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

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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 and 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, 14^{th,} and 21st day and evaluated for pain, edema, wound dehiscence, and scar. Results were evaluated using the 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 the 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 advantages like ease of application, less time consuming, and is well accepted by patients.

Keywords: Oral Mucosa, Incision, Tissue adhesive, Sutures, n-butyl 2 Cyanoacrylate

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Introduction

Ideal wound healing largely depends upon the use of proper surgical techniquesand wound care. Good wound healing can be achieved by accurate incision, delicatetissue handling, precise wound approximation, good working properties of woundclosure material, and aseptic techniques to prevent pathogenic microbes from enteringthe 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, protectsunderlying 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 ofwound closure have many advantages such as achievement of careful closure, lowdehiscence rate, and resilient tensile strength [4]. However, sutures do have certaindisadvantage namely prolonged duration of surgery and anesthesia, tissue reactivity, risk of needle stick, undesirable trauma to the intact tissue on either side of the wound,permanent suture tracts, early removal which results in dehiscence, anxiety, and painduring removal and inadequate estheticN-butyl-2-cyanoacrylate, a tissue adhesive has also been tried to seal the wounds of theoral cavity and skin. Advantages of this adhesive over conventional wound closuretechniques include easy to use, rapid application, patient comfort, excellentbacteriostatic property, resistant to infection, no risk of needle stick injury, decreased repair time, good hemostasis, eliminates recalled visits and has good short and longtime cosmetic outcome [5]. Presently in oral and maxillofacial surgery, adhesives have a minimal role, but this ischanging rapidly [6]. Clinical trials are beginning for newly developed adhesives with thechemical characteristics, the safe reabsorptive profile, and the adhesive strengthnecessary 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 comparethe clinical responses of intraoral mucosal incisions closed with n-butyl-2-cyanoacrylates with incisions closed with silk sutures.

Materials and 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 minorsurgical Procedures. Patients werethen 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 silks uture and the opposite side with N-butyl cyanoacrylate and the surgicalsites were evaluated on first, third, seventh, fourteenth, and twenty-first postoperative days for any pain, edema, wound dehiscence and scarformation 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 medical laboratories limited and manufactured by Samarth life sciencesas 0.25 ml, 0.5 ml, 1ml ampule. As the suture is the most commonly used material for wound closure, the current study used a 3-0braided black silk suture - Mersilk to compare its consequential healing with that of XOIN glue. In third molar surgeries or Alveoloplasties, bilaterally symmetrical crestalincision was made on the lower arch. The length of incision varied from 3-4 cmdepending on the surgical access required for the procedure.After performing the surgical procedure and achieving adequate hemostasis, closures were performed on one side with n-butyl cyanoacrylate tissue adhesive and onthe other side with 3-0 black braided Mersilk suture and these sides were random lychosen. The side of the incision where n-butyl cyanoacrylate tissue adhesive was to be appliedwas isolated with dry gauze. The incised edges were accurately approximated, tryingnot to leave any gap between them. After loading the glue in a syringe, it was appliedat the approximated wound margins through the needle in the form of drops forthe closure of the mucoperiosteal flaps.Under the same aseptic precautions, anesthesia, 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-operativeinstructions regarding diet, avoid disrupting the wound at glue site, oral hygienemaintenance, and warm saline gargles were given to the patients. Statistical analysis of the information obtained was performed. Thedifferences with a P </= 0.5 were found to be statistically significant.

Results

A total of 60 patients were included in the study and were treated with 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 3-0Mersilk while the closure on the 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 thestudy were surgical extractions of third molars (40 cases), alveoloplasties (18 cases),and other minor surgeries (4 cases) like a cyst, canine impaction, etc. Theaverage time required for closure of third molar removal with silk suture was 4minutes 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-butylcyanoacrylate was 45 sec. Allthe results were accurately recorded and statistical analysis was done using the Chi-squaretest.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, a higher number of samples in both groups was found to have an absenceof a scar. On day 14, the number of samples with the presence of scars was found to be almostequal in both the groups but no statistically significant association was observedbetween materials and scar. The number of samples with the presence of scar was found to be higher in N-Butyl-2-Cyanoactylate group compared to the 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 timeintervals.

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 timeintervals.

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 lessscarring and the healing is rapid [7]. The primary steps in the management of surgical wounds are hemostasis and tissue approximation. Through ages, surgeons have used various materials to close the incision.They are metal clips, adhesive tapes, and sutures [8]. Every material has its ownadvantages and shortcomings. A never-ending search for a material to overcome theshortcomings of the various wound closure techniques led to the discovery of varioustissue adhesives [9]. Time taken for closure of wounds using silk sutures was considerably more thancyanoacrylate even in the present study. The average time required for closure of third molarremoval with silk suture was 4 minutes and N-butyl cyanoacrylate was 1 min. Inalveoloplasty cases, silk suture required 6mins and N-butyl cyanoacrylate required 45sec. In other minor oral surgeries, the average time required for closure with silksuture was 5 minutes and N-butyl cyanoacrylate was 45 sec.

Pasqualini and Cocero found the pain was less severe with secondary healing thanwith primary healing after third molar surgery. They used the visual analog scale, which is considered to be an

Efficacious tool to evaluate clinical parameters, such aspain.

No statistically significant association is observed between pain and the materialsused in the present study (P>0.05). A higher number of samples in the N-Butyl-2-Cyanoactylategroup were found to have no pain when compared to those in the Silk Suture group. The disadvantages of sutures are anxiety at the prospect of the removal of sutures and the unaesthetic appearance of the vertical line of suture puncture scars.

Potentialadvantages of cyanoacrylates, therefore, include reduced anxiety about the removal ofsutures. The present study clinically compared n-butyl 2- cyanoacrylate with silk suture for closure ofintraoral wounds. Postoperative parameters like pain, edema, wound dehiscence, and the scar was evaluated and was found to have similar results. However, ease ofapplication, less time consumption, and better patient acceptability makecyanoacrylate 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 the development of better tissue adhesives for usage in intraoral wounds with lesser tissue toxicity and better handling properties.

What does the study add to the existing knowledge?

To achieve proper wound healing, the incision should be accurate, tissue handling should be delicate, precise wound re-approximation, closure material should have an ideal working property and aseptic. Various other factors also contributing to ideal wound healing are systemic health, nutritional status, immune responses of individual and presence or absence of infection in the wound. ease of application, less time consumption, and better patient acceptability make cyanoacrylate more advantageous over silk sutures.

Author's Contributions

Dr. Jaydeep M Gadhavi: Formulated the aims and objectives with study design and helped in data collection from the medical record department.

Dr. Mukesh Chande: Contributed to the preparation of the manuscript and data analysis.

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