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Original Research

Comparison of n butyl 2 cyanoacrylate and silk sutures for minor surgical procedure: a clinical study

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ABSTRACT:

Background and Aim: The purpose of this study is to compare the clinical responses of intraoral mucosal incisions closed with n-butyl-2- cyanoacrylates with incisions closed with silk sutures. **Materials & Methods:** In thirty patients requiring minor oral surgical procedures bilateral mucosal incisions were placed. One side was closed with n-butyl cyanoacrylate and other with silk suture. Postoperatively patients were recalled on 1st, 7th, 14th and 21th day and evaluated for pain, edema, wound dehiscence and scar. Results were evaluated using chi square test. **Results:** The results showed that there was no statistically significant difference between suture and cyanoacrylate for occurrences of pain, edema, and wound dehiscence and scar formation. However the averages time taken for suturing was considerable more than the time taken for cyanoacrylate application. **Conclusion:** This study suggests that efficacy of cyanoacrylate and suture in intraoral wound closure is similar for postoperatively finding like pain, edema, wound dehiscence and scar formation. However cyanoacrylate has certain advantage like ease of application, less time consuming and is well accepted by patients.

Key words: Oral Mucosa, Incision, Tissue adhesive, Sutures, n-butyl 2 cyanoacrylate

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INTRODUCTION:

Ideal wound healing largely depends upon use of proper surgical techniques and wound care. Good wound healing can be achieved by accurate incision, delicate tissue handling, precise wound approximation, good working properties of wound closure material and aseptic techniques to prevent pathogenic microbes from entering the body.^{1, 2} The ideal wound closure material permits a precise wound closure with reapproximation of wound edges, it is easily and rapidly applied, painless, protects underlying tissues from infection or other irritating

factors, prevents postoperative hemorrhage, is inexpensive with less tissue toxicity, and results in minimal scarring.³

Sutures being a classic method of wound closure have many advantages such as achievement of careful closure, low dehiscence rate and resilient tensile strength.⁴ However, sutures do have certain disadvantage namely prolonged duration of surgery and anaesthesia, tissue reactivity, risk of needle stick, undesirable trauma to the intact tissue on either side of wound, permanent suture tracts, early removal which results in dehiscence, anxiety and pain during removal

and inadequate esthetic N-butyl-2-cyanoacrylate, a tissue adhesive has also been tried to seal the wounds of the oral cavity and skin. Advantages of this adhesive over conventional wound closure techniques include easy to use, rapid application, patient comfort, excellent bacteriostatic property, resistant to infection, no risk of needle stick injury, decreased repair time, good haemostasis, eliminates recalled visits and has good short and long time cosmetic outcome.⁵

Presently in oral and maxillofacial surgery, adhesives have a minimal role, but this is changing rapidly.⁶ Clinical trials are beginning for newly developed adhesives with the chemical characteristics, the safe reabsorptive profile, and the adhesive strength necessary to benefit oral and maxillofacial surgery patients in the near future. Thus in view of the above mentioned features, the purpose of this study is to compare the clinical responses of intraoral mucosal incisions closed with n-butyl-2- cyanoacrylates with incisions closed with silk sutures.

MATERIALS & METHOD

A total of 60 patients who attended the oral surgery department of the dental college for the surgical procedure were included in the study. All the patients were scheduled for minor surgical procedure. Patients were then informed of the surgery and method of closure of the surgical wound, its advantage and complication. The informed consent was taken from the patients. All the included patients were to undergo bilateral mucoperiosteal incision for the surgical procedure. One side is closed with silk suture and opposite side with N-butyl cyanoacrylate and the surgical sites were evaluated on first, third, seventh, fourteenth, and twenty-first postoperative days for any pain, edema, wound dehiscence and scar formation on 1st, 7th, 14th and 21st days respectively.

N butyl -2-cyanoacrylate was used in this study, which is available as a Single-use XOIN from medicinal laboratories limited and manufactured by Samarth life sciences as 0.25 ml, 0.5 ml, 1ml ampule. As suture is the most commonly used material for wound closure, we used 3-0 braided black silk suture - Mersilk to compare its consequential healing with that of XOIN glue.

In third molar surgeries or Alveoplasties, bilaterally symmetrical crestal incision was made on the lower arch. The length of incision varied from 3-4 cm depending on the surgical access required for the procedure. After performing the surgical procedure and achieving adequate haemostasis, closures were performed on one side with n-butyl cyanoacrylate tissue adhesive and on the other side with 3-0 black braided Mersilk suture and these sides were randomly chosen.

The side of the incision where n-butyl cyanoacrylate tissue adhesive was to be applied was isolated with

dry gauze. The incised edges were accurately approximated, trying not to leave any gap between them. After loading the glue in a syringe, it was applied at the approximated wound margins through the needle in the form of drops for closure of the mucoperiosteal flaps. Under same aseptic precautions, anaesthesia, and surgical procedure on the other side, suturing was done with interrupted braided black 3-0 silk suture.

