

A Comparative study of Skin Closure by Adhesives (N-Butyl Cyanoacrylate) v/s Conventional methods

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Abstract

The skin closure by adhesives (Glue) is quick method of skin approximation. It reduces closure time by half in comparison of stapler technique and the one tenth of the conventional techniques. Glue leaves a hair line scar whereas other method gives additional pins & suture marks on both side of incision line. Glue gives no pain which a patient experiences during suture / stapler.

Keywords: Tissue Adhesives, cyanoacrylate, suture, staplers, wound closure, wound cosmesis.

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INTRODUCTION

In the past the options for wound closure have been limited largely to sutures (needle and thread) and with other alternatives such as staplers. Tissue adhesives have entered clinical practice more recently. Closure of wounds with sutures enables meticulous closure, but sutures may induce reactivity and they usually require removal. Tissue adhesives (glues) offer the advantages that the patient does not require suture removal at a later date and there is no risk of needle stick injury to the surgeon or assistant. The introduction of tissue adhesives has been received enthusiastically since they may result in equivalent tensile strength, improved cosmetic appearance of the scar and lower infection rate when

compared with sutures, staplers and adhesive tapes, and they are without many of the risks and disadvantages of alternative methods.^{1,2,3}

MATERIAL AND METHODS

The study was conducted on 300 patients admitted in surgical unit of NIMS Hospital, Jaipur from 1st April 2013 to 30th August 2015. Study group included patients undergoing elective surgery only, in routine theatre days. Only clean & clean contaminated wounds were included in the study. Dirty & frankly contaminated wounds were not included. Following surgical procedures were included: Cholecystectomy, Appendisectomy & Herniorrhaphy. Glue closure was done with Endocryl 0.25 CC, 0.5 CC & 1.0 CC pack for incision having maximum length of approximately 10.00cm. For stapler closure, we used Ethicon proximate plus disposable devices. For conventional closure routine linen thread was used. First dressing was usually seen on 3rd post operative day. If stitch-line was healthy then patient was discharged and if staple/sutures were used we removed those on 7th to 10th post operative days. Patients with poor outcome were managed with antibiotics, drainage of collection or secondary re-suturing, whatever required.

OBSERVATIONS

Table 1: Distribution of cases according to type of surgery

Type of Surgery	Glue closure	Stapler closure	Conventional suture	Total
Clean (A)	35	32	35	102
Clean contaminated (B)	65	68	65	198
Total	100	100	100	300

Table 2: Post operative outcome in glue v/s stapler and conventional methods

	CLEAN SURGERY (A)			CLEAN-CONTAMINATED (B)		
	Glue closure	Stapler	Conventional	Glue	Stapler	Conventional
TOTAL	35	32	35	65	68	65
No Infection	32	28	29	54	54	50
Infection present	03	04	06	11	14	15
RATE OF INFECTION	08.57%	12.50%	17.14%	16.92%	20.58%	23.07%

Table 3: Distribution of cases and outcomes according to surgical procedures

TYPE OF SURGERY	GLUE APPROXIMATION			STAPLER APPROXIMATION			CONVENTIONAL APPROXIMATION		
	No. Of cases	Infection present	Infection rate	No. Of cases	Infection present	Infection rate	No. Of cases	Infection present	Infection rate
Appendisectomy	32	05	15.62%	28	06	21.42%	35	08	22.85%
Cholecystectomy	33	06	18.18%	40	08	20%	30	07	23.33%
Herniorrhaphy	35	03	08.57%	32	04	12.50%	35	05	14.28%

Table 4: Presentation of wound infection in post-operative period

Presentation	Glue closure		Stapler closure		Conventional closure	
	No. Of cases	%(out of 100 cases)	No. of cases	%(out of 100 cases)	No. Of cases	%(out of 100 cases)
Fever/ tachycardia	0	0%	02	02%	04	04%
Pain/ itching at stitch line	0	0%	02	02%	03	03%
Collection	14	14%	13	13%	11	11%
Redness	0	0%	01	01%	02	02%

