

Skin glues for wound closure

SUMMARY

Skin glues are a safe and effective method to close selected wounds.

They are also cost-effective and help prevent infection.

Ideally, wounds should be less than 4 cm, not contaminated or infected and have skin edges that are not under tension. Wounds should be closed within 12 hours.

Most patients will be children with short clean wounds.

Dehiscence is slightly higher with skin glues than with sutures, but the cosmetic outcome is comparable and skin glues are painless.

Skin glues should be used only for superficial approximation of skin. With surgical incisions, wound closure of layers should be performed and ideally glue should only be used in the skin approximation. Similarly in all other wounds which are gaping, it is vital to have skin approximation before applying the skin glue.

Variable results with some wounds

Without deeper sutures to approximate the skin, using skin glues to close excision sites is associated with increased rates of dehiscence.^{2,9} Glues may be used over joints only when accompanied by deeper tension sutures and splinting.^{1,2} They are generally acceptable for the treatment of skin flaps.² Glues do not appear to compromise circulation further given that the circulation is often already compromised. Nail bed repair has been successfully reported.

Advantages of skin glues

Applying skin glue is painless. In about 20% of patients there is a report of a sensation of mild heat but no actual pain.¹ Wound infection rates are low (less than 3%) and are not increased with skin glues.⁵ Procedure time is reduced.^{1,2,5,8} Studies reported that the time of the actual wound repair in all settings was less than formal suturing. Sedation, which is sometimes used in children having sutures, is not needed with skin glues.

Cosmetic appearance with skin glues is comparable to outcomes with sutures and strip approximation.^{1,2,5,7,10} Most of the trials have used a blinding method with photographs assessed by plastic surgeons, other doctors and patients themselves. Comparisons were made of appearance, absence of step-off, margin irregularities, separation, edge inversion and wound

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Introduction

Closure of wounds is often needed to promote wound healing and to produce an acceptable cosmetic result. Traditionally sutures and also adhesive strips have been used. Skin glues are safe and effective but wound selection is important.¹⁻⁴

Skin glues are cyanoacrylates. Derivatives with long chains are less reactive and stronger. They are available in liquid monomer formulations which react with formaldehyde on contact with skin or other surfaces. This polymerisation produces an exothermic reaction to create a bridge while becoming adherent to the skin. Today's products are all effective and non-toxic and produce strong bonds.⁵ One study has shown that the current adhesive properties have a bursting strength equivalent to 4/0 nylon in an intracuticular wound closure.²

Wound selection

Not all wounds are suitable for skin glues (Box 1) – it is likely that they are only appropriate for 15–20%.² In particular, bites should not be treated with glues. Wounds should be less than 12 hours old, clean and free of debris.

Most wounds studied, particularly in emergency departments, were 1–6 cm. Some experts believe that wounds greater than 4 cm should not be closed with skin glue alone⁶ while others believe up to 10 cm is acceptable^{7,8}. A general agreement is that for optimum results, wounds should be less than 4 cm in length. Longer wounds have increased rates of dehiscence.

Box 1 Wounds not suitable for skin glue

Deeper wounds requiring sutures to approximate the skin edges
Contaminated wounds from animal or human bites
Crushed or infected wounds
Skin over joints or other high tension areas
Wounds which cross muco-cutaneous borders
High friction areas such as perineum, buttocks
High moisture areas
Wounds over 12 hours old

distortion. The results universally recorded that final cosmetic appearance for skin glues was similar to sutures, and both were better than adhesive strips.^{8,9}

Skin glues are expensive. However, when compared with equipment and labour costs as well as the need for follow-up for suture removal, the overall cost is felt to be equivalent to sutures.¹¹

Patient satisfaction with skin glues was higher than with sutures in most studies. Reasons included lack of pain, ease of wound care and no need for follow-up and suture removal.

There is no chance of needle-stick injury with skin glues. They provide a barrier for short-term exposure to water. Swimming is generally not recommended.

Disadvantages of skin glues

In studies, 4% of wounds reopen with skin glues compared to 1–2% with sutures. This was thought to be due to a combination of poor technique, poor wound selection, but most importantly breakage of bonds or sloughing from the skin surface.¹² Dihescence may cause delayed healing, poor cosmetic result and possible infection.

Patients may not feel that glue alone is adequate.⁷ This was found generally in active males who felt there was a higher chance of wound breakdown. Some patients are allergic to the cyanoacrylate or residual formaldehyde.

