

**Get Stuck In!**  
**Hands On Experiences With Surgical Skin Glue**

Reprint from Obs & Gynae Product News (Pg 24-28)  
Issue 14: January/February 2007  
Pelican Magazines Ltd.

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## Get Stuck In! Hands On Experiences With Surgical Skin Glue.

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### Introduction

Suturing has traditionally been regarded as the mainstay of surgical skin closure. However, newer techniques of wound closure utilising modern skin adhesives such as cyanoacrylates offer the surgeon an attractive, non-invasive method of quick and effective skin closure<sup>1</sup>.

Surgeons become adept at skin closure with conventional techniques such as sutures and staples. The use of cyanoacrylates will however for many be a new technique to learn. Rightly or wrongly, despite the expertise we may demonstrate beneath the skin during a procedure, patients often judge us on how neat their superficial skin scar appears! Any new technique for skin closure therefore, not only needs to be effective but needs to be at least cosmetically equivalent or better than conventional closure techniques.

I have used a number of different cyanoacrylates but the advent of improved, fast setting cyanoacrylate glues and purpose designed surgical applicators means that I can now use them in routine practice to achieve good clinical and cosmetic wound closure. I have

found that in order to achieve this, it is useful to understand how these skin adhesives work and their limitations. With this in mind I would like to share a few practical tips that I have found helpful. Cyanoacrylate monomers polymerise in the presence of moisture to form a strong covalent bond to the epidermis and form a strong, semi-occlusive wound dressing. The cyanoacrylate dressing lasts for 5-10 days and naturally falls off as skin desquamation occurs. Early studies used the fast-setting, strong but relatively brittle n-butyl cyanoacrylates i.e. HistoAcryl. (B Braun), Indermil (Vygon), or LiquiBand (Medlogix). These are commonly used in the Emergency Departments for small wound closure. DermaBond (Ethicon) is a slower-setting, but more flexible octyl cyanoacrylate that can be used for surgical wound closure. More recently we have seen the development of blended cyanoacrylates for surgical wound closure such as LiquiBand Laparoscopic (Medlogix). These newer cyanoacrylates either blend Butyl and Octyl monomers together so that they are both strong and fast setting, with a good degree of flexibility or, as with LiquiBand Surgical (Medlogix) use a butyl-cyanoacrylate for closure and a secondary liquid bandage layer (Octyl/butyl) to reinforce and provide a semi-occlusive microbial dressing.

Potential benefits of surgical wound closure with cyanoacrylates;

1. Quicker wound closure.
2. Comparable / better scar cosmesis than sutures or staples.
3. Occlusive microbial dressing.
4. Non-invasive – less tissue trauma with reduced inflammatory reaction.
5. No requirement for secondary dressings.
6. No requirement for subsequent non-absorbable suture staple removal.
7. Easy to use / quick learning curve
8. Wound visualisation easy (i.e. no dressings to remove).
9. Reduced closure / dressing products.
10. Reduced risk of needle-stick injury.
11. Cost-effective.

Which wounds? – Surgical wound closure with cyanoacrylates is

best suited for wounds that are not subjected to too much stress or flexion. A good “rule of thumb” is that if the skin needs more than simple pulling together with forceps or fingers to achieve apposition, then deeper sutures and/or subcutaneous sutures should be used before the glue is applied. Areas of flexion should be avoided as this may lead to the polymerised cyanoacrylate film cracking and leading to disruption of the microbial barrier and possibly to wound dehiscence.

Clean and dry – optimal results are obtained if the wound incision is clean and dry with absolute haemostasis prior to application of the skin adhesive (otherwise the cyanoacrylate will polymerise with the fluids rather than bonding to the skin). Bleeding needs to be minimal and I have found that time taken in ensuring good haemostasis during surgical incision e.g. using monopolar diathermy to cut and coagulate subcutaneous / fat layer tissues, saves time during wound closure. In laparoscopic port sites the use of a local anaesthetic such as 5ml of 0.5% Bupivacaine with 1:200,000 adrenaline into each skin port site prior to incision also minimises the amount of bleeding when it comes to application of the glue at the end of the procedure. After cleaning wounds with a damp swab a second clean dry swab should dry the wound immediately prior to glue application once the skin edges are in apposition.

