



## Surgery

## A COMPARATIVE STUDY OF NON SUTURE CLOSURE OF SURGICAL INCISION USING CYANOACRYLATE VERSUS CONVENTIONAL METHOD.

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**ABSTRACT** In our evolution we have had to past price for our specialization as We cannot regenerate most organs or appendages after damage. The highly developed mammals, including man require rapid restoration of defects caused by wounding. This cannot be achieved by regeneration but by repair. We can regenerate epithelial surfaces but not connective tissues.

**AIMS AND OBJECTIVES:** In the present study, we used the cyanoacrylate, tissue adhesive closure of surgical incision to compare the results with conventional methods to find out:

1. Incidence of infection
2. Time consumed
3. Duration of Hospital Stay
4. Cosmetic results

**Material and methods:** The study was conducted in sardar Patel medical college and hospital Bikaner for the period of one year 2009-2010.

**Inclusion criteria:** All Patients admitted in surgical ward for elective surgery.

**Exclusion criteria:** All patients with multiple comorbidities were excluded from the study.

**Conclusion:** Wound closure by cyanoacrylate was quicker, pain free, had better cosmetic appeal and the hospital stay of the patients was reduced. No significant difference was found in infection rate and wound complications.

**KEYWORDS :** Complications, Cyanoacrylate, Emergency

### Introduction

In our evolution we have had to past price for our specialization as We cannot regenerate most organs or appendages after damage. The highly developed mammals, including man require rapid restoration of defects caused by wounding. This cannot be achieved by regeneration but by repair. We can regenerate epithelial surfaces but not connective tissues. Wound management are fundamental to the practice of the surgery. In surgery or trauma, wound is frequently the primary pathology. In elective surgery it is through the wound (surgical incision) that access is obtained to deal with the underlying pathology. In both situations the surgeon's task is to minimize the adverse effects of wound, remove or repair damaged structures & harness the processes of wound healing, to restore function.

Severed tissue must be held in apposition until the healing process has endowed the wound with sufficient strength to withstand stress without mechanical support.

The surgical scar remains as the only visible evidence of the surgeons skill and not infrequently, the whole of his effort is judged on its final appearance. Basic & vitally important procedures of repair in surgical operations are techniques of joining & uniting tissue.

### There are various techniques of joining and uniting tissues.

Long times back in history (3000 B.C.) wounds were closed by Egyptians using thorns and needles. They also used adhesive linen strips, similar to modern day steristrips 2000 BC (Baily & love 25th edi.), medical literature contains references to the use of strings and snaws for ligating and suturing. South American used large black ants which bite the wound edges together.

### AIMS AND OBJECTIVES

In the present study, we used the cyanoacrylate, tissue adhesive closure of surgical incision to compare the results with conventional methods to find out:

1. Incidence of infection
2. Time consumed
3. Duration of Hospital Stay
4. Cosmetic results

### Material and methods

The study was conducted in sardar Patel medical college and hospital Bikaner. A total of 80 Patients were included in the study and divided into two groups.

### Inclusion criteria

All Patients admitted in surgical ward for elective surgery.

### Exclusion criteria

All patients of emergency surgery were excluded from the study

### OBSERVATION:

**TABLE -1: distribution of cases according to operation performed.**

Name of operation	No. Of cases in study group	%	No. Of cases in control	%
Herniotomy / Hernioplasty	11	27.5	10	25
Appendicetomy	6	15.0	8	20
Enucleation fibroadenoma breast	5	12.5	4	10
Traumatic lacerations	10	25.0	9	22.5
Open cholecystectomy	1	2.5	2	5
Throidectomy (hemi/subtotal/total)	3	7.5	3	7.5
Cut ear lobule repair	2	5.0	2	5.0
Lipoma excision	1	2.5	1	2.5
Dermoid cyst excision	1	2.5	1	2.5
TOTAL	40		40	

**TABLE-2: Distribution of cases according to site of operation.**

Name of operation	Study group		Control group	
	No.	%	No.	%
Face	13	32.5	12	30.0
Abdomen	8	20.0	10	25.0
Inguinal region/groin	11	27.5	10	25.0
Breast	5	12.5	4	10.0
Extremities	0	0	1	2.5
Neck	3	7.5	3	7.5
TOTAL	40		40.0	

**TABLE-3 : Distribution of cases according to sex**

	Study group		Control group	
	No.	%	No.	%
Male	21	52.5	23	57.5
Female	19	47.5	17	42.5
TOTAL	40		40	

**TABLE-4 : Distribution of cases according to age group.**

Age	Study group		Control group	
	No.	%	No.	%
0-14	19	47.5	16	40.0
15-18	4	10.0	5	12.5
Above 18	17	42.5	19	47.5

