



SURGICAL SKIN CLOSURE OF POST AURAL INCISION BY CONVENTIONAL SUTURES VERSUS ADHESIVE GLUE FOR EAR SURGERIES- A RANDOMIZED CONTROL TRIAL

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ABSTRACT **Title:** Surgical Skin Closure of Post-Aural Incision by Conventional Sutures Versus Adhesive Glue for Ear Surgeries- A Randomized Control Trial **Aim:** This study compares skin closure time, wound healing, and cosmetic outcomes between conventional sutures and adhesive skin glue in ear surgeries. **Methodology:** A randomized trial was conducted on 50 patients undergoing tympanoplasty or mastoidectomy. Group A used conventional sutures (Ethilon-3-0) and Group B used adhesive skin glue (QUICKFIX™). Closure time, pain (Visual Analog Scale at 24, 48, 72 hours, and Day 7), wound healing (ASEPSIS scores on Days 2, 7, and 15), and cosmesis (modified Hollander Cosmesis Scale on Days 7, 15, and 30) were assessed. **Results:** Group A had significantly faster closure (13.68 seconds vs. 816 seconds). Pain scores were similar between groups. No significant differences were found in ASEPSIS or cosmesis scores, with all patients achieving optimal outcomes by Day 30. **Conclusion:** Both methods showed similar outcomes in pain, infection, and cosmesis. Adhesive glue offers quicker closure and no need for suture removal, making it a preferable option.

KEYWORDS : adhesive skin glue, sutures, wound closure time, ASEPSIS score, cosmesis score

INTRODUCTION

A surgeon's signature is scar^[1]. Wound closure from pre-historic till date has evolved with mankind. Numerous techniques and developments have occurred in management and closure of wounds. Closing of wounds to achieve an aesthetically pleasing scar has always been a challenge. The ideal surgical wound would be as strong as normal tissue. Douglas and Forester found that the maximum strength in the tissue that could be regained after wound closure is 80% even on one year follow-up^[2]. Wound closure technique has evolved widely over the period of time. Various methods of skin closure are available in places of traditional sutures like adhesive compounds, tapes and staples^[3].

During Vietnam War (1955-1975) it was revealed that cyanoacrylate glue had an unusual property to grip wounds shut. It polymerized and toughened when left open to moisture. Ultimately, trauma surgeons or field surgeons begun to spray it on wounds prior to transporting patients to the military hospitals and as a result, many lives were saved^[4].

The most widely used tissue adhesives nowadays come from alkyl cyanoacrylates^[4]. Octyl-2-cyanoacrylate is now being used in hospitals across the world, mostly for minor surface wound repairs and in places wherein the use of sutures would demonstrate to be unreasonable or tricky.^[5]

Even with various skin closures techniques, the basic doctrine of skin closure technique has not changed. That is to bring together the edges of skin in an everted position and thereby lessening the tension on the wound. The means of wound closure should ideally be cheap, quick, painless, simple, safe, if possible bactericidal, and should be able to produce the optimal cosmetic result. Adhesive glue suits the standard, it supplies a quick, trouble-free, water resistant sealed needle free skin closure which is also cosmetic. It also has anti-microbial properties and hence, requires no added antiseptic bandaging. Reduced pain was noted in post-op period. Patients are able to bathe. The wound disappears naturally, leaving no incision mark and no suture or stapler removal is required. Probability of infection of wound with adhesive glue, appropriate features for closure of the wound such as adequate power, barrier proficiency in tissues, and potential to bind in clammy environment.^[6]

Aims

- To compare skin closure time between both method (conventional sutures v/s adhesive skin glue).

- To compare post-op wound healing between both method (conventional sutures v/s adhesive skin glue).
- To compare post-op cosmetic appearance and any other complications (post-op pain, wound gaping, scar) between both method (conventional sutures v/s adhesive skin glue).

Methodology

Inclusion Criteria:

- Patients of age group 10-50 years.
- Patients undergoing ear surgeries- Tympanoplasty, Canal wall up and Canal wall down surgeries.

Exclusion Criteria:

- Patients with history of diabetes mellitus, Immunosuppression, Malignancies, prone to develop hypertrophic scars or Keloid.
- Patients who has undergone previous ear surgery.

