SUTURELESS SKIN CLOSURE: A COMPARATIVE STUDY WITH CONVENTIONAL STITCHING

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Abstract

Sutureless skin closure employing a new product 'Polyurethane membrane' (opsite) was evaluated in North Surgical Unit, Mayo Hospital Lahore in comparison with the standard technique of skin closure using interrupted silk stitches. The trial was conducted on 1 20 patients undergoing elective and emergency surgery. The results were comparable in both cases. Polyurethane skin closure yielded equally sound wound healing as the conventional method of skin closure with the added advantages that it was easier and quicker to apply, produced superior cosmetic results, the final scar being limited to a fine line devoid of the cross marks of suturing. It was also associated with lower incidence of infection and greater patient satisfaction (JPMA 35 :323, 1985).

INTRODUCTION

The surgical scar remains the only visible evidence of the surgeon's skill, and not infrequently all of his efforts are judged on its final appearance (Howells and Young, 1966). The requirements of skin closure by any method are that it should hold the skin edges in apposition for a sufficient length of time to allow healing to take place, there should be no movements between the skin edges and excessive tension on the wound margins must be avoided[1] Infection should be prevented from reaching the deeper layers[2].

A new means of skin closure using polyureth4ne membrane has been introduced recently. This is a permeable adhesive transplant film, available in two forms, plain and fenestrated. The fenestrated membrane was introduced specifically for sutureless skin closure, the fenetrations being placed over the wound to allow alignment of its edges and free drainage of exudate. Practically speaking there is no difference between the two forms and the plain one can be used just as well for closure.. Polyurethane membrane is strong and flexible and conforms to body contours. It provides a controlled environment ideal for wound healing under reduced risk of infection[3]. Also the resulting scar is said to be stronger[4].

A trial was conducted in North Surgical Unit, Mayo Hospital, Lahore to evaluate sutureless skin closure using polyurethane membrane and compare this with conventional skin suturing following various elective and emergency operations.

MATERIAL AND METHODS

One hundred and twenty patients were included in the trial, 64 males and 56 females. Their ages varied between 14 and 63 years. Children below 12 years, unresponsive patients and those with serious systemic diseases like diabetes meilitus, uraemia and congestive cardiac failure were excluded from the trial. The criteria for unresponsiveness were laid down before the trial and included unintelligent and uneducated patients and those in whom the nature of medical illness prevented cooperation. All the operations were performed by senior surgeons.

Each member of a pair matched for age, sex (Table I)

Table I
Stratification of Patients by Age and Sex.

Age in Years	No. of patients assigned to each method of closure	
	Males	Females
0–10 Years	–	–
11–20 years	3	4
21–30 years	7	5
31–40 years	8	6
41–50 years	7	6
51–60 years	5	6
61–70 Years	2	1
Total	32	28

and proposed surgical procedure (Table II)

Table II
Stratification According to Nature of Operation.

Operations	Males	Females
1. Appendicectomies	6	6
2. Laparotomies	5	6
3. Partial thyrodectomies	4	3
4. Inguinal herniorrhaphies	7	–
5. Pyelolithotomies	4	2
6. Mayo's repair for ventral hernia	1	5
7. Cholecystectomies	2	2
8. Enucleation of fibroadenoma breast	–	4
9. Excision and ligation of varicocoele	3	–
	32	28

was assigned either to polyurethane skin closure or to skin closure with 2 zero braided silk. In each case an attempt was made to secure haemostasis meticulously and to eliminate the subcutaneous dead space. If the depth of subcutaneous fat was more than 1 cm approximating 2/zero catgut stitches were inserted. Preoperative skin preparation was standardised using 2% tincture iodine. The deeper layers of the wound were closed with by similar materials. Drainage tubes were used when indicated and brought out through separate stab incisions. Wounds closed by skin stitches were covered with polyurethane membrane to standardize the environment for wound repair. Similar antibiotics were used in both members of pair for equal durations of time. Seven pairs who had undergone appendicectomy and 14 pairs who needed emergency laparo tomy were given metronidazole to cover against anaerobic infection.

Temperature was recorded 4 hourly for 48 hours and then twice daily till the wound had healed. Wounds were inspected daily for evidence of infection. In case of infection in polyurethane membrane

closure, the membrane was slit at an appropriate site for drainage purposes. Similarly in the sutured cases, one or more stitches were removed when indicated. The patients were followed up for one month and appearance and strength of the scar as well as any untoward change were noted. The patients were also asked to give their own assessment of the cosmetic result at the end of this period.

RESULTS

The results of this study are summerised in Table III IV and V.

