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Original Article

A Study of Primary Skin Closure by Intradermal Stitches with and Without Adhesive Tapes

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Abstract

The study was done to evaluate whether adhesive tape after intradermal skin closure in face and neck produces better aesthetic scar than intradermal skin closure in face and neck without adhesive tape. It was a prospective, interventional, purposive study and was done in department of Plastic Surgery, Dhaka Medical College Hospital (D.M.C.H.) from July 2005 to October 2007. A total of 90 patients was included in the study. In one group (A), face and neck skin was closed by intradermal stitches with Vicryl. In other group (B), face and neck skin was closed by intradermal stitches with Vicryl 6/0, cutting body needle with adhesive tape (Nichistrip). The study included 76 patients. The age range was from 13-45 years. 34 patients were male and 42 patients were female. None of the baseline variables like age and gender was found to be different in two groups (p> 0.05). There was no statistically significant difference between two groups in the distribution of Incision along Langer's line, Length of incisions, Gapping and Swelling (p>0.05). Group B (intradermal skin closure in face and neck lesions with adhesive tape) had statistically highly significant difference (p<0.001) visual analogue score than group A (intradermal skin closure in face and neck lesions without adhesive tape). It can be said that intradermal skin closure in face and neck lesions causes better aesthetic scar than intradermal skin closure in face and neck lesions without adhesive tape. Adhesive skin tape has definite value in the plastic surgery and can be regarded as a specific modality for aesthetic scars in face and neck.

Introduction

Skin closure techniques have evolved from the earliest development of suturing materials to compromise resources that include synthetic sutures, absorbables, staples, tapes and adhesive compounds. The engineering of sutures in synthetic material along with standardization of traditional materials (catgut / vicryl, silk / prolene) has made for superior aesthetic results. Similarly the creation of natural glues, surgical adhesive tapes and staples to substitute for sutures has supplemented the armamentarium of skin closure techniques.

The history (Galli Suzanne K Dond, 2004) of skin closure of wounds by sutures begins more than 2000 years ago with first records of eyed needle. The Indian plastic surgeon Susruta (AD c380-c450) described skin closure suture material made from flax, hemp, and hair. No single suture offers all of the ideal characteristics that one would wish for. Synthetic materials cause less reactions and resultant inflammatory reaction around the suture material is minimized.

Absorbable suture materials lose their tensile strength before complete absorption. Vicryl maintains tensile strength for 7-14 days although complete absorption takes few months.

Use of surgical adhesives can simplify skin closure in that certain problems inherent to suture use can be avoided. Problems such as reactivity, premature reabsortion can occur with sutures and lead to an undesirable result both cosmetically and functionally.

Closure using adhesive tapes was first described in France in the 1500s, when Pare devised strips of sticking plaster that were sewn together for facial wounds. The porous paper tapes eg. Steri-Strips (Nichistrip) in use today are reminiscent of these earlier splints and are used to ensure proper wound apposition and to provide additional suture reinforcement. Disadvantage of skin closure tapes is that not all areas of body can be taped. Body areas with secretion such as armpits, palms or soles are difficult areas to tape. Areas with hair also would not be suitable for taping.

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Materials and Methods

This was a prospective, interventional & purposive study. It was carried out in the Department of Plastic Surgery, Dhaka Medical College Hospital from July 200 to October 2007. After reviewing clinical history and doing local examination, an informed consent was taken from all the patients about the procedure. A data-sheet was used to collect the data from the patients. Surgery was done by local anaesthesia (bupivacaine) with adrenaline (1:100000) in Plastic Surgery Operation Theater , D.M.C.H. In one group (A), skin was closed by intradermal stitches with Vicryl 6/0, cutting body needle with conventional gauge dressing and Micropore. In other group (B), skin was closed by intradermal stitches with Vicryl 6/0, cutting body 'needle with adhesive skin tape (Nichistrip). Patients were followed up on Post Operative Day 5, 60 and 180.

