

ORIGINAL ARTICLE

A randomised, controlled trial comparing a tissue adhesive (2-octylcyanoacrylate) with adhesive strips (Steristrips) for paediatric laceration repair

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Objective: To compare the tissue adhesive 2-octylcyanoacrylate (Dermabond) with adhesive strips, Steristrips in paediatric laceration repair.

Method: Children with suitable lacerations were randomly allocated for wound closure with either a tissue adhesive or adhesive strips. Thirty children were treated in each group. Linear Visual Analogue Scores were used to judge parents' and nurses' opinions of the application of each treatment. A similar scoring system was used to judge the cosmetic outcome as viewed by parents and a plastic surgeon. Complications and trial failures were noted.

Results: Complete data were available for 44 of the children. Parents viewed the treatments as equally acceptable. In contrast those performing the procedure judged the tissue adhesive more difficult to apply. Scores of cosmetic outcome by both parents and the plastic surgeon showed no significant difference in the treatment method used. There were four children in the tissue adhesive group and one from the adhesive strip group in whom the wounds were unable to be closed.

Conclusion: Both tissue adhesives and adhesive strips are excellent "no needle" alternatives for the closure of suitable paediatric lacerations. This study suggests that the techniques are similar in efficacy, parental acceptability, and cosmetic outcome. The choice as to which is used may come down to economics and operator preference.

Lacerations requiring wound closure account for a significant number of all childhood injuries presenting to an accident and emergency (A&E) department.¹ Methods to achieve this in the paediatric population are ideally quick, easy to perform, cause minimum discomfort, and result in a good cosmetic outcome. Adhesive strips or standard suturing have been well established techniques for wound repair in children, with the former having the obvious "no needle" advantage.²⁻⁵ In more recent years tissue adhesives have been presented in the literature as a viable alternative to suturing suitable children's lacerations⁶⁻²¹ and, as a technique, has rapidly become established in its own right. No such evidence, however, has been published comparing tissue adhesives with adhesive strips, the two "no needle" techniques. Thus the aim of our study was to compare these two methods of wound closure with respect to ease of use, efficacy, parental acceptability, and cosmetic outcome.

METHODS

Between the period August to December 1998, children who attended the A&E Department of the Royal Hospital for Sick Children, Edinburgh with a suitable laceration were considered for entry into the trial. Written consent was then sought from the parents or guardian and, if granted, the children were entered into the trial. They were then randomly allocated for treatment with either tissue adhesive or adhesive strips using a computer generated randomised number system. Those allocated tissue adhesive were treated with 2-octylcyanoacrylate (Dermabond, Ethicon) a new medical grade tissue adhesive. Those allocated adhesive strips were treated with Steristrips (3M), which are currently used in our department.

The wounds were photographed before treatment and their lengths as well as their locations noted.

Wounds considered for inclusion into the trial were simple lacerations that required closure, in children aged between

1-14 years of age. Wounds that were not considered included those that were greater than 5 cm in length, infected, caused by a bite, involved the mucous membranes, the scalp, or areas of high skin tension. In addition, wounds that required surgical toilet, and thus the use of local anaesthetic, were also excluded.

Before the start of the study named doctors and nurses who would perform the treatments were shown the ideal method of tissue adhesive and adhesive strip application. These treatments were practised on latex simulations until the operators were deemed competent in each technique as judged by the most senior clinician among the authors (TB).

Ethical permission for the study was sought and granted by the Regional Paediatric Research Ethics Committee.

After each treatment the parents were asked for their assessment of the technique by judging what effect, if any, it caused to their child in terms of distress. This was achieved by using a linear Visual Analogue Score (VAS) and entailed the parents marking a point on a 100 mm line at a position compatible with their score. The line showed a zero at one end, which stated "very distressing", and the figure 100 at the opposite end stating "perfect, no distress". This same validated scoring system²² was used throughout for judging any technique or outcome. Similarly the doctor or nurse was asked to judge the ease of application of each technique they performed using the VAS.

The parents were given an information sheet for the technique that their child had received and encouraged to contact the department if they had any queries before follow up. Review of the children occurred between five to seven days, according to standard department policy, and any complications noted.

At between 3 and 12 months photographs of the children's scars were obtained and the parents asked for their opinion of the outcome of the wound closure. These photographs of the

Table 1 Patients randomised into study

	Tissue adhesive	Adhesive strips
Study group	19	25
Lost to follow up	7	3
Trial failures	4	1
Camera failure	0	1
Total	30	30

Table 2 Comparison of demographics and wound characteristics of the study group with those lost to the trial

Parameter	Test	p Value
Age	Mann-Whitney	p=0.92
Length	Mann-Whitney	p>0.99
Sex	χ^2	p=0.03*
Location	χ^2	p=0.82

*Significant to 95% CI.

scars were then judged for cosmetic appearance by a consultant plastic surgeon who, although he had the pretreatment photographs for comparison, was blinded to the method of treatment undertaken. These latter two judgements were obtained using a 100 mm VAS, which stated that zero at one end represented a "poor scar" and 100 at the opposite end represented a "perfect scar".

RESULTS

A total number of 60 children were initially entered into the study and, by random allocation, 30 were treated with tissue adhesive and 30 with adhesive strips.

Successful treatment and follow up photographs of the resultant scar was possible in 44 of the children leaving 16 children who were lost from the trial (table 1).

