

# Wound closure

BY JAMES FRAME

Looking to upskill? Professor James Frame and a host of co-authors share their tips and tricks so you can benefit from their experience.

I recently saw two wound closures exhibiting poor technique and contributing significant morbidity, including suture site inflammation, infection and partial wound edge necrosis (Figures 1 & 2). In both instances, the wounds were closed by separate surgeons using a similar subcuticular technique that needs rethinking. Both patients were told that their surgeons were taught suture wound closure by plastic surgeons during their own specialty training. Having taught both trainee and fully accredited plastic surgeons for over 40 years, this is not the way that I was shown to close skin, nor would I teach this technique, even if it sped up the operation time. I also think that if these surgeons were to follow the wounds over the first three weeks, they would realise that they are asking for complications. Superficial complications are not reported in any outcome measure unless the wound dehisces or there is pus. Skin prep techniques vary but total surface sterilisation of the deep dermis is unlikely, so suture transfer of microbes into unhealthy necrotic tissue becomes more likely with continuous subcuticular sutures that are held by knots presenting on skin.

The tips to learn for wound closure are simple and obvious when considered alongside these two cases:

1. The initial incision should always be within the natural crease lines of skin. These may not always be along lingers lines but should follow the lines of least resistance to motion.
2. To avoid deep-wound dead spaces filling with blood and serum, tissue planes must be closed in precise layers to allow rapid recovery. Elite athletes will never return to their sporting level unless the tissues are approximated with minimal tension and are able to glide early and safely during the repair process under expert physiotherapy supervision.
3. Avoid drains by closing spaces and only closing after haemostasis.
4. Close the deep dermal / subcutaneous layer using a braided tension, removing absorbable suture of appropriate thickness (3/0, 2/0 Vicryl plus).
5. Close the deep / intermediate dermis using tension-removing interrupted braided absorbable sutures (4/0 Vicryl plus) where there is a thick dermis, i.e. lateral thigh or buttock.



Figure 1: A 17-year-old male with a closed surgical incision used for access to biopsy of femur. The knots at each end are inflamed and buried with underlying necrosis and there is iatrogenic necrosis of the skin closure at a site that has been placed under undue tension. The wound is obliquely placed across natural skin crease lines.



Figure 2: A 72-year-old female with a hip wound from posterior approach total hip replacement. The absorbable suture knots are inflamed and there is skin edge necrosis from closure under undue tension at three weeks. The wound has crossed natural crease lines.

6. If an absorbable subcuticular suture is to be used, don't use the technique shown in these cases. The problems shown are:
  - a) The braided suture is used to close an incision wound that should not be closed under any unnatural tension.
  - b) The deep tissues have not been closed in layers.
  - c) The wound is being pulled tight across a convex skin surface therefore the central wound dips and the lateral ends show dog ears.
  - d) The lateral ends are unnecessarily tight, crimping the dog ears down but causing loss of blood supply and edge necrosis in the process. By pulling the central wound together under tension, dog ears are crimped in. Avoid this by using the tension-removing deep dermal interrupted suture and approximating the superficial dermal closure without tension. Often, no knots are required at each end if closed this way but it is always possible to bury the subcuticular knot without exiting and re-entering the epidermis.
  - e) The knots at each end are well away from the incision and therefore contain an unnecessary amount of inflammation-producing suture and a risk of superficial infection, deep tissue infection in haematoma, and infection of implant.
  - f) The knots are totally unnecessary if the deep dermis is held by appropriate interrupted sutures.
  - g) Once having passed through skin to make a knot, the subcutaneous suture is reintroduced into the dermis and repeated

horizontally in the subcuticular plane to the end of the wound before exiting into the skin, where another knot is applied. To close a long wound in this way without deeper tension-removing sutures means the tissues are crimped and edge necrosis will be commonly seen (but probably unreported as a complication in outcome measures unless it proceeds to a deeper wound dehiscence or infected implant).

- h) The skin sutures take at least six weeks to absorb and in the meantime the knots friction the skin, causing inflammation and tenderness. The length of the subcuticular suture is at risk of infection.
- i) The scars are forever unsightly.

There are variances in technique for wound closure and most will give similar outcomes, but consideration of the importance of wound closure in preventing necrosis and deep tissue infection should run alongside the consideration of aesthetic and functional outcome. As I learned from working in trauma and burns, it is all very well keeping patients with deforming injuries alive, but it is equally important to get them back to function with as close to normal appearance as possible. That is the essence of aesthetics and why I considered aesthetic surgery as a vital part of my training as a plastic surgeon.

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