Inclusion criteria were patients having lesions in face and neck region, wounds, possible to close primarily, patients suitable for local anaesthesia and suitable for day case. Exclusion criteria were scar containing any other pathology (ulcer), surrounding skin is not healthy. eg. scar, keloid, skin disease, malignant lesions, radiation exposed skin etc.

Patients on drugs like steroid, aspirin, chemotherapeutics etc, patient having systemic diseases e.g. diabetes, bleeding disorders, patients with known tendency of keloid formation and children and mentally retarded patients were in exclusion criteria.

Though initially 90 patients were enrolled with 45 patients in each group, 9 patients in Group A were excluded from the study due to infection from exaggerated inflammation and 5 patients from Group B were excluded from the study for the same reason. In total 76 patients were included in the study finally, 36 were in Group A and 40 were in Group B. The first consecutive 90 patients from the starting of the study were selected who attended Plastic surgery OPD and who met the selection criteria. The whole sample was divided into two groups: A and B. In-group A, skin was closed by intradermal stitches without adhesive tape and in group B, skin was closed by intradermal stitches with adhesive tapes. Patients were asked to follow up on P.O.D. 5, 60 and 180. On the 5th P.O.D. after removing Nichistrip or gauge dressing, presence of exaxareted inflammation or gaping at incision site were observed. On the 60th P.O.D. presence or absence of swelling was noted. On the 180th P.O.D. the scar quality was evaluated by a plastic surgery resident (3rd part M.S. student), who was blind to the type of procedure. Scar was assessed by measuring the width by scale, palpating the height whether elevated or not, feeling texture (soft or hard), looking colour and pigmentation.

Each criteria of scar assessment was given 2 points. In width, scar of 0-2mm=2 points, 2-4mm=1 point and >4mm=0 point. In height, scar not elevated=2 points and elevated=0 point. In texture, soft scar=2 points, moderate consistency=1 point and hard scar=0 point. In colour, pink scar=2 points, pale=1 point and reddish=0 point. In pigmentation, normal pigmented scar=2 points, hypopigmented scar=1 point and hyperpigmented scar=0 point.

Finally scar was evaluated by summation of all 5 criteria which go on visual analogue scale (Zempsky et al., 2004) graded 10-0, where 10= fine scar and 0=worst scar. Digital photographs were taken preoperatively, immediate post operatively, on 5th P.O.D., on 60th P.O.D. and finally on 180th P.O.D.

Demographic variables of the study were age of the patients and gender ofthe patients. Clinical variables were length of the incisions of the patients, incisions along Langer's line, post operative gaping of incisions of the patients, postoperative swelling at incision sites of the patients and visual analogue score.

All the relevant collected data were compiled on a master chart first. They were organized by using scientific calculator and standard statistical formulae. Percentages were calculated to find-out the proportion of the findings. The results were prepared by using the Microsoft Excel programme. Further statistical analysis of the results was done by computer software devised as the statistical packages for social scientist (SPSS). A 'p' value <0.05 was considered as significant.

Observations and Results

The findings of the study derived from data analysis are presented below:

The study included 76 patients. Of them 36 were in Group A and 40 were in Group B. The age range was from 13-45 years. They were divided into 4 age groups.

Table I

Age distribution of patients in Groups.

Age group (yrs)	Group A (n=36)	Group B (n=40)	χ2 value	p value
11-20	12(33.3%)	10(25%)	1.367	0.73
21-30	10(27.8%)	15(37.5%)		
31-40	9(25%)	8(20%)		
>40	5(13.9%)	7(17.5%)		

Table I shows that the maximum number of patients (12) were found in age group 11-20 years in-group A and the maximum number of patients (15) were found in age group 21-30years in-group B. The minimum number of patients (5) were found in age group >40 years in-group A and the minimum number of patients (7) were found in age group >40 years in-group B. But there was no statistically significant difference between the two groups (p=0.73)

Among 76 patients, 34(45%) were male and 42 (55%) were female. 36 patients were in Group A and 40 patients were in Group B.