A single blinded randomized control trial, after attaining ethical clearance from institutional ethical committee, Study was conducted on 50 patients requiring ear surgery (tympanoplasty, canal wall up or canal wall down mastoidectomies) after fulfilling inclusion criteria that are admitted under Department of Otorhinolaryngology. patients were enrolled for the study, a thorough history, physical and clinical (ENT examination) examination was done. Written informed consent was taken.

Patients were divided in 2 groups 1 & 2 by a computer generated randomized table. In group 1, incision was closed by conventional sutures Ethilon- 3-0 (Black monofilament nylon) and in group 2, incision was closed by surgical adhesive glue- QUICKFIX™ -topical skin adhesive (N-Butyl 2 Cynoacrylate) Qubix Medicare. Same antibiotic protocol was followed. In both the groups, time taken to close the incised wound was noted using a stopwatch. The postoperative pain was assessed at 24hrs, 48hrs, 72hrs and 7th day using visual analogue scale.

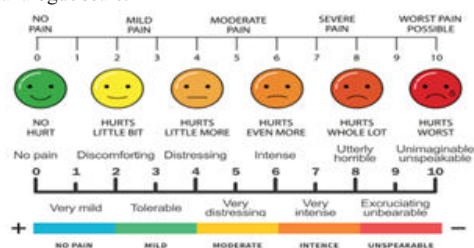


Figure 1. Visual analogue scale.

The outcome of wound was assessed at post op day 2nd, 7th and 15th using standard wound asepis scoring system.

Wound characteristic	0	Proportion of wound affected				
		<20	20-39	40-59	60-79	>80
serious exudates	0	1	2	3	4	5
Erythema	0	1	2	3	4	5
purulent exudates	0	2	4	6	8	10
Separation deep tissues	0	2	4	6	8	10
Points are scored for daily wound infection						
Additional treatment					Points	
Antibiotics					10	
Drainage of pus under local anesthesia					5	
Debridement of wound (general anesthesia)					10	
Serous discharge*					Daily 0-5	
Erythema*					Daily 0-5	
purulent exudate*					Daily 0-5	
Separation deep tissues*					Daily 0-5	
Isolation of bacteria					10	
Stay as inpatient prolonged over 14 days					5	
*Given score only on 5 to 7 days. Highest weekly score used. Category of infection -Total						
score 0-10: Satisfactory healing ,11-20: Disturbance of healing, 20-30: Minor wound infection,						
>40: Severe Wound infection (Wilson AP et al) ¹⁶						

Figure 2. Asepis Score^[7,8]

The wound was assessed for cosmesis on post op day 7th, 15th and 1 month using modified Hollander cosmesis scale.

Incision attribute	Score if absent	Score if present
Step-off borders	0	1
Contour Irregularities	0	1
Margin Separation	0	1
Edge inversion	0	1
Excessive Distortion	0	1
Overall appearance	0 (satisfactory)	1 (unsatisfactory)
Total Hollander score	0 (best)	6 (worse)

Figure 3. Modified Hollander Cosmesis Scale.

RESULTS:

Table 1. Age And Gender Distribution

Group	1	2
Age (in years) (Mean + SD)	30.16±11.86	33.68±11.67
Female	16 (64%)	11 (44%)
Male	9 (36%)	1 (56%)

The mean age of participants in **Group 1** was **30.16 ± 11.86 years**, while in **Group 2**, the mean age was **33.68 ± 11.67 years**.

Table 2. Post-operative Pain In 2 Groups Of Patients.

Duration in hours	Group 1	Group 2	P value
12 hrs	5.80±0.64	6.12±0.83	0.13
24	4.44±0.71	4.68±0.95	0.16
48	3.24±0.59	3.0±0.82	0.11
72	2.12±0.33	2.08±0.28	0.13

Pain scores was assessed at 12, 24, 48, and 72 hours post-surgery for both groups. At all time points (12h: p = 0.13, 24h: p = 0.16, 48h: p = 0.11, 72h: p = 0.13), there were no statistically significant differences in pain scores between the two groups. Both groups showed similar pain levels throughout the recovery period.

Table 3. ASEPIS score distribution in both groups of patients.