The post-operative sites pressure pack was given at the sutured sites. Post-operative instructions regarding diet, avoid disrupting the wound at glue site, oral hygiene maintenance and warm saline gargles were given to the patients. Statistical analysis of the information obtained was performed. The differences with a $P \leq 0.5$ were found to be statistically significant.

RESULTS

A total of 60 patients were included in the study and were treated maxillofacial surgical bilaterally. The incisions for various surgical procedures were assigned to one of the following treatment groups:

Group 1: incisions closed with sutures 3-0 Mersilk

Group 2: incision closed with n-butyl 2- cyanoacrylates

The procedures were done bilaterally and closure on one side was done using 3-0 Mersilk while the closure on other side was achieved with n-butyl 2- cyanoacrylate. The age of the patients included in the study was between 15 to 60 years. The different surgical procedures performed in the study were surgical extractions of third molars (40 cases), alveoplasties (18 cases) and other minor surgeries (4 cases) like cyst, canine impaction etc. The average time required for closure of third molar removal with silk suture was 4 minutes and N-butyl cyanoacrylate was 1 min. In alveoplasty cases, silk suture required 6mins and N-butyl cyanoacrylate was 45 sec. In other minor oral surgeries the average time required for closure with silk suture was 5 minutes and N-butyl cyanoacrylate was 45 sec. All the results were accurately recorded and statistical analysis was done using Chi-square test. No statistically significant association is observed between pain and the materials used on day 1, day 7, day 14 and day 21 ($P > 0.05$).

No scar was recorded in both the groups on day 1. On day 7, higher number of samples in both the groups was found to have an absence of scar. On day 14, the number of samples with presence of scars were found to be almost equal in both the groups but no statistically significant association was observed between materials and scar. The number of samples with presence of scar was found to be higher in N-Butyl-2- Cyanoacrylate group compared to Silk Suture group on day 21.

Table 1: Number of cases performed

Materials used	No. of impaction	No. of alveoplasty	Other minor surgeries
Silk	40	18	4
N-butyl 2-cyanoacrylate	40	18	4

Table 2: Comparison of pain between the two materials at different time Intervals

Time interval	Pain	N-butyl 2-cyanoacrylate	Silk suture	Total
Day 1	No pain	20	6	26
	Mild pain	24	28	62
	Moderate pain	16	26	42
Day 7	No pain	30	52	52
	Mild pain	28	62	62
	Moderate pain	2	6	6
Day 14	No pain	48	100	100
	Mild pain	10	18	18
	Moderate pain	2	2	2
Day 21	No pain	60	60	120
	Mild pain	-	-	-
	Moderate pain	-	-	-

Table 3: Comparison of scar between the two materials at different time Intervals

Time interval	Pain	Present	Absent
Day 1	N-butyl 2-cyanoacrylate	-	-
	Silk suture	-	-
	Total	-	-
Day 7	N-butyl 2-cyanoacrylate	8	52
	Silk suture	4	56
	Total	12	108
Day 14	N-butyl 2-cyanoacrylate	16	44
	Silk suture	14	46
	Total	30	90
Day 21	N-butyl 2-cyanoacrylate	16	44
	Silk suture	8	52
	Total	24	96

DISCUSSION

Soft tissue wounds heal in three general ways: primary intention, secondary intention and tertiary intention. Healing by primary intention is preferable as there is less scarring and the healing is rapid.⁷ The primary steps in the management of surgical wounds are haemostasis and tissue approximation. Through ages surgeons have used various materials to close incision. They are metal clips, adhesive tapes and sutures.⁸ Every material has its own advantages and shortcomings. A never ending search for a material to overcome the short comings of the various wound closure techniques led to the discovery of various tissue adhesives.⁹ Time taken for closure of wounds using silk sutures was considerably more than cyanoacrylate even in our study. The average time required for closure of third molar removal with silk suture was 4 minutes and N-butyl cyanoacrylate was 1 min. In alveoloplasty cases,

silk suture required 6mins and N-butyl cyanoacrylate required 45 sec. In other minor oral surgeries the average time required for closure with silk suture was 5 minutes and N-butyl cyanoacrylate was 45 sec. Pasqualini and Cocero found the pain was less severe with secondary healing than with primary healing after third molar surgery. They used the visual analogue scale, which is considered to be an efficacious tool to evaluate clinical parameters, such as pain. No statistically significant association is observed between pain and the materials used in our study (P>0.05). Higher number of samples in N-Butyl-2-Cyanoactylate group were found to have no pain when compared to those in Silk Suture group. The disadvantages of sutures are anxiety at the prospect of removal of sutures and the unaesthetic appearance of the vertical line of suture puncture scars. Potential advantages of cyanoacrylates therefore include reduced anxiety about removal of

sutures. Our study clinically compared n-butyl 2-cyanoacrylate with silk suture for closure of intraoral wounds. Postoperative parameters like pain, edema, wound dehiscence, and scar were evaluated and were found to have similar results. However ease of application, less time consumption, and better patient acceptability make cyanoacrylate more advantageous over silk sutures.

CONCLUSION

Future studies are required to evaluate long term results of intraoral usage to further its application. Research is needed for development of better tissue adhesives for usage in intraoral wounds with lesser tissue toxicity and better handling properties.

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