Table II

Gender distribution in groups:

Gender	Group A (n=36)	Group B (n=40)	χ^2 value	p value
Male	18(50%)	16(40%)	0.766	0.38
Female	18(50%)	24(60%)		

Table II demonstrates that in Group A, 18 (50%) patients were male and 18 (50%) patients were female. While in Group B 24(60%) patients were female and 16(40%) patients were male. But there is no statistically significant difference between the two groups (p=0.38).

Table-III

Comparison of baseline characteristics between two groups

Variable	Group		t/χ^2 value	p-value
	A (n = 36)	B (n = 40)		
Age (Mean±SD) years#	24.7±9.81	23.63±8.0	0.767	0.44
Gender (male/female)*	18/18	16/24	0.766	0.38

Data were analyzed using Students t Test.

* Data were analyzed using Chi-squared (χ^2) Test.

Table III demonstrates the comparison of baseline characteristics between two groups. The mean ± SD of age was 24.7 ± 9.81 years for group A and 23.63 ± 8.0 years for group B. None of the baseline variables like age and gender was found to be different in two groups (p> 0.05). So, comparing the baseline characteristics between the two groups, it seemed that the patients of both groups were homogeneously distributed.

Out of 76 patients, incisions along Langer's line were given in 59 patients; 27patients in-group A and 32 patients in-group B.

Table IV

Comparison of Incisions along Langer's line in Groups.

Incision along Langer's line	Group A (n=36)	Group B (n=40)	χ^2 value	p value
Yes	27(75%)	32(80%)	0.273	0.60
No	9 (25%)	8(20%)		

Table IV shows that incisions were given along Langer's line in 27(75%) patients in Group A and in 32(80%) patients in Group B. Incisions along Langer's line were not given in 9(25%) patients in Group A and in 8(20%) patients in Group B. But there was no statistically significant difference in incisions along Langer's line between the two groups (p=0.60).

Table V

Comparison of Length of incisions between two groups

Length of incisions (mm)	Group A (n=36)	Group B (n=40)	χ^2 value	p value
<20	20(55.5%)	22(55%)	0.171	0.91
21-40	10(27.8%)	10(25%)		
>40	6(16.7%)	8(20%)		

Table V shows that majority of the patients in both groups, had length of incisions were in<20 mm; 20(55.5%) patients in group A and 22(55%) patients in group B. Lowest number of patients 6(16.7%) in group A and 8(20%) in group B, had the length of wound >40mm. But there was no statistically significant difference in length of the incisions between the two groups (p=0.91).

Table VI

Comparison of gaping of incisions between two groups.

Gaping	Group A	Group B	χ^2 value	p value
Present	8(22.2%)	5(12.5%)	0.763	0.36
Absent	28(77.8%)	35(87.5%)		

Table VI shows that 8(22.2%) patients had postoperative gaping of incisions in-group A and 5(12.5%) patients had in-group B. There was no statistical significant difference in postoperative gaping of incisions between two groups (p=0.36)

Table VII

Comparison of swelling at incision sites between two groups

Swelling	Group A	Group B	χ^2 value	p value
Present	7(19.4%)	5(12.5%)	0.687	0.41
Absent	29(81.6%)	35(87.5%)		

Table VIII shows that 7(19.4%) patients had postoperative swelling at incision sites in-group A and 5(12.5%) patients had in-group B. There was no statistical significant difference between two groups (p=0.41).

Table VIII

Comparison of visual analogue score in groups:

VAS	Group A (n=36)	Group B (n=40)	χ^2 value	p value
<7	20(55.5%)	10(25%)	7.404	0.007
7/>7	16(45%)	30(75%)		

Table VIII shows that majority of the patients 30(75%) in group B had visual analogue Score 7/>7, while majority of the patients 20(55.5%) in group A had visual analogue Score <7. There was statistical significant difference in visual analogue score between two groups (p=0.007).