Good wound edge apposition - Cyanoacrylate adhesives close the skin by forming a polymerised layer across the top of the skin that binds the skin edges together. Hence it is important that excellent epidermal edge-to-edge apposition is obtained and held whilst the glue sets over the wound. This can be affected on small wounds by the use of the surgeons (or assistants) fingers holding the edges together and/or the use of a pair of Officer Forceps to appose the edges. It is here that a fast setting cyanoacrylate is preferable so that the wound is rapidly closed whilst maintaining optimal apposition. One should remember that these glues set very rapidly and care needs to be taken not to inadvertently glue gloves, forceps or assistants to the patient! If stuck, fingers or forceps should be gently peeled towards the wound so as not to disrupt the glue bond, rather than pulling. It is important that the glue is layered across the apposed wound so that there is none

# ARTICLE

or negligible glue getting between the skin edges. If cyanoacrylate gets between the skin edges it will form a layer that may prevent healing by primary intention potentially leading to a foreign body reaction / delayed wound healing. It should be remembered that the skin edges will be held in the position that the glue sets/polymerises, so the better the apposition the smaller the scar.



**Dot or continuous line** - When the wound skin edges are held tightly together the skin glue can be applied as series of dots along the wound to effect closure (a small amount of cyanoacrylate may wick along the epidermis helping wound adhesion). The technique I prefer however is to gently run the applicator tip across the top of the closed incision (barely touching the wound) to form a continuous line of skin adhesive. Care should be taken not to push the applicator tip into the wound thus disturbing the close apposition of the skin edges. For small wounds (< 3cm), closure can be obtained in one step. For longer incisions I find that closing 2-3 cm at a time and then moving along the wound line works well. With the fast setting glues (i.e, LiquiBand Laparoscopic) – the glue polymerises fully in about 7 seconds and after 20 seconds there is no danger of sticking gloves, surgical drapes or surgical assistants etc to the patient.

**Laparoscopic / small incisions** – currently I use Medlogics LiquiBand Laparoscopic to close most laparoscopic port-site incisions. The flow control applicator tip allows precise application of the glue along the wound line and then an additional liquid bandage layer can be applied to reinforce the closure. This also acts as a microbial barrier using the integral applicator. It is best to close all the incisions first with the “flow control” tip and then follow up by applying the liquid bandage. Care should be taken when closing umbilical incisions because if excess glue is applied, this may run into the umbilicus and form a “plug” of glue that the patient may later find uncomfortable. This can be minimised by applying the glue in a light sweeping motion from the inside to

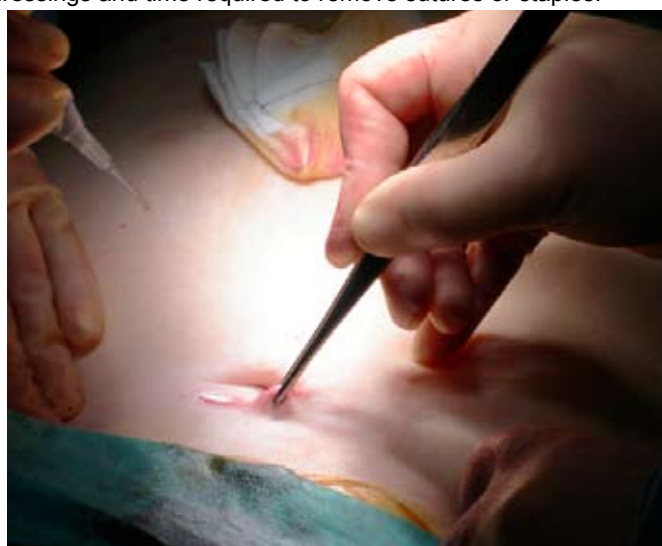
out of the umbilical closure. The corner edge of clean swab can be used to remove excess glue quickly from the umbilicus before it sets if required. Local experience reports increased patient satisfaction with cyanoacrylate closure compared to traditional suture closure particularly in patients experiencing previous suture closure.

