

Evaluation Of Different Types Of Skin Closure Techniques

F Shah, M Porecha, M Gandhi, P Mehta, B Prajapati, Niket

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Abstract

The scar is the signature of the surgeon. Apart from cosmetically good scars it is also necessary that the skin closure technique should be technically easy, acceptable, speedy and economical. AIMS: To evaluate different techniques viz simple interrupted closure, vertical mattress closure, subcuticular stitches, glue application and staple closure in terms of time taken, acceptability, cost and cosmetic outcome. MATERIALS AND METHODS: This study was carried out in 100 patients (20 in each group). RESULTS: Simple suture, though speedy and economical, was not favoured by paediatric patients. It was evident that in smaller wounds (5cm) simple suture, glue and staples were faster than other types of closure while subcuticular closure was slowest. Glue application had higher acceptability. As the wound size increased, the vertical mattress technique was used; however, it was slower than simple and staple closure. In larger wounds (>10 cm), stapling was significantly faster than vertical mattress. There was only one major wound infection with glue closure. Simple suture had the cheapest per centimetre cost while glue had highest cost in smaller wounds. In larger wounds, simple closure did remain cheapest; however, vertical mattress and stapling had identical cost. Cosmesis was excellent in glue and subcuticular stitches while in other cases it was mostly good. CONCLUSION: Newer methods of skin closure like staples and glue are as good as traditional methods of suture closure and both are cosmetically better, have better patient acceptability and are speedy, operator friendly and cost-effective, too.

INTRODUCTION

A basic need of skin closure is good approximation. Good tissue union and cosmetically acceptable scars are vital for ideal surgical practice. Today, wound closure techniques have evolved from early developments in suturing materials to advanced resources that include synthetic sutures, absorbable sutures, staples, tapes, and adhesive compounds. The main aims of skin closure are good tissue approximation, ease of performance, good patient acceptability, less/minimal scar and good cosmetic appearance. So this study was aimed to study various aspects of different types of skin closure techniques in terms of technical easiness, time required, patient's acceptance, cost effectiveness and cosmetic outcome.

MATERIALS AND METHODS

This study was carried out in 100 patients from June 2009 to June 2011 at M.P.Shah Medical College, Jamnagar, Gujarat, India. Surgical procedures selected were clean or clean-contaminated wounds. In all patients wound size, length of material used and time taken for closure were noted. The wound was inspected on the 7th post-operative day, then on

the 14th post-operative day and further at end of the 1st, 2nd, 3rd and 6th month. Twenty patients were randomly selected for each method of closure, namely simple stitches, vertical mattress stitches, subcuticular stitches, adhesive glue and stapler.

OBSERVATIONS AND RESULTS

Series A: Simple interrupted stitches with 3-0 monofilament nylon

Series B: Vertical mattress with 3-0 monofilament nylon

Series C: Subcuticular stitches with 4-0 polypropylene

Series D: 2-octyl cyanoacrylate adhesive glue

Series E: Staples

Figure 1

TABLE 1 Age distribution

AGE (years)	A		B		C		D		E	
1-10	5	25%	1	5%	14	70%	11	55%	3	15%
11-20	7	35%	0	0%	5	25%	4	20%	2	10%
21-30	1	5%	6	30%	1	5%	2	10%	5	25%
31-40	2	10%	3	15%	0	0%	2	10%	2	10%
41-50	2	10%	3	15%	0	0%	1	5%	3	15%
51-60	2	10%	3	15%	0	0%	0	0%	5	25%
61-70	1	5%	4	20%	0	0%	0	0%	0	0%
TOTAL	20		20		20		20		20	

Figure 2

TABLE 2 Length of wound/time taken for closure

Length of Wound (centimetres)	Total no of patients					Time taken for closure					
	A	B	C	D	E	MINUTES	A	B	C	D	E
<5CM	7	1	5	17	7	<5	7	0	0	14	6
	35%	5%	25%	85%	35%	5-10	0	1	4	03	1
						>10	0	0	1	0	0
5-10CM	8	14	15	3	8	<5	7	0	0	0	7
	40%	70%	75%	15%	40%	5-10	1	14	4	3	1
						>10	0	0	11	0	0
>10CM	5	5	0	0	5	<5	0	0	0	0	0
	25%	25%	0%	0%	25%	5-10	5	0	0	0	4
						>10	0	5	0	0	1

Figure 3

TABLE 3 PROCEDURES FOR WHICH CLOSURE WAS DONE

Procedures	A	B	C	D	E
Laparoscopy	1	0	0	4	4
Suprapubic cystolithotomy	0	3	2	0	0
High ligation	1	0	12	0	0
Inguinal meshplasty	0	8	0	1	5
Excision of swelling	1	2	0	0	0
Laparotomy	0	2	0	0	3
CLW closure*	13	5	6	15	6
Thyroidectomy	4	0	0	0	2

*CLW = Contused lacerated wound

Figure 4

TABLE 4 FOLLOW-UP ON VARIOUS POST-OPERATIVE DAYS

Follow-up	Group	Wound grade					
		0	1	2	3	4	5
7 th DAY	A	18	02	00	00	00	00
	B	14	03	01	02	00	00
	C	19	01	00	00	00	00
	D	15	04	00	00	00	01
	E	17	03	00	00	00	00
14 th DAY	A	18	02	00	00	00	00
	B	16	04	00	00	00	00
	C	20	00	00	00	00	00
	D	20	00	00	00	00	00
	E	20	00	00	00	00	00
WOUND GRADE CLASSIFICATION		NORMAL	ERYTHEMA REDNESS	OEDEMA TENDERNESS	SEROUS DISCHARGE	PUS DISCHARGE	DEHISCENCE

