

"CLOSURE OF SURGICAL INCISIONS OF THE LOWER ABDOMEN BY NON-SUTURE TECHNIQUE"

by

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Proper closing of surgical wounds had been a real problem with surgeons since the days of 'Sushruta' the famous Indian surgeon of 300. B. C. Lord Moynihan said rightly, 'Never judge the surgeon until you have seen him close the wound'. However, even to-day surgeons still look for a reliable and fool-proof method of wound closure. In spite of the fantastic achievements in other fields of modern medicine, we are at the same place where we were in the days of John Hunter, in tackling this age old problem. Ever changing philosophies regarding the healing of the wounds have complicated the search, for satisfactory method of wound closure. This problem was discussed as long back as 1600 B.C., and in the recent past a range of techniques and materials have been mentioned in the literature (Garrison, 1960; Cope, 1958; Goldenberg, 1959; Sigerist, 1951) but the problem still remains.

The earliest known method of the wound closure, was the use of linen strips, pasted with adhesive made of substances like honey, lead oxide, olive oil, etc., in combination with flour and gum. In the 19th century a compound 'Emplastium-

resinae' was used for the purpose. (Hewson, 1880). Reduction of the scar was first considered by Ambroise Paré in the 16th Century, who was one of the first to use the sutureless techniques for the closing of the surgical incisions (Johnson, 1949). To-day, the surgeons are using needle with some kind of thread, for the repair of surgical wounds. In spite of its various shortcomings and drawbacks this technique has become the technique of choice, world over. As far back as in 1793, no less a surgical authority than John Hunter, pointed out the drawbacks of this method and the superiority of adhesive strips. (Palmer 1837).

Some of the main drawbacks of the needle suture technique are: total and absolute sterilization of the skin—a practical impossibility, the extensive damage caused by the suture needle and sutures in the epithelium and dermis (Ordman and Gillman, 1966), the embedded suture material in the body undoubtedly acts as a foreign body, thus resulting at least in the inflammation around the sutures. Then the removal of the suture material also requires a sterile atmosphere and trained hands, and its association with a certain degree of pain is undisputed. As late as 1913, it was established that the nature and size of the suture material had a direct and rather important relationship with the healing process. (Halsted 1913).

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This resulted in the gradual switch over from the catgut to silk, a process which took not less than 20 years. (Whipple, 1933). Strangely enough at some hospitals the catgut is still favoured for the closure of surgical wounds. However, it is practically out to-day, but even the silk and the newer surgical threads are far from a thread, which can be said to be an ideal surgical thread. That is a thread material, provoking no foreign body reaction, completely inert, totally devoid of the capillary action and entirely absorbable too. Such a thread is still in the developmental stage, if it is. Even if an ideal thread is made available to the surgeons in the near future the cell damage and spreading of the pathogens is a must with the passage of the suture needle. It is an established fact that the presence of the sutures considerably lowers the local resistance to infection. (Taylor *et al* 1962). A single suture in the skin has been found to enhance by a factor of 10,000., the invasiveness of staphylococci, according to a study done by Elek and Conen in 1957. Finally, the additional puncture marks and cross hatching of the scar, mar the cosmetic appeal, which is nowadays an important factor.

Skin incisions had been closed, by the adhesive tapes from time to time, but the absence of a really reliable tape was never realised. Then the problems of an adhesive which should be free from any type of skin irritant, which was needed to achieve uninterrupted wound healing, was there. (Russel and Thorne, 1955; Golden, 1960; Peck *et al* 1945; Peck *et al* 1951). Other problems were: application of the strips with the gloved hand and proper sterilization. An adhesive tape allowing free evaporation of the secretions was needed, to prevent skin macerations. (Legge, 1941; Scale *et al* 1956). Several enterprising surgeons tried this techni-

que; however, the results were never satisfactory in general, due to the absence of an proper adhesive tape. Even then, surgeons tried to make it a standard technique, to replace the thread suture technique which has got obvious shortcomings. (Gillman *et al* 1955; Gillman, T., 1958; Roberts *et al* 1933; Young, 1808).