Table III.
Patients Showing Uneventful Recovery.

Operations	No. of patients with polyurethane Skin Closure (%)	No. of patients with Conventional Skin stitching (%)
1. Appendicectomy		
i. Emergency	8/9 (89)	7/9 (78)
ii. Elective	3/3 (100)	3/3 (100)
2. Laparotomy		
i. Emergency	5/6 (83)	4/6 (67)
ii. Elective	5/5 (100)	4/5 (80)
3. Partial Thyroidectomy	7/7 (100)	6/7 (86)
4. Inguinal Herniorrhaphy	6/7 (86)	6/7 (86)
5. Pyelolithotomy	6/6 (100)	5/6 (83)
6. Mayo's repairs for ventral hernia	5/6 (83)	4/6 (66)
7. Cholecystectomy	4/4 (100)	4/4 (100)
8. Enucleation of Fibroadenoma breast	3/4 (75)	3/4 (75)
9. Ligation of varicocoele	3/3 (100)	3/3 (100)
	55/60 (92)	49/60 (82)

Table IV

Features of Wound Healing on removal of Skin Closures Device.

	Polyurethane Skin Closure No. of patients %	Conventional Skin Closure No. of patients %
1. Soundly healed	55(92)	49(82)
2. Healed with inflammation	2 (3)	8 (13)
3. Healed with partial skin overlap	1 (2)	2 (3)
4. Healed with partial skin dehiscence	2 (3)	1 (2)

Table V.

Assessment of the Results of Wound Healing.

	Polyurethane Group	Skin Stitch Group
Good	55 (92)	49 (82)
Satisfactory	2 (3)	5 (8)
Poor	3 (5)	6 (10)

Comfort, Cosmetic appearance and patients reaction to the two methods of skin closure is given in

Table VI.

Table VI
Patients Assessment of the two Types of Skin Closure.

	Polyurethane Membrane No. of patients %	Skin Suture No. of patients %
A. Comfort of dressing:		
1. Comfortable	46/60 (77)	36/60 (60)
2. Satisfactory	12/60 (20)	12/60 (20)
3. Painful	2/60 (3)	12/60 (20)
B. Cosmetic appearance:		
1. Good	56/60 (93)	32/60 (53)
2. Satisfactory	3/60 (5)	17/60 (28)
3. Poor	1/60 (2)	11/60 (19)

DISCUSSION

There are a number of well proved techniques of skin closure employing a variety of materials in use today. These include interrupted or continuous sutures using braided or monofilament material, subcuticular closure using absorb. able or non-absorbable sutures, metal clips and various types of adhesive tapes. The choice of technique is determined in part by surgeon's own preference and in part by nature of the surgery performed, i.e., clean contaminated[5].

Conventional skin suturing, a time tested and safe method has certain disadvantages. When the needle passes through the intact skin on either side of the wound, it carries both epidermis and organisms lying on the surface along its tract into the depth of the wound, thereby causing a higher incidence of wound infection.[6,7] Bacterial adherence with suture material was demonstrated by Katz et al. in a large series of patients using different types of sutures[8]

Improperly applied, conventional skin sutures produce alternating areas of edema and ischemia eventually responsible for cross hatching along the scar and a poor cosmetic result[9].

Tensiometry studies have shown that mild, evenly applied tension as opposed to localized excessive tension produces increased strength of repair in the skin at an early stage[2].

Poly urethane skin closure was found to be easy and quick to apply. The incidence of established wound infection was low as compared with the conventional method of skin closure.
The adhesive on the polyurethane skin do sure did not cause allergic reaction and in no case did the membrane peel off before the desired time. After one week no difficulty was experienped in its removal.
Patient acceptability was high as demonstrated by patients own assessment of the cosmetic results. This was especially marked in the younger female patients, where the cosmetic results are considerably important. Fewer patients complained of discomfort in the wound than in the skin suture group. An added advantage of polyure thane skin closure was that patients could take a bath without fear of the dressing being dislodged. This was appreciated by patients during the hot weather.
A further advantage of polyurethane skin closure is that it removes irrationally exaggerated fear excperienced by patients, particularly children, awaiting the removal of sutures.
From the point of view of resident staff, the wound could be readily inspected through the transparent membrane without need to remove the dressing. It also saved the patients from the trauma of repeated dressings. Reduced number of dressings had no economical value for the hospital. Similar results have been reported by Eaton[10]. Watson et al.[11] in a comparative study concluded that polyurethane membrane skin closure gave better results than interrupted silk or subcuticular nylon except for a greater tendency for the wound edges to slip out of alignment and invert.

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