Porre attenzione a…

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Soft Tissue Injuries

- Injuries to vulnerable features require attention
  - Forehead
  - Eyebrow
  - Eyelids
  - Ears
  - Nose
  - Cheeks
  - Chin
- Cheek and chin
  - loss of function
  - facial nerves / muscles injured

SCALP injuries

- Frequently **bleed profusely** due to the extensive blood supply and require **good visualization** to gain **hemostasis**.
- Scalp lacerations with defects **smaller that 3 cm** can be closed **primarily** in most cases. Larger defects may require **galea scoring** to allow laxity for closure.
- Closure of larger defects in hair bearing areas include local **rotational** or **advancement** flaps,

Forehead

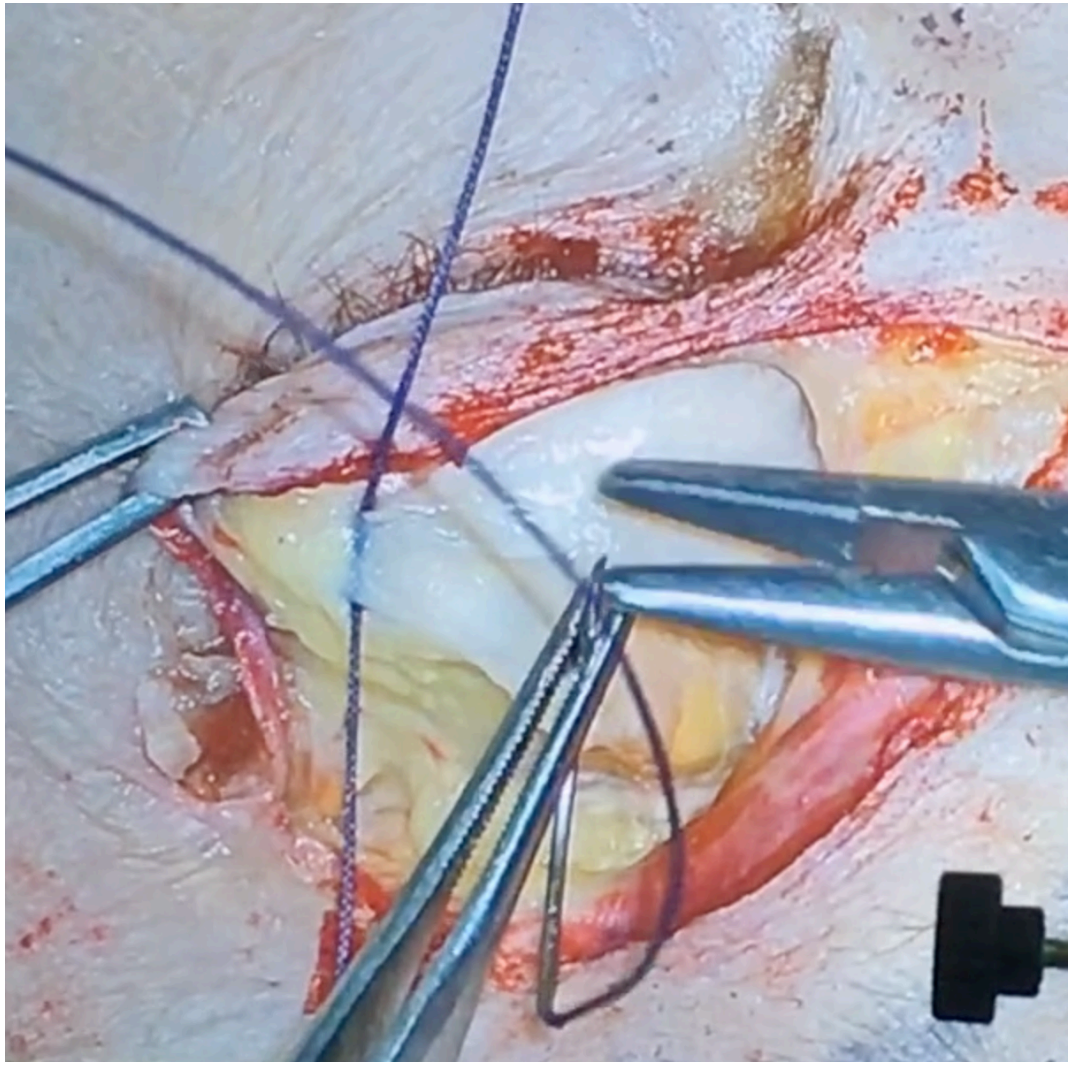
- Avulsion defects that are smaller can be managed with rotational flaps or advancement local flaps based off the supraorbital or supratrochlear vessels.

Eyelid

- Management of eyelid lacerations requires **accurate identification** of injury to all components of the eyelid. This involves upper lid, lower lid, medial canthus, lateral canthus, tarsal plates of upper and lower lid, levator aponeurosis, and lacrimal apparatus, as well as thickness of the injury and loss of tissue.
- **Timing** of closure is **not a critical factor** owing to the excellent tissue vascularity in the periorbital area and in most cases a delay of **12 to 36 hours** will not alter the outcome of the primary closure.
- Lacerations of the **lid** margin and **tarsal plate** must be approximated anatomically and the lid margin everted with **vertical mattress sutures** using 6-0 silk to prevent notching.
- In **upper lid** lacerations **levator aponeurosis integrity** is important to establish to prevent postoperative **ptosis**.

Sutura aponeurosi elevatore

Anatomic approximation of the aponeurosis with the tarsal plate can be performed with 6-0 or 7-0 polyglactin sutures placed central, medial, and lateral.



Eyelid

- Medial lid lacerations require **evaluation of the lacrimal ducts and canaliculi** and appropriate **ophthalmologic consultation** for repair.
- Partial-thickness loss **greater than 50%** of either upper or lower lid requires full-thickness **skin graft**. Donor sites from the contralateral eyelid when adequate skin exists or postauricular.
- In complete upper and lower lid avulsion wounds it is critically important to protect the eye from further injury. Ophthalmic antibiotic ointment and protective shields should be employed for protection followed by early reconstruction.
- **Lateral canthus** can be recreated with suture repair of the lower lid tarsus to the lateral orbit placed **inside the rim**.
- **Medial canthus** lacerations frequently involve the canaliculi or lacrimal apparatus and should be addressed with **ophthalmologic consultation**

Eyelid

Nose

- With **simple** lacerations, anatomic approximation is performed using 5-0 chromic for mucosal lacerations and 5-0 or 6-0 nonabsorbable sutures for skin.
- When **cartilage lacerations** are present, simple approximation with monofilament absorbable sutures can prevent collapse of nasal ala and tip and improve esthetic outcome.
- With **larger defects** involving more than just tip, local and regional **flaps** such as dorsal nasal, cheek advancement, nasolabial, and paramedian forehead flaps are used for repair

Lips

- Identification and marking of **key landmarks** such as the vermillion border, Cupid's bow, and commissure **prior** to injection of local anesthesia is important.
- Alignment of **vermillion border** is critical to the final esthetic outcome because the human eye can detect as little as 1 mm of discrepancy in vermillion continuity.
- **Skin** can be performed using 4-0 polyglactin or polydioxanone suture for deep tissue and intradermal approximation with 6-0 permanent monofilament skin sutures
- **Through and through** lip lacerations should be closed from **inside out**.
- The **lower lip** can tolerate up to **one third** loss of tissue and still be managed with primary closure.
- **Lip avulsion** wounds can be accomplished with lip switch procedures such as the **Abby-Elslander** and reverse Abby-Elslander technique

Abby-Eistlander