**TABLE-5: Disribution of cases according to average time taken in wound closure**

Size of wound	Study group		Control group	
	No.	Average time taken( in minutes)	No.	Average time taken( in minutes)
Upto 5cm	35	0.93	31	2.81
More than 5cm	5	3.87	9	5.86
Total	40		40	
Mean	1.10		3.64	
SD	1.03		2.02	
T	-5.45			
p	<0.001 <sup>HS</sup>			

**TABLE-6: Distribution of cases according to average duration of hospital stay**

OPERATION	Study group		Control group	
	No.	Duration (days)	No.	Duration (days)
Hernioplasty/ Herniotomy	11	2	10	Same day discharge
Appendectomy	6	3	8	5
Enucleation fibroadenoma breast	5	Same day discharge	4	2
Traumatic laceration	10	Same day discharge	7	Same day discharge
Open cholecystectomy	1	3	2	8
Thyroidectomy (hemi/subtotal/total)	3	4	3	6
Cut ear lobe repair	2	Same day discharge	4	Same day discharge
Lipoma excision	1	Same day discharge	1	Same day discharge
Dermoid cyst	1	Same day discharge	1	Same day discharge
Mean	2.72		4.72	
SD	1.03		2.50	
T	-4.76			
P	<0.001 <sup>HS</sup>			

**TABLE-7: Distribution of cases according to incidence of post operative inflammation (Erythema).**

Characteristics	Study group (n=40)		Control group (n=40)	
	No.	%	No.	%
No. Of patients developing erythema	7	17.5	9	22.5
t	0.31			
P	>0.05 <sup>HS</sup>			

**TABLE-8: Incidence of severity of infection**

Grades of infection and percentage	Study group (n=40)		Control group (n=40)	
	No.	%	No.	%
Overall no. of patients having infection	8	20.0	9	22.5
Serous discharge	8	20.0	6	15.0
Seropurulent discharge	3	7.5	7	17.5
T	0.22			
P	>0.05 <sup>HS</sup>			

**DISCUSSION:**

In the present study, Iso amyl 2 cyanoacrylate, a tissue adhesive was used in skin closure of various operations with an aim to find out:

- (I) time consumed.
- (ii) incidence of infection
- (iii) Duration of Hospital Stay
- (iv) Cosmetic result

Study included a wide spectrum of cases. Cases were selected from the patients in emergency as well as indoor surgical wards of P.B.M. Hospital Bikaner, both for study as well as control groups.

In this series of study we used iso amyl 2 cyanoacrylate glue over the incisions various parts of body (abdomen 20%, inguinal 27.5%, face 32% as shown in table no. 2) in different operations like Herniotomy, Hernioplasty, Appendicectomy, enucleation of fibroadenoma breast, lipoma excision, repair of cut ear lobule and cases of traumatic laceration from emergency department also included for repair.

In this study we have calculated time spent in the procedure. It varied with size of incision. We classified the incision as <5cm and >5cm in which average spent was 0.93 minute (In study group where we used cyanoacrylate) and 2.81 minute (in control group) respectively. By concluding mentioned data in table-5, it is clear that cyanoacrylate application required 1/3 time as compared to that required in suture technique. It has been seen that longer the incision, shorter the comparable time.

Similar observations were reported by Kaplan (1966), Kaplan, in his experimental study has shown that the time required to close the incision using the adhesive is 4th as compared to the suture technique.

Sabesta et al evaluated the use of cyanoacrylate for closure of laproscopic incisions versus sub cuticular suture. They found that mean time for skin closure using cyanoacrylate and suture was 3.7 min. and 14 min. respectively.

A study conducted by Barnett et al (1998) to compare histoacryl blue tissue adhesive glue with suturing in the repair of simple paediatric lacerations. Children 4 years old or older with non-ragged lacerations <5 cm in length, <12 hr old and not involving eyelid or mucous membrane were selected. A total of 163 patients were randomly allocated to either glue (83 cases) or sutures (80 controls) to repair their laceration. Primary outcome measures were cosmetic outcome at 3 and 12 months with secondary outcomes- length of time to perform procedure, and pain assessment of Procedure by doctor, nurse, parent and child. Tissue adhesive glue is faster and probably less painful than suturing. Tissue adhesive glue has the same cosmetic result as suturing when used for the repair of simple lacerations in children.

A study conducted by Ankerman et al (2005) showed that tissue adhesives are effective and yield results comparable to those with conventional suturing of superficial, linear, and low-tension lacerations. The cosmetic outcome is similar; Wound complications, such as infection and dehiscence, may be lower with tissue adhesives. Wound closure at superficial lacerations by tissue adhesive is quicker and less painful compared to conventional suturing.