Tips for using skin glues

Accurately applying skin glues is easy (Box 2) and takes less than an hour to learn. In contrast, optimising suture usage takes about two years.¹² The wound still needs to be irrigated and prepared before applying skin glues.

Antibiotic ointments should not be used in conjunction with the application of skin glues. Care should be taken not to get the glue near or in the eye. Eyes should be protected with gauze to prevent eyelid attachment or corneal deposition. Antibiotic ointment or petroleum jelly can facilitate removal of glue if corrections are required.

Box 2 Steps for applying skin glue

1. Select wound carefully
2. Apply antiseptic solution to clean wound as usual
3. Oppose skin edges, usually by pulling slightly on both ends of the wound
4. Apply adhesive to the wound plus 5–10 mm either side. It usually needs three coats.
5. Allow 30–45 seconds for polymerisation with 10–15 seconds between layers.
Fanning the wound will not speed up polymerisation.
6. Once dry, cover the wound if the child is likely to pick at it, otherwise leave open
7. Glue will peel off in 5–8 days

Applying the glue

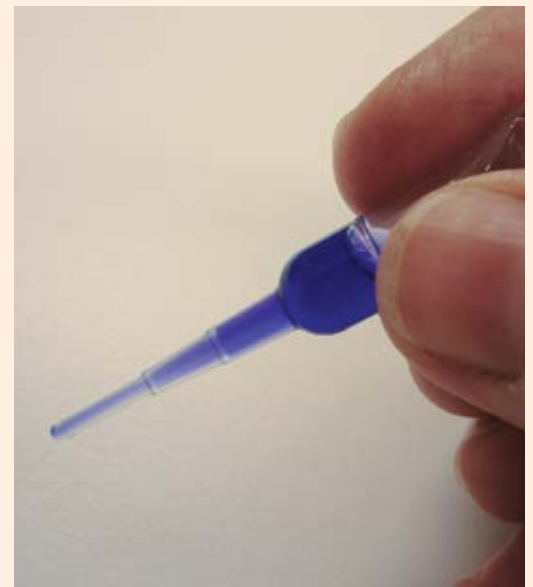
The two most common applicators for skin glues involve pressure on the container with gravity assisting. They are difficult to apply upwards on a wound. In one type (Fig. 1A), the inner glass container is crushed between the fingers which starts the polymerisation process. The liquid flows easily from the bottom of the container by gravity and pressure feed to an outward nozzle which allows continuous application due to lower viscosity. The other type (Fig. 1B) requires scissors to open the feeder and has larger droplets with higher viscosity to allow droplet application. The nozzle is then used to spread the coating.

Fig. 1 Skin glue applicators

A Continuous applicator



B Droplet applicator



The skin edges are approximated with fingers of the other hand, taking care not to include the gloves in the application process. It is important to practise controlling the applicator and get used to adhesive viscosity. The glue should cover the wound plus about 5–10 mm of skin on either side. Polymerisation takes 30–45 seconds. Two additional layers should be used, with 10–15 seconds between each layer. Full strength is achieved after 2.5 minutes.

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FURTHER READING

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Conclusion

Careful wound selection and practice of the technique make wound closure with skin glue acceptable in up to 20% of wounds. An increased rate of wound dehiscence is a potential drawback. ◀

Conflict of interest: none declared

Book review

Therapeutic Guidelines: Ulcer and wound management. Version 1.

Melbourne: Therapeutic Guidelines Limited; 2012. 87 pages

The prevalence of ulcers in the community has been estimated to be up to 2% and contributes a significant impost on the health budget. This has led to a general realisation of the importance of not only managing, but preventing this potentially chronic problem. This handbook highlights the importance of not treating the ulcer in isolation, but also considering factors that influence healing and the effects of the ulcer on the patient.

The handbook covers the causes of ulcers and wounds and their management in an easy-to-read and informative manner. It gives guidance on the

role of investigations, antibiotics, dressings and, in particular, management for particular ulcer beds. Importantly, less commonly addressed issues such as pain management are outlined.

The text is supplemented with boxes and figures which summarise assessment and treatment plans for individuals with ulcers. The photos used are true representations of the pathologies described.

The information within the handbook has been extensively researched and is in keeping with international consensus guidelines. The handbook would serve as an excellent adjunct for the specialist, medic and paramedic who has an interest in wound and ulcer management.

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