Breakthrough came in November 1960, when Golden published his experiences with a tape, used for dressing and strapings. This tape was having the properties never found before in any other adhesive tape. It was fully adaptable in all situations, its adherence to the skin was strong enough, and it caused no chemical irritation or tissue maceration. Removal of this tape was not associated with any pain, the drainage of the secretions, perspiration and soaking could not dislodge it. It was not reactive under X-Ray, and could be sterilized by all standard methods. Thus, it was having practically all the properties of an ideal tape needed for the closing of skin incisions. Such remarkable properties of this adhesive tape were due to its inert adhesive substance and equally inert synthetic backing coupled together with a unique process, which gave a microporous surface to the adhesive, thus not interfering with the normal physiology of the skin.

This microporous adhesive tape has been used by the surgeons successfully in the West for closing of the skin incisions. Bonnar used it on 100 patients having gynaecological operations, Shepherd used it on 507 thoracic operations. Others to use the tape were McGuinness, 1966; Golden *et al* 1962; Fischel, 1965; and all were satisfied with the studies.

The present study was conducted to record the experiences of the use of skin closure tape (3 m 'Steri-Strip') on gynae-

gynaecological cases needing operations at Zenana Hospital, Jaipur.

Material and Method

Patients undergoing gynaecological operations or caesarean sections, at Zenana Hospital, Jaipur, were subjected to this technique of closure of skin incisions. This study includes 40 patients in all, on whom different types of surgical incisions were used. They are summarized in Table I.

TABLE I
Types of Incision

Operations	Type of incisions & Number of Cases	
	Transverse	midline
Hysterectomy	—	4
Cervicopexy	2	—
Tubal ligation	4	19
Caesarean section	—	10
Keloid formation		Supra-umbilical-right paramedian

Sterile trays were prepared having, one pair of fine dissecting forceps, one pair of sponge holding forceps, one pair of sharp-pointed scissors, a couple of gauze and cotton swabs. When the surgeon is ready for the closing of the incision, the circulating nurse, peels the package open carefully, having sterile Steri-Strip skin closures. The Scrub Nurse grasps the contents with a forceps, holding the tape surface up, grasps the short perforated tab at one end and pulls down on it. Thus the tab fully separated and discarded, the ends of the Steri-Strip adhesive tape are free for removal. Whenever the strip is needed the Scrub Nurse presents the card thus allowing the surgeon to peel the strip

from the card. Thus the strips are delivered in a sterile way.

In the usual manner the deep structures and subcutaneous layer are closed carefully, taking precautions to avoid the creation of subcutaneous dead space. Next, the skin surface is cleaned thoroughly with saline and dried with ether swabs for about 2½" to each side of the incision. For good adherence of the strips the complete removal of oiliness, moisture, and soapy residue is very essential, and care should be taken of it. A final wipe with ether or a similar solute is important and helpful. Equally, important is the dryness of the surgeon's gloves while applying the strips.

The incised ends of the skin at edge are held at the level of the surrounding skin with a pair of Allis forceps, and a little lateral traction helps in perfect apposition of the edges. Next the adhesive tape is applied across the incision using a gentle pressure, and avoiding any eversion or inversion of the skin edges. The first strip is applied in the midportion of the incision. Care should be taken to see that one wound edge is not pulled against the other by the tapes, as it would result in unequal skin tensions, and the nonelastic tape may cause erythema and vesication of the skin. Additional strips are applied at an interval of ½" or so on both the sides of the first strip. After the wound surface is covered, the interval between the strips is reduced to 1/8" approximately, by using additional strips. If during the closure the patient starts perspiring or blood or serum are discharged on to the skin, the skin is dried by a dry gauze before applying the next strip.

Wounds are inspected after the closure, particularly the larger ones as the skin under the first strip may have gaped due to the initial stress. If so these strips are removed and wound edges reapproximat-

ed intimately with additional strips. After the tapes have been applied a light nonadherent dressing is put on, making sure that it completely covers the ends of the strips. The strips were left in place from six days to 14 days, and were easily removed by peeling away with no discomfort to the patients. For control study in few cases, (6 cases) half of the incision was closed by the strips and the another half by sutures.