Table 1: ASEP Score distribution in young cups of patients			
Asepsis Score	Group 1	Group 2	p-value
Day 2			
0	12	12	0.38
1-10	12	11	
11-20	1	1	
>20	0	1	
Day 7			
0	22	19	0.23
1-10	3	5	
11-20	0	1	

>20	0	0	
Day 15			
0	25	25	p-value can not be calculated
1-10	0	0	
11-20	0	0	
>20	0	0	

ASEPIS scores was assessed on Day 2, Day 7, and Day 15 to evaluate infection or complications. On Day 2 (p = 0.38) and Day 7 (p = 0.23), no statistically significant differences were found between the groups, with most patients having an ASEPIS score of 0. By Day 15, all patients had an ASEPIS score of 0, indicating no infections or complications, and no statistical analysis was possible.

Table 4. Duration For Wound Closure.

Time taken to close wound	1	2	p
	13.68±1.547	816±155.88	<0.05

The p-value, significantly smaller than 0.05, indicates a statistically significant difference between the two groups in incision closure time. Group 1 took an average of 13.68 seconds, whereas Group 2 took 816 seconds (13.60 minutes), with Group 1 closing the incision much faster.

Table 5. Cosmesis Score Distribution In Two Groups Of Patients.

Cosmesis Score	1	2	p
Day 7			
0	20	18	0.25
1-3	5	7	
Day 15			
0	24	22	0.30
1-3	1	3	
Day 30			
0	25	25	P value can not be calculated as it has 0
1-3	0	0	

The Cosmesis Score was assessed on Day 7, Day 15, and Day 30 to evaluate cosmetic outcomes. On Day 7 (p = 0.25) and Day 15 (p = 0.30), no statistically significant differences were found between the groups, with most patients in both groups having a score of 0. By Day 30, all patients had a score of 0, indicating excellent cosmetic outcomes, and no p-value could be calculated.

DISCUSSION:

In our study total of 50 patients were included and randomised into 2 groups. In group 1, incision was closed by conventional sutures Ethilon- 3-0 (Black monofilament nylon) and in group 2, incision was closed by surgical adhesive glue- QUICKFIX™-topical skin adhesive (N-Butyl 2 Cyanoacrylate) Qubix Medicare and found statistically significant in terms of wound closure time but no statistically significant in terms of post operative pain, and cosmesis.

In a study conducted by Ridgway et al^[9], average time taken for closure of cervicotomy incision in neck surgeries with glue was much more than with skin staplers with a mean difference of 67 sec. Reported average time for skin closure in the adhesive group to be 100 sec and the average time for the placement of staples was 30 sec in patients undergoing arthroplasty. According to Chibbaro et al^[10], there was no significant difference between surgical adhesive glue and skin staples for closure of neurosurgical scalp incisions. In our present study shows that glue population wound closure time was less when compared with sutures. This comparison had a strong statistical significance explaining that glue closure had taken lesser time for wound closure when compared to sutures.

Studies by Zempsky et al^[11], Arunachalam et al^[12], have compared the post-operative pain using a visual analog scale and shown less post-operative pain following adhesive glue closures but had failed statistical significance. In present study there were no significant differences in pain scores between the two groups. Both groups showed similar pain levels throughout the recovery period.

Khan et al^[7], and Chibbaro et al^[8], had no significant difference as regards with serous collection in their studies between both groups. 13 Cases in staple group developed wound gaping as compared to glue group. In our study no significant differences was found between the groups, with most patients having an ASEPIS score of 0. By Day 15, all patients had an ASEPIS score of 0, indicating no infections or complications.

Keng et al^[13], in a randomized series of 43 patients whose operations involved a groin incision found that the glued wounds had consistently better cosmetic scores (mean score 4.71 at 4 weeks) compared to subcuticular wounds (mean score 4.00 at 4 weeks) with a $P < 0.05$.²⁴ in present study no significant differences were found between the groups, with most patients in both groups having a score of 0. By Day 30, all patients had a score of 0.

CONCLUSION:

Group 1 showed a significant advantage in wound closure time, there were no statistical significance between the groups in terms of pain, infection and cosmetic outcomes, suggesting that both interventions led to similar post-operative recovery experiences for the patients. In group 1 there is additional advantage of no post-operative removal of sutures required. Therefore, adhesive skin glue merits to be the closure method of choice for a wound closure.

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