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## ORIGINAL ARTICLE

# Closure of traumatic wounds without cleaning and suturing

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**Background:** In less than ideal situations wounds have to be closed without extensive cleaning using sterile adhesive strips (Steristrips). This prospective analyses the efficiency of this technique and compares it to the more conventional approach.

**Methods:** Altogether 147 lacerations were closed with sterile strips with no wound cleaning. Patients were subsequently followed up for a minimum of three months.

**Results:** The sepsis rate in compliant patients was 1.4% with a total complication rate of 2.7%.

**Conclusion:** This technique, while contradicting the "sacred tenets" of wound closure, is a cheap, quick, and effective alternative to routine closure of traumatic wounds in a casualty department.

The concept of using sutureless techniques to close wounds dates back to about 1600 BC when linen strips were used in Egypt.<sup>1</sup> Since then numerous materials have been utilised including clips, tissue glue, and adhesive tape.<sup>2</sup>

The most practised method of skin closure is suturing the skin edges together. This process requires expensive suture material, sterile instruments, a minor operating theatre, cleaning solution, local anaesthesia, and an assistant. In the third world accident and emergency setting, such facilities are sometimes not readily available but even when they are, cleaning and suturing involves increased cost, longer waiting time, and a longer procedure—cleaning, draping, giving local anaesthesia, suturing, and dressing the laceration. On occasion we have had, in apprehensive children, to resort to tape closure of wounds without injecting anaesthetic and without cleaning or suturing. We have also had to do this in adults admitted to the ward when it was not possible to get into the theatre within six hours. We noticed, however, that these wounds healed quite well, with a low incidence of infection, and decided to study tape closed wounds prospectively.

We present a study of 147 consecutive wounds closed without cleaning and anaesthesia, using sterile adhesive strips (Steristrips, 3M) in the Casualty Department of General Hospital, Port-of-Spain.

All the wounds in our study were a result of trauma outside hospital in a non-sterile environment, with non-sterile objects, and therefore were considered contaminated.

## PATIENTS AND METHODS

Altogether 117 consecutive patients with a total of 147 lacerations were studied. All patients presented to the Casualty Department of General Hospital, Port-of-Spain.

Wounds in the hairy areas of the body, for example scalp and beard area, were excluded. Wounds with obvious gross contamination and particulate matter were also excluded as were those sustained more than 24 hours before presentation. Areas posing technical difficulty, for example flexured surfaces, and those with excessive bleeding were also excluded as were wounds involving tendon and muscle. Antibiotics were not used except in two cases in which chest tubes were concomitantly inserted. Follow up time varied from three to 12 months.

The length of the wound was measured using a sterile ruler and the depth was gauged by comparison with a nearby chart.

Strips of the sterile adhesive tape (12 mm) were used for closure. Wounds were inspected for debris and uncontrollable bleeding. Blood was wiped away from the adjacent skin, not from within the wound. Tincture of benzoin was applied to the skin up to but not in the wound. The skin edges were approximated and strips applied. Gaps of 0.25–0.50 cm were left between strips. The strips extended no less than 2 cm from the edges of the wound. Perpendicular strips were placed at the end of the Steristrips to dissipate shearing force over a greater area and prevent premature curling at the ends.<sup>3</sup> A gauze dressing was only applied if there was obvious oozing.

The wound was inspected on day 5 and 10, and the strips were then allowed to peel off on their own. Patients were instructed to clip off the free ends and not to pull off the strips, in order to prevent premature removal of the strips.

Infected wounds were defined as those showing features of cellulitis including hyperaemia and warmth, or frank pus. Dehisced wounds were defined as wounds having reopened after closure with the tape.

## RESULTS

A total of 117 patients with 147 wounds were studied. Their ages ranged from 2–65 years (mean 29 years); 61% (89) were male. Wounds were inflicted by assorted instruments, the most common being knives 40 (27%). Fifty two (35%) were due to blunt trauma.

Forty one per cent of the wounds were on the face, 21% on the trunk, and 38% on the limbs. The length of the wounds varied from 2–17 cm (mean 8 cm). The depth varied from 0.25–2.0 cm (mean 1.0 cm).