Results

Diminished pain in the wound area was the first notable difference, as compared with suture closure, in the immediate postoperative period. Not a single case of inflammatory reaction was noted in the wounds closed by this technique. Inflammatory reactions were noticed around the sites of sutures in patients having the closing by sutures as well as strips. No inflammatory reaction was noticed around the area closed by sutures. Strips were so adherent that the patients were allowed to bathe after fifth postoperative day keeping in view that a minimum of water is soaked by the strips. Strips were easily removed by the nursing staff, without any discomfort to the patient. The strips were left in place from 8 days to 14 days. No cross-hatching was noticed in contrast to suture wounds. The incision healed to a thin line with good cosmetic results.

Discussion

Universally accepted and time honoured procedure of closing skin incisions and lacerations is by means of interrupted sutures of nylon, or any other unreactive material, and applying of a sterile dressing, which is held in place by bandages. However, this method had been submitted to the scrutiny of laboratory research lately and more and more surgeons are now trying to evaluate the microporous

adhesive tapes for closing surgical incisions. (Bonnar 1968; Shepherd 1966).

The technique of closing the incisions by means of adhesive strips is not a new one, being used even by the Egyptians, centuries before Lister. However, the modern adhesive strips have advantages such as high degree of adhesiveness, sterility, porousness and convenient packings. Conolly in 1969 compared the two methods of wound closures at School of Medicine San Francisco, and reported a reduction of the infection rate in contaminated wounds closed by tapes, compared with a series of wounds in which sutures were used. An extra risk of contamination is produced by suturing due to the suture canal and its cuff of dead tissue. Major complications which may arise out of each and every operation are wound infection and dehiscence. It is an established fact that the tract of the skin suture is the main route of wound infection and the incision is not that much significant in itself. (Carpendale and Sereda 1965). Injuries inflicted by the suture needle to the blood vessels of the skin and the dermis, result in wound hematomas—to open wounds. Although some wounds break open due to inadequate haemostasis, and in some the suture thread can also become tight due to subcutaneous haemorrhage or tissue oedema and in case of abdominal operations the pressure of underlying intestinal distension, resulting in tissue strangulation leading to localised ischemia, necrosis and stitch abscesses. In spite of meticulous care with which tension is relieved, the aforesaid complications cannot always be avoided. The cosmetic effects usually require more sophisticated techniques and specialised management, (Crikelair 1960; Gillies 1943; Ju. D. M. 1951) to avoid cross hatching of varying prominence and angry, conspicuous scarring, etc. In

certain cases the cosmetic appeal is destroyed altogether by the spreading of the scar, hypertrophy or keloid formation.

The use of the adhesive strips for the closing of the skin incisions has manifold advantages over the common suture method. It is painless and always a good cosmetic end result is obtained, as there are no puncture marks so common with the suture technique. With the strips there are no chances of reducing the local resistance to infection as is with suture technique. Even in the present study there was not a single case of inflammatory reaction, when the wounds were closed by tapes only. Moreover, the tapes can be left in place for fifteen days or more as required, and the patient can bathe easily. The adhesive tapes can be used for most of the cases. However, in wounds of the perineum and scrotal areas where there is profuse drainage, on the hairy parts of the scalp and circumferentially round a digit its use may not be advocated at present. A clean stitched wound needs no dressing, (Howells and Young 1966) and same stands true for the adhesive tapes. However, dressings may be required to provide pressure. In the current study we never used a dressing over the strips in the last 20 cases, and the results were not different from the dressed wounds.

Authors are hopeful that quite soon this new technique of closing the incisions of the skin will replace the suture technique, particularly in the field of gynaecological surgery where the cosmetic effects of the scar are important to the patient. However, it is suggested that more extensive trials should be held in India and other tropical countries where the temperature and perspiration are problems in themselves.

Summary

Closing of surgical skin incisions by means of microporous adhesive tapes (Steri-Strip) was evaluated in 40 cases, admitted for gynaecological and obstetrical surgery at Zenana Hospital, Jaipur. Closing was always effected within ninety seconds once the skin was dry. Scar had a good cosmetic appeal always. No case of wound sepsis was encountered and healing was uneventful in all the cases.

Advantages of the new technique are discussed and a suggestion for more extensive trials in the tropics is made, keeping in view the problems of temperature and perspiration. The technique is bound to reduce the incidence of wound infections.

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See Fig. on Art Paper I