Figure 5

TABLE 5 AVERAGE COST OF MATERIAL PER CM OF WOUND LENGTH

Wound length (cm)	Average cost /cm in rupees/ (Dollar \$)				
	A	B	C	D	E
Up to 5	3.05 (0.06)	9.30 (0.186)	4.35 (0.087)	21 (0.42)	8.40 (0.168)
6-10	3.40 (0.068)	11.20 (0.224)	4.20 (0.084)	14.60 (0.292)	11.75 (0.235)
11-15	3.20 (0.064)	11.90 (0.238)			12.50 (0.25)
16-20	4.45 (0.09)	12.90 (0.258)			12.90 (0.258)
21-25		12.30 (0.246)			
Material used	3-0 on needle nylon (70cm)	3-0 on needle nylon (70cm)	4-0 on needle polypropylene	One vial of 2-octyl cyanoacrylate adhesive glue	Stapler 55 pins
Rupees	113 (2.26)	113 (2.26)	129 (2.58)	1070 (21.4)	750 (1.5)

1\$=52 Rs or 1Rs= 0.02 \$

Figure 6

TABLE 6 COSMETIC OUTCOME (VISUAL ANALOGUE SCORE)

APPEARANCE	A	B	C	D	E
FAIR	0	2	0	1	0
GOOD	16	16	2	4	17
EXCELLENT	04	2	18	15	03

DISCUSSION

It is said that the scar is the “signature of a surgeon”. Every surgeon wants cosmetically acceptable scars along with optimal healing. The findings of various methods of skin closures are discussed here. The majority of simple sutures were taken in the age group <20yrs (60%). It is easier to appose a wound in young age without undue tension and inversion. So this technique suffices in this age group. Vertical mattress sutures were taken more frequently in age group >20yrs (95%) as the skin tends to get inverted; hence,

it needs to be everted for proper apposition. This technique keeps the skin adequately everted without undue tension across suture lines. Subcuticular stitches were taken more commonly <10 yrs(70%) as the skin is soft and supple and this technique helps in cosmesis, which is also helped by good healing tendencies of this age group. Adhesive glue was used more frequently <10yrs (55%) as easy approximation and good healing help in better cosmesis and this age group accepted this technique more than suturing due to fear associated with suturing. Skin staples were more commonly taken in the age group of 21 to 60yrs (75%). It was evident that in smaller wounds (5cm) simple suture, glue and staples were faster than other types of closure while the subcuticular technique was slowest. As the wound size increased, vertical mattress technique was used; however, it was slower than simple and staple closure. In larger wounds >10 cm, stapling was significantly faster than vertical mattress sutures. Simple suture, glue and stapling were preferred when rapid closure was needed. Subcuticular stitches and glue were preferred where cosmesis was also a prime concern. There were no major wound infections with all types of closure except in one patient (contused lacerated wound of 7cm) with glue closure who had a wound dehiscence (grade 5) which was closed secondarily by vertical mattress sutures. One patient each of suprapubic cystolithotomy and laparotomy who had vertical mattress closure had grade 2 wound infection. Simple suture had the lowest per centimetre cost while glue had the highest one in smaller wounds. In larger wounds simple closure did remain cheapest; however, vertical mattress closure and stapling had identical cost. Cosmesis was excellent with glue and subcuticular stitches, while in other cases it was mostly good.

SUMMARY AND CONCLUSIONS

Simple interrupted suture was fastest to take and economical. Cosmetic outcome was good; however, it had low acceptability in children due to fear of needle and local anaesthesia. Vertical mattress suture was used for general purpose. It was somewhat more time-consuming than simple closure as well as stapler closure. Cosmetic outcome was good with cost comparable to stapler in longer incisions. It was unacceptable to children. Subcuticular stitches had excellent cosmetic outcome; however, it was time consuming and slightly more expensive than simple and vertical mattress closure. Glue application was easy and had excellent cosmetic outcome with great acceptability in all

age groups due to lack of needle fear and anaesthesia^(1,4). Application was also fast^(3,4,9) with less chance of infection due to its antimicrobial property⁽¹⁾. However, some studies have shown that it has a greater chance of gap.^(2,8) Tissue adhesives showed excellent cosmetic outcomes in laparoscopic port-site closure as compared to staples in our study, which was comparable to other studies^(2,5). Adhesive glue was costly to use for small wounds as it was not reusable. However, as the wound size increases the cost comes down due to reduced physician and ancillary services, reduced equipment needs, and elimination of the need for suture removal^(2,7). Closure with staples was faster than vertical mattress sutures in larger wounds with identical cost and had good patient acceptability of scar. The merits of stapling come down to its convenience and rapidity. Staplers were well liked by operators. This correlates with findings of Owen et al.⁽⁶⁾ who also thought it resulted in a substantial and worthwhile saving in time for wound closure. From this study we conclude that

“Newer methods of skin closure like staples and glue are as good as traditional methods of suture closure and both are cosmetically better, have better patient acceptability and are speedy, operator friendly and cost- effective.¶

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Author Information

Frans Harshad Shah

Assistant Professor, Surgery Department, M.P.Shah Medical College

Mehul M Porecha

Associate Professor, Surgery Department, M.P.Shah Medical College

Mona Dineshchandra Gandhi

Associate Professor, Obstetric and Gynecology Department, M.P.Shah Medical College

Purvi Mehta

Associate Professor, Anaesthesia Department, M.P.Shah Medical College

Bharat Prajapati

Assistant Professor, Surgery Department, M.P.Shah Medical College

Niket

Third year resident in surgery, Surgery Department, M.P.Shah Medical College