Lost from the study (n=16)

Ten children were lost to follow up through being uncontactable at the 3–12 months stage. Trial failures occurred in the other six children. Of these, four were those in whom wounds were unable to be closed using tissue adhesive and one whose wound was unable to be closed with Steristrips. The final trial failure was attributable to camera malfunction at the pretreatment post-randomisation stage.

There was no significant difference in the method of wound closure in those lost to follow up (χ^2 p=0.31) or in the trial failures (χ^2 p=0.35). When comparing the patient characteristics and wound characteristics of those lost from the study with the study group (table 2), the only significant difference was that more boys were lost to follow up (χ^2 p=0.03).

Study group (n=44)

The patient and wound characteristics were similar in both closure groups with the exception that the proportion of boys in the tissue adhesive group was higher (p=0.07) (table 3).

The VAS scores were compared using the Mann-Whitney test (table 4). Parental scoring of the ease of application of either treatment showed there was no significant difference. However, when the operators scored the same procedure they were significantly of the view that the application of adhesive strips caused less distress to the child than that of tissue adhesive. Cosmetic outcome for both treatments was high, with no significance when viewed from the critical eye of both the parent and the plastic surgeon.

Table 3 Demographics and wound characteristics in the study group (n=44)

Parameter	Tissue adhesive	Adhesive strips	Test	p Value
Sex				
Male	15	13	χ^2	p=0.07*
Female	4	12		
Age				
Median (y)	4	4	Mann-Whitney	p=0.95
Range (y)	1–9	1–12		
Length				
Median (mm)	10	10	Mann-Whitney	p=0.68
Range (mm)	5–30	5–30		
Location				
Forehead	11	16	χ^2	p=0.68
Other	8	9		

*Significant to 95% CI.

Table 4 Comparison of wound closure methods in the study groups

Parameter	Tissue adhesive (VA score)	Adhesive strips (VA score)	p Value (Mann-Whitney)
Parent's opinion of treatment			
Median	95	96	p=0.96
Range	70–100	44–100	
Operator's opinion of treatment			
Median	91	95	p=0.07*
Range	50–100	10–100	
Parent's opinion of scar			
Median	84	80	p=0.62
Range	34–100	43–100	
Surgeon's opinion of scar			
Median	87	87	p=0.81
Range	65–93	62–96	

*Significant to 95% CI.

DISCUSSION

For many children, and a proportion of adults, the prospect of wound closure with a suture needle is a worse thought than the actual injury itself. Tissue adhesives represent one "no needle" solution to this problem and have been compared favourably to the technique of suturing in numerous studies regarding factors such as cosmetic outcome and parental acceptability. An alternative "no needle" technique that is equally well established is that of adhesive strips. This study compares the two "no needle" techniques of tissue adhesive and adhesive strips. The evidence from the study suggests there to be little difference between these techniques when considering cosmetic outcome and parental acceptability in suitable wounds. Suitable wounds are those mentioned in the inclusion-exclusion criteria of the methods section. These criteria represent wounds that could be closed with either technique. Scalp wounds were excluded because the use of adhesive strips would require local shaving of the scalp, unlike tissue adhesive, and may adversely bias parental acceptability. Wounds that were not suitable for either technique included those under tension and thus with an increased risk of wound dehiscence unless sutured.

The study showed that adhesive strips were viewed, by those performing the procedure, to be significantly less distressing to apply than tissue adhesive. When analysing these results the possibility of operator bias must be borne in mind. Indeed at this A&E department before the study, the standard method of closure of this type of wound would have been adhesive strips. Staff at other institutions may be more familiar with the use of tissue adhesives. Indeed, although the study did not investigate this issue, other tissue adhesive such as Histoacryl Blue are applied in a slightly different manner,

and its application may be deemed by its advocates as easier and less distressing to for the child. However, all those involved in the trial attended a workshop before the study started and were competent in both techniques. In addition, it has been shown that proficiency in tissue adhesive application can be easily achieved.²³

Parental perception of the technique and the cosmetic outcome using a validated scoring system was thought more appropriate than a direct opinion from the child. The median age of the children was only 4.

The majority of those children lost to the study were as a result of a difficulty tracing them despite an extensive search of records. Some were known to have left the region and were therefore unavailable for follow up photography.

In the group that was followed up, the children were found to be comparable in all categories, except that of sex. This higher proportion of boys in the tissue adhesive group might, it could be argued, affect the VAS of the parents' view of the scars. However, the plastic surgeon's opinion will be unbiased, as he would have been unable to distinguish the sex of the child from such close up views of the scars.

Pretreatment photographs were taken in good lighting with a background of a surgical drape if the child permitted. Follow up photographs were taken in the child's home to minimise inconvenience for the family. All photographs were colour and taken as close as possible to the wound. Some degree of quality variance existed, as those who have tried to photograph children will testify. Several photographs of each wound were taken and the best accepted for judgement.

At the time of the study, the tissue adhesive cost £12 per application compared with 18 pence for a treatment with adhesive strips. Both are markedly cheaper than if the corresponding wounds had been sutured, a factor mentioned previously in the literature.²⁴

In conclusion, both tissue adhesives and adhesive strips are excellent "no needle" alternatives for the closure of suitable paediatric lacerations. While the authors accept that the number of children involved in the study is relatively small, our findings suggest that the techniques are similar in efficacy, parental acceptability, and cosmetic outcome. The choice as to which is used may come down to economics, and operator preference.

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