor surgical procedures as tissue adhesive as it has hemostatic properties.This helped in reducing postoperative pain and is comfortable to patient.

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