**Peritoneal adhesion prevention fluids** - One particular problem with laparoscopic port-site closure can be the leakage of adhesion prevention fluids from the peritoneal cavity through wounds particularly where port-sites are >5mm. This can be minimised by using fast setting skin adhesives. I have experienced good results if lower abdominal laparoscopic incisions are closed first with the flow control tip whilst the patient is kept in Trendelenberg position during infusion of fluid via the umbilical port. Thereafter the umbilical port can be closed when returned to the horizontal. Port sizes of >5mm benefit from deep suture placement in addition to skin glue closure to minimise fluid leakage. Patients with very low body mass index may also benefit from a deep suture even in 5mm ports.

**Longer wounds** – The Pfannenstiel incision is commonly used in both obstetrics and gynaecology. I routinely use cyanoacrylates to close skin with these incisions. Although many longer wounds may not require fat / subcutaneous sutures the possibility of traction on the wound with subsequent superficial dehiscence makes the use of one or both advisable. I would recommend that surgeons gain experience of small wound closure before migrating to larger wounds. LiquiBand Surgical may be used for longer wound closure such as the Pfannenstiel incision provided the guidelines above are followed. In my experience patients who have had previous Pfannenstiel incisions closed with absorbable subcutaneous sutures appear to experience less wound discomfort / pulling sensation after cyanoacrylate closure in the subsequent procedure.

**Occlusive wound dressing** – Cyanoacrylates as they polymerize form a semi-occlusive, water resistant, microbial wound dressing over the closed surgical wound. No further dressings are required unless it is for mechanical protection. Continuous unimpeded visualisation of the wound in the post-operative period is therefore permitted. Patients also experience less discomfort around the wound due to the absence of a traditional dressing.

**Cost-effective?** Although the initial purchase price of a cyanoacrylate skin adhesive may be marginally more than suture or staples, this may be balanced against the savings in wound dressings and time required to remove sutures or staples.



# ARTICLE

Patient / post-operative staff information – it is important to inform both patient and post-op care staff that cyanoacrylate skin adhesive has been used. Staff should be informed of how to manage patients whose wounds have been closed with cyanoacrylate. Patients will be expecting sutures and the wound to be covered with a dressing, and hence may be surprised if they don't see this. Patient information leaflets (available from manufacturers) should be provided to supplement verbal staff instructions relating to wound care.

In conclusion, I have found that modern cyanoacrylate adhesives and applicator systems (such as Medlogics LiquiBand Laparoscopic) offer me a fast, simple and effective means of surgical wound closure, especially for smaller surgical incisions. Cosmetic results are good and patients are usually delighted as the waterproof microbial barrier function means they can lightly wash or shower the area. Not having any sutures or dressings visible, or requiring follow up for removal is also a benefit. Medlogics LiquiBand Surgical offers similar benefits for use in larger wounds. Below is a summary of my hopefully helpful tips:

## SKIN GLUE – TOP TIPS

- Clean, dry wound
- haemostasis
- good skin apposition
- Apply glue over tightly apposed skin edges
- Maintain apposition until glue has dried (7 seconds with LiquiBand Laparoscopic)
- No further dressings required
- Ensure patient / post-op staff know glue been used and knowledge of wound site care
- Patient Information leaflet.
- Apply secondary layers to strengthen and act as microbial barrier.



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## References

1. Couthard P, et al. Tissue Adhesives for Closure of Surgical Incisions (Review) 2004, The Cochrane Library, 2004. John Wiley & Sons. Tissue adhesives for closure of surgical incisions (Cochrane Review). Or Cochrane Database Syst Rev. 2004;(2):CD004287
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