A randomized controlled study conducted by Beam (2008) compared tissue adhesives with standard wound closure (SWC) (sutures, staples, adhesive strips) or tissue adhesive. This review provides evidence that tissue adhesives are an option to SWC (sutures, staples, adhesive Strips) for the management of simple traumatic laceration. Overall, no significant differences were found in cosmetic scores at the reported assessment periods between tissue adhesives and SWC. At 1 to 3 months, a subgroup analysis significantly favored butylcyanoacrylate over SWC. Tissue adhesives significantly lowered the time to complete the procedure, levels of pain and rate of erythema. However, the data revealed a significant increase in the rate of dehiscence with the use of tissue adhesives when compared with SWC. The low methodologic quality of the evidence should be considered in the interpretation of the findings.

The majority of cases where cyanoacrylate was applied for wound closure were discharged on the same day or the next day unless any complication arises as shown in table no.6. the patients of herniotomy and traumatic lacerations no follow up was required.

The duration of the hospital stay is important in modern context, where the numbers of beds in hospital are limited and prolonged stay in the hospital causes an unnecessary financial and mental burden to the patient as well as to the hospital authorities. The duration of hospital stay in patients with cyanoacrylate closure was markedly less than those with sutures (table-6). p value is <.001 that is highly significant.

In our study, we do not find any significant difference in incidence of infection in study or control group. Overall 20% and 22.5% patients had wound complication in study and control group respectively and 2 patients required secondary suturing in study group as compared to 1 patient in control group. 1 But in cases of traumatic laceration repair 2

Patients out of 10 developed wound erythema and serous discharge in study group as compared to 4 patients out of 9 in control group in emergency department of our hospital.

Brunius and Ahren(1967) in their study on albino rats showed that tensile strength of incisions with non suture techniques was higher than that of sutured dehiscence. In this study, total 3 patients required secondary suturing and all patients were having appendectomy wound.

In a study conducted by Dalvi et al (1986) 3.57% cases of wound closure by cyanoacrylate developed wound dehiscence and required secondary suturing Whereas only 12% cases required secondary suturing.

In majority of cases the glue was removed by patient himself on 7<sup>th</sup> day. This can easily be done by washing the part with soap solution or with savlon. No sterile instrument and assistance was required. The removal was entirely painless and pleasant for most of the patients especially children.

### SUMMARY AND CONCLUSIONS

With the recent development in the field of tissue adhesives, cyanoacrylate has emerged as an easy, rapid, effective and pain free method of wound closure because of its ability to polymerize quickly.

This was a clinical study in which various surgical and traumatic cutaneous wounds were closed by the application of iso amyl 2 cyanoacrylate, a bioadhesive. Wound edges of some 40 patients were approximated by cyanoacrylate tissue adhesive and the results were critically analysed and compared with the control group comprising of about 40 patients in which conventional method of wound closure was used.

Wound closure by cyanoacrylate was quicker, pain free, had better cosmetic appeal and the hospital stay of the patients was reduced. No significant difference was found in infection rate and wound complication.

### CONCLUSIONS:

The following conclusions could be drawn from our clinical study.

1. Wound closure by cyanoacrylate was easier and less time consuming reducing the anesthesia time.
2. The procedure itself does not require any kind of anaesthesia and is pain free. In emergency department no specialized technique, & usually no sterilized instruments required for its application.
3. Painful needle prick for local anesthesia is avoided.
4. No significant difference in the incidence of wound infection in study and control group.
5. The compound is non toxic and no case of skin hypersensitivity was noted in our study.
6. Use of cyanoacrylate is acceptable to patients also, especially children. Its pain free wound closure in emergency department, particularly in superficial clean lacerated wound.
7. The cyanoacrylate tissue adhesives have also been shown to have a barrier function against microbial penetration and serve as an optimal wound dressing, no frequent change of dressing is required.
8. Cyanoacrylate released mental and hospital burden over patients due to less visits to hospital and thus reduces psychological trauma due to physical illness.
9. Cyanoacrylate did not cause itching dermatitis, eczema in any case. It did not provoke bleeding in any case.
10. The cosmetic results were much better in wounds closed by cyanoacrylate than those closed by conventional methods. The cyanoacrylate closed incision scar was better without any cross hatching or unevenness of the edge.
11. It is not very successful at places where body contour is uneven, it is not very successful in closure of curved incision.
12. Considering cost effectiveness, use of cyanoacrylate is comparable to suturing as it reduces hospital stay, nursing care and dressing care.
13. Lastly painful removal of sutures is averted.

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