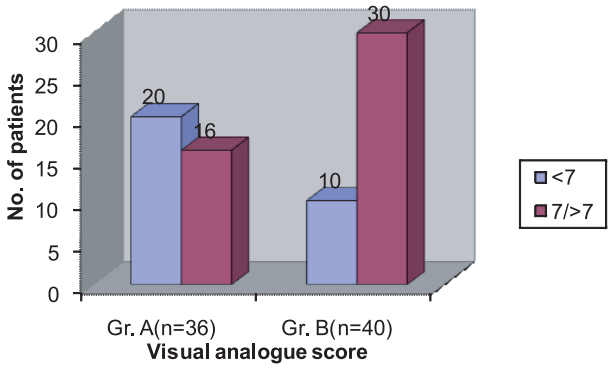

Fig. 7: *Bar diagram showing distribution of visual analogue score between two groups.*

VAS	Length of incisions			Spearman Correlation	p value
	<20mm	21-40mm	>40mm		
<7	20	10	6	-0.4	0.002
7/>7	22	10	8		

Table IX shows that the highest visual analogue score lied in <20 mm length of wound and the lowest score lied in >40 mm. There was negative relation of visual analogue score with the length of incisions and the result was significant (p=0.002). That is visual analogue score was inversely proportional to the length of incisions.

Discussion

From analysis of the result, the age of the patients ranged from 13 years to 45 years. They were divided into 4 age groups. The maximum number of patients (12) found in age group 11-20 years in-group A and the maximum number of patients (15) found in age group 21-30years in-group B. The mean ± SD of age in-group A was 24.7 ± 9. 81 years and in-group B, it was 23.63 ± 8.0 years. There was no statistically significant difference observed between mean ages of group A and group B (p=0.44). Considering gender distribution, there were 36 male patients and 44 female patients. Among male patients, 18(50%) were in-group A and 16(40%) were in-group B. Among female patients 18(50%) were in-group A and 24(60%) were in-group B. There was no statistically significant difference in gender in both groups (p=0.38). So, comparing the baseline characteristics like age and gender between the two groups, it seemed that the patients of both groups were homogeneously distributed.

Out of 76 patients, incisions along Langer's line were given in 59 patients: 27(75%) patients in Group A and 32(80%) patients in Group B. Incisions along Langer's line were not given in 9(25%) patients in Group A and 8(20%) patients in Group B. But there was no statistically significant difference in incisions along Langer's line between the two groups (p=0.60).

The maximum length of incisions after skin closure was in 20(55.5%) patients in <20mm in-group A and 22 patients in <20mm in-group B. The minimum length of incisions was in 6(16.7%) patients in >40mm in-Group A and 8(20%) patients in >40mm in-Group B. The mean ± SD of length of incisions was 25.30 ± 5.01 mm in-group A whereas that was 21.23 ± 7.61 mm in-group B. But there was no statistical significant difference between the lengths of the incisions in two groups (p=0.07).

Postoperative gaping of incisions was found in 8(22.2%) patients in-group A and 5(12.5%) patients in-group B. No statistically significant difference was found between two groups (p = 0.36).

7(19.4%) patients had postoperative swelling at incision sites in-group A and 5(12.5%) patients had postoperative swelling at incision sites in-group B. There was no statistical significant difference between two groups (p=0.41).

In-group A, visual analogue score were <7 in 20(55.5%) patients and 7/ >7 in 16(44.5%) in patients. In-group B, visual analogue scores were <7 in 10(25%) patients and 7/>7 in

30(75%) patients. The mean±SD of visual analogue score in-group A was 6.73±0.91 and in-group B was 7.98±0.83. Group B had highly significant visual analogue score compared to that of group A (p<0.001). Therefore, primary skin closure by intradermal stitches with adhesive tape causes better surgical outcome than primary skin closure by intradermal stitches without adhesive tape.

Maximum visual analogue score 7/>7 were found in 22 patients in < 20mm of length of incisions category and minimum visual analogue score < 7 were found in 6 patients in > 40 mm of length of incisions category. There was negative relation of visual analogue score with the length of the incisions (p=0.002) and the result was significant. Visual analogue score was more in large length of the incisions and visual analogue score was less in small length of the incisions.

