



## "Seven Deadly Sins" in Facial Trauma - Number Three, Soft Tissue Injuries. Some Common Causes of Concerns, Complaint and Catastrophe and How to (Hopefully) Avoid Them.

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***Disclaimer*** - *This review is not an extensive evidenced based review of the literature. It is based on the past 20 years experience I have gained in assessing and managing facial injuries. Its principles have served me well (so far). Hopefully it will help those readers who see these injuries on an infrequent basis.*

The term "soft tissue" is a commonly used term that surgeons use to refer to all the structures covering the bones (skin, fat, muscle, nerves and vessels). It is also often referred to as the "soft tissue envelope" when talking about fractures. This is a very important layer. How well a fracture heals is highly dependent on the blood supply it receives and this comes largely from the overlying soft tissues. As one could imagine, a crushed wound, or one subject to blast type injuries would heal poorly because the blood supply to the bones is compromised. This can occur even if the soft tissues appear at first glance to be relatively undamaged.

Any full thickness skin wound will result in a permanent scar no matter how well it is treated. It is therefore important patients are informed of this early. As yet, 'invisible scars' do not exist, although promising research may change this in the future.

The severity of scarring in a patient depends on four main factors:

- 1) The type of injury sustained (sharp cut, blunt force, crush injury etc)
- 2) The 'biology' of the patient (age / health / smoking / tendency to heal poorly)
- 3) The management of the wound itself - what the surgeon does
- 4) Aftercare of the wound - what the surgeon advises and what the patient does.

The final cosmetic result (good or bad) is therefore partly outside the clinician's control and therefore, they cannot necessarily be held to account in all cases. Nevertheless, outcomes can be greatly influenced by surgical technique and appropriate advice and aftercare. By their very nature a poorly repaired wound, or one that is not looked after well following repair, can result in unsightly scarring and an unhappy patient. Facial wounds require time to suture and should never be done in a hurry. Simply discharging patients with no followup advice or planned aftercare can also result in dissatisfaction, particularly if the patient feels they were not 'referred to a specialist'. Even if the skin is intact following an impact, subsequent neglect or mismanagement of the injured site can still result in deformity and disability.

Facial lacerations can be deceptive. Quite often a wound will either appear to have missing tissue (when it's actually just gaping apart), or it may appear to be relatively superficial (because the wound edges have become stuck together by the clot). This latter type of wound can therefore be inadvertently trivialised and left for less experienced staff to treat. Simply stitching or glueing the skin surface in these wounds may result in unsightly stretching of the scar, once the sutures have been removed or the glue has shed. Deep wounds require buried sutures to maintain longterm support for the skin. The cosmetic implications of unsightly scarring occurring on the face and the chances of an unhappy patient are self evident. It's very important therefore that clinicians carefully assess the extent and depth of a wound before repairing it. More often than not, deep sutures will be required.

Glass related injuries often require imaging to look for retained foreign bodies. These can migrate and may not be obvious when examining a wound. Shatter resistant glass (eg car windscreen) tends to fragment into small blocks, while glass in other forms (eg pint glass, windows) can split leaving small splinters in the wound. X-rays are therefore required to look for these fragments, although they are not 100% reliable in identifying them. Careful exploration is still required. Plant leaves and other organic material may also be poorly visualised on imaging. Therefore all wounds need careful exploration before they are repaired. Grit needs careful, but gentle scrubbing to avoid tattooing.

The face contains quite a few important structures and whilst a good cosmetic result is always important, its also important to make sure this 'clockwork' is undamaged or if it is, identified and repaired if possible. The length of a wound is no indication of how much damage has occurred deep to it. Some notable examples include:

1) The facial nerve (the main nerve that moves the facial muscles) and parotid gland (a major salivary gland) are always at risk with deep lacerations to the side of the face. Injuries to these structures can be easily overlooked if the patient is swollen. Facial nerve injuries can result in permanent weakness or paralysis, either in one part of the face or an entire side.

2) Penetrating injuries to the globe / lacrimal apparatus and detachment of the medial canthus (inner corner of the eye) may be associated with nearby lacerations. These may not be immediately apparent and can result in considerable problems for the patient later.

3) Eyelids and the lips are common sites of minor (but concerning) disfigurement.

### **Initial Assessment and Management of soft tissue injuries**

It is important clinicians take sufficient time to carefully assess facial wounds. A good working knowledge of anatomy is important to assess for loss of tissue or underlying injuries. For this reason lacerations are often referred (but not always) to facial surgeons from varying backgrounds. Referral should be considered with anything more complex than a superficial and simple wound, or if the clinician feels the wound is beyond their level of expertise.

A simple checklist can be helpful in making this decision. This includes;

1) Consider the mechanism of injury (incised v crushed tissues). This may give an indication of the complexity of the wound and the possibility of 'hidden' injuries.

2) Consider the underlying structures. Assess for injuries to the deeper structures, (such as the eye / lacrimal gland / eyelid muscles / canthi / parotid duct / facial nerve / sensory nerves).

3) Consider the possibility of underlying fractures. A blunt force applied over a curved bony surface may result in both splitting of the skin and a fracture in the underlying bone.