There were three infected wounds. One wound became infected in a patient who removed both the dressing and the strip on day 2 and refused further treatment. The other two cases were detected on day 5 and were treated with antibiotics. Steristrips were reapplied on day 7 and healing followed an uneventful course.

One case of dehiscence was seen in a patient who removed the strips on day 3. The wound was restripped on day 5 and healed uneventfully thereafter.

The overall sepsis rate in compliant patients was thus 1.4%. Dehiscence occurred in 0.7%. The total complication rate was 2.7%.

Ten per cent of the patients had previous suturing of wounds. Subjective assessment of patients' experience with tape and suture closure revealed that all expressed a preference for tape closure, claiming that it was far less painful than the conventional technique. They have so far all been pleased with the surgical scar.

## DISCUSSION

Sutureless closure of wounds gives a lower rate of infection than those sutured.<sup>4</sup> The number of organisms needed to cause an infection is reduced by a factor of 10 000 in the presence of a silk suture.<sup>5</sup> Further, tape closure decreased sepsis and it has been shown that survival of *Staphylococcus pyogenes* is reduced under micropore tape.<sup>6</sup> Regardless of how meticulously a wound is cleaned, repeated puncture of the suture needle will inoculate the subcutaneous tissues with organisms.<sup>7</sup> The suture material itself is a potential source for foreign body reaction, and in addition may cause strangulation of the tissues leading to ischaemia and necrosis and create the ideal milieu for infection. Tape closure thus leads to a lower infection rate when compared with thread closure especially in contaminated wounds.<sup>8</sup>

Traumatic wounds produced in a non-sterile environment are already contaminated both with micro-organisms and microscopic inorganic debris. Surgical convention dictates that such wounds should be meticulously cleaned, chemically and/or mechanically, by irrigation and scrubbing. Our study disputes this dogma. Using tape closure in wounds with no microscopic signs of contamination and without formal chemical or mechanical cleaning, we were able to obtain an overall infection rate of 1.4%. This compares well with previous studies where overall incidence of infection for tape closure of cleaned abdominal surgical incisions was 1.1%.<sup>8</sup> We excluded all wounds with obvious gross contamination: those with particulate matter and necrotic tissue. Such cases are better treated in the conventional manner, with copious irrigation and debridement of soiled or necrotic edges.

The technique of tape closure without cleaning may be performed far quicker than the conventional approach<sup>9</sup> with no need for a formal operating room. This technique is also far cheaper as there is no need for expensive sutures, sterilised equipment, sterile gauze, sterile gloves, cleaning solution, or local anaesthesia. Because of the technical ease of the procedure, no assistant is required to cut sutures or administer local anaesthesia. Furthermore, the patient does not have to return for removal of sutures and can be discharged with advice on infection. The patient is not subjected to the pain or discomfort of anaesthesia injection, suturing and removal of sutures, and therefore finds this treatment more acceptable. Cosmetically, tape closure is not associated with needle puncture marks and crosshatch scarring, features which make suture closure relatively unacceptable, especially in patients with keloids or hypertrophic scarring.

It may appear that we have committed a further cardinal sin in withholding antibiotics for these contaminated wounds. However, some studies have shown an increased infection rate among antimicrobial treated wounds.<sup>10 11</sup>

The use of tissue adhesives for closure of skin lacerations is now in vogue, and currently under investigation. Several advantages have been identified including quick application, good cosmesis, and cost effectiveness. However, cleaning is still required.<sup>12 13</sup> Ong and Dudley have demonstrated that most lacerations of the upper face can be treated by Steristrips with favourable results. All 458 patients in their series were, however, subjected to wound cleaning.<sup>14</sup>

We have now established the safety of this procedure. Randomised trials are required to further validate these findings and compare tape closure without cleaning and conventional suturing of traumatic wounds with regard to sepsis and cosmesis. We believe that this technique is ideal for the typical third world emergency setting, which is grossly understaffed, under-equipped, and yet overwhelmed with trauma.

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