The wound closed with paper tape, healed well and had satisfactory cosmetic result (Chao TC and Tsaez FY, 1990). Our study showed similarity with Chao TC and Tsaez FY (1990).

The combination closure of skin wound with adhesive tape had a slightly superior cosmetic result to suture less techniques (Kolt JD, 2003) and tape closure alone had advantages of lower infection rate and greater wound tensile strength.

In the study conducted by Zempsky WT et al (2004), out of 97 patients 48 received Steri strip skin closures and 49 patients Dermabond. They found that one wound complication in the Steristrip group and 7 wound complication in the Dermabond group.

Compared with suture closure, adhesive tape was associated with a reduced potential for infection, faster renewal of tensile strength, greater cost effectiveness and better cosmetic effects (Rubio PA, 1990).

Closure of wounds by adhesive strips was a satisfactory procedure than interrupted silk sutures (Webster DJ, Davis PW, 1975).

The tissue adhesive octylacyanoacrylate was found to be an effective method of skin closure in head and neck incisions in comparison to intradermal suture (Maw JL et al. 1997).

Taped skin closure was better than staples and interrupted nylon in respect of cost effectiveness, comfort and complication rate (Liew SM, Haw CS, 1993).

There was no statistical significant difference in mean visual analogue scale cosmetic scores in simple facial laceration closed with Stristrip or Dermabond tissue adhesive (Zempsky WT et al. 2004).

Summary

The mean ± SD of ages in-group A was 24.7 ± 9.81 years and in-group B, it was 23.63 ± 8.0 years. But there was no statistically significant difference in ages between two groups (p = 0.44).

Among 76 patients there were 34(45%) male patients and 42(55%) female patients. In-group A, 18(50%) were male patients and 18(50%) were female patients. In-group B, 24(60%) patients were female and 16(40%) patients were male. There was no statistically significant difference in both groups (p=0.38).

Incisions along the Langer's line were given in 27(75%) patients in-group A and 32 patients (80%) in group B. But there was no statistically significant difference in incisions along the Langer's line between two groups (p =0.60).

The maximum length of incisions after skin closure was in <20mm in both groups and the minimum length of incisions after skin closure was in > 40mm in both Groups. But there was no statistical significant difference between the lengths of the incisions in two groups (p=0.60).

In-group A, 8(22.2%) patients had postoperative gaping at incision site and in-group B, 5(12.5%) patients had postoperative gaping at incision site. No statistically significant difference was found between the two groups (p= 0.36).

Postoperative swelling at incision sites was found in 7(19.4%) patients in-group A and 5(12.5%) patients in-group B. But there was no statistical significant difference between two groups (p=0.41).

The highest visual analogue score lied in <20 mm length of wound and the lowest score lied in >40 mm. There was negative relation of visual analogue score with the length of the incisions (p=0.002). Visual analogue score was more in large length of the incisions and Visual analogue score was less in small length of the incisions.

The mean±SD of visual analogue score in-group A was 6.73±0.91 and in-group B was 7.98±0.83. Group B had highly significant visual analogue score compared to that of group A (p<0.001).

As group B (primary skin closure by intradermal stitches with adhesive tape) had statistically highly significant difference (p<0.001) visual analogue score than group A (primary skin closure by intradermal stitches without adhesive tape), it can be said that primary skin closure by intradermal stitches with adhesive tape causes better aesthetic scar than primary skin closure by intradermal stitches without adhesive tape. Adhesive skin tape is

effective, non-expensive and convenient method of skin closure. Application of adhesive tape produces better aesthetic scar. So, the hypothesis is proved.

Conclusion and Recommendation

Adhesive skin tape has definite value in the plastic surgery and can be regarded as a specific modality for aesthetic scars. This can easily be performed high OPD basis and is well accepted by the patients. The study had several limitations. The sample size was not very large. Consecutive patients were involved in the study rather than in a randomized fashion. Further studies may be undertaken to determine the scope of adhesive tape in decreasing tension at wound edge and reducing infection rate. A larger study with patients from multiple centers can be recommended.

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