4) Consider if there is any tissue loss, or is it all there, but just displaced? Rarely is there true loss of tissue (this usually occurs following bites, blasts, or projectile injuries). More commonly, the tissues are present, but are just gaping, creating the appearance of tissue loss.

5) Consider if any imaging is required? Plain films (Xrays) are often required for glass injuries, although computed tomography (CT) or sometimes ultrasound (US) may be used to look for deeper foreign bodies. MRI scanning works by using powerful magnets. It should therefore not be used if metal in the wound / pacemakers / internal metal clips etc are known, or suspected to be present. MRI is useful in identifying nonmetallic foreign bodies such as plastic, but some materials may still be very difficult to see (notably vegetation such as twigs, etc).

6) Consider the anticipated extent of scarring or tattooing. Risk factors for these include - a delayed presentation / contamination / tissue loss / crush injury / underlying fractures and patients known to scar badly.

7) Consider - Do I have enough time to suture this and get a nice result?

In addition clinicians should also;

1) Consider the risks of tetanus and need for tetanus prophylaxis and antibiotics.

2) If a delay in treatment is anticipated, they should gently clean the wound and loosely close it, or dress it.

3) Where tissue is twisted, untwist, realign and support it as soon as possible. Failure to do this simple manoeuvre may cut off the blood supply to the flap, which may then die. Tissues on the face that are attached by even a small 'pedicle' can do surprisingly well if they are realigned early. This is due to the excellent blood supply to the head and neck.

4) Warn all patients about scarring and the risk of subsequent deformity.

5) Document carefully: ideally, photographing the wound (with the patient's consent).

Clean wounds should ideally be sutured as soon as possible (within 12 hours). Simple treatments, such as adhesive strips and tissue glues are commonly used as they are economical and quick. Whilst excellent cosmetic results are possible in appropriately selected cases, wounds that are deep or those unfavourably orientated, require "deep" sutures. Suturing of these wounds should be performed in layers. Closing the skin only can sometimes predispose to infection and a stretched scar.

Alternatives to sutures include clips, adhesive paper tapes and skin glues. These can be applied quickly, but accurate alignment of the wound edges can be difficult. Clips tend to be reserved for lacerations involving the scalp. Adhesive paper tapes and skin glues are especially useful in children and those who will not cooperate. Care is required in both patient and wound selection. Only superficial facial or hairless scalp wounds should be considered. Although seemingly simpler, gluing can still be quite tricky— clinicians and assistants must take care not to allow glue to enter the patient's eyes, ears or mouth and be careful not to glue their gloves to the patient. Although it can be removed, this can be somewhat embarrassing!

Tattooing can occur when grit and debris are not completely removed from a wound. This heals with visible particles under the skin surface. Foreign material must therefore be removed by meticulous wound cleaning.

Bites and scratches whether animal or human in origin, must be considered as potentially serious injuries and managed expeditiously. Both can rapidly become infected if they are not

treated properly. Dog bites can penetrate deeply, taking bacteria deep into the wound. Depending on the patient (and the dog) underlying fractures have also been reported. More unusual bites (eg, farmyard animals, snakes, spiders) require specialist knowledge due to the risks of unusual infections or venoms.

### **Medico-legal issues that can arise**

- Not all lacerations need to be referred to a 'specialist', but if a clinician decides not to refer they must be able to manage it well. Patients have to live with the results of their treatment, not the rest of us. Clinicians should therefore always work within their sphere of competencies.
- Facial wounds are best managed early, following careful assessment. Failure to undertake either of these can result in complications and unsightly scarring.
- Underlying fractures or associated injuries may result in significant deformity and complications, if not recognised and treated.
- Animal bites should be carefully documented (especially if the animal belongs to someone else). Puncture wounds can be easily underestimated. The risk of infection is high.
- Whilst some aspects of lacerations are outwith the control of the patient's doctor / nurse, others are not. Poor choice of suture, poor technique and removal of sutures too early or too late can result in poor scarring.
- Patients need to take some responsibility for their wound's care. Whilst they may not be responsible for its cause, they do need to take an active role in its aftercare, as directed by their doctor or specialist. Outcomes are often good when the patient is highly motivated.
- Glueing all wounds routinely will result in poor scars in some patients. Eyelids have been known to be glued together and glue applied to the eyes even. Failure to protect the nearby structures should never happen
- Some wounds can 'tan' as they heal. Pigmented scars and darkening of the skin following a bruise can result in unsightly appearances.
- Patients should never be promised a good scar. Unpredictable factors outside our control may adversely influence healing.
- Retained foreign bodies can result in pain, infection or tattooing.
- In the presence of metallic foreign bodies, magnetic resonance imaging (MRI) is contraindicated.
- Bruises still need careful assessment and aftercare. Bleeding into a bruise can result in a clot ('haematoma') which may need draining, or prolonged massage over the coming months. Very occasionally these can go very hard as the haematoma is replaced with scar tissue.
- Sometimes the type of laceration may give an indication as to the cause of the injury. Similarly the shape of a bruise, or split in the skin may indicate the type of blunt weapon used. This may have forensic implications.
- Forensically, the age of a wound may be determined. The wound may also give an indication about the site of impact and direction of the force.