Table 5: Management of post-operative infection

Management	Glue series		Stapler series		Conventional series	
	No. Of cases	%(out of 14 cases)	No. Of cases	%(out of 18 cases)	No. Of cases	%(out of 20 cases)
Conservative (antibiotics)	02	14.28%	03	16.66%	09	45%
Drainage	02	42.85%	08	44.44%	05	25%
Secondary suturing	06	42.85%	07	38.88%	06	30%

Table 6: Comparison of scar quality in glue closure versus stapler versus conventional closure

Scar quality	CLEAN SURGERY(A)						CLEAN CONTAMINATED (B)					
	Glue closure		Stapler closure		Conventional closure		Glue closure		Stapler closure		Conventional closure	
	No. Of cases	%	No. Of cases	%	No. Of cases	%	No. Of cases	%	No. Of cases	%	No. Of cases	%
Minimum scarring	35	100%	24	75%	20	57.14%	65	100%	54	79.41%	49	75.38%
Scarring(but acceptable)	0	0%	08	25%	11	31.42%	0	0%	09	13.23%	12	18.46%
Ugly hypertropic scar	0	0%	0	0%	04	11.42%	0	0%	05	07.35%	04	06.15%

RESULTS AND DISCUSSION

Tissue adhesives have been used in various forms for more than 35 years since the first cyanoacrylate adhesives were synthesised in 1949.⁴ The early adhesives were

appropriate for small superficial lacerations and incisions but their limited physical properties prevented their use in the management of other wounds. There were also reports of acute and chronic inflammatory reactions⁵. More recently tissue adhesives have been developed with

further improved strength and combining plasticisers and stabilisers to increase flexibility.⁶

Topical adhesives, made from medical grade cyanoacrylates, polymerise into a thin protective film over the wound edges when they come into contact with moisture in the skin. The polymerised cyanoacrylate adheres to the skin and by itself, forming a clean strong adherent bond that holds the edges of skin wounds together so that wounds can heal normally underneath the film. When intact, the polymerised film also acts as a microbial barrier to protect the wound from the potential colonisation of infection-causing micro-organisms originating outside the wound. Topical tissue adhesives slough from the skin in 7 to 10 days as the skin heals underneath and it is no longer required, thus eliminating the need for non-absorbable suture or stapler removal.⁷

In our study we found that for clean type surgery, the post operative wound infection rate was 8.5 % in series of Glue skin approximation, whereas 12.5 % in stapler series and 17.14% in conventional closure. Infection was maximum for clean contaminated type of surgery. In these series infection rate in glue closure was 16.92 %, whereas 20.58% in stapler series and 23.07% in conventional closure. Overall infection rate was 14% for glue series, 18% for stapler series and 20% for conventional series. Although no statistical significant difference in rates of wound infection was seen after surgical incision closure with sutures or staples or amongst tissue adhesives, the cosmesis of scar was significantly better. Patient satisfaction was also more when comparing alternatives for cosmesis, overall comfort, ability to shower, dressing changes, tension on wounds, hygiene problems, allergic reactions and the lack of requirement for removal⁸. Also the tissue adhesives significantly lowered the time to complete the procedure, levels of pain, and rate of erythema. The study also provides the evidence that topical tissues adhesives offer a fast and less traumatic skin closure for appropriately selected wounds with distinct advantages over non-absorbable sutures and staples. Though the tissue adhesives cost more than their alternative, a dressing is not required over the tissue adhesive as is the usual with alternatives. Also, when taking into the account the overall cost of the surgical procedure then this small difference may be of less significance.

CONCLUSION

Tissue adhesive maybe quicker and easier to use than stitches for closing surgical wounds, and there are no stitches to remove They offer the benefit of decreased procedure time, less pain and no follow-up for removal, when compared to standard wound closure. Surgeons may consider the use of tissue adhesives as an alternative to sutures or staplers for the closure of incisions in the operating room. The study found that glue is an excellent substitute for stitches and staplers to close clean wounds^{1,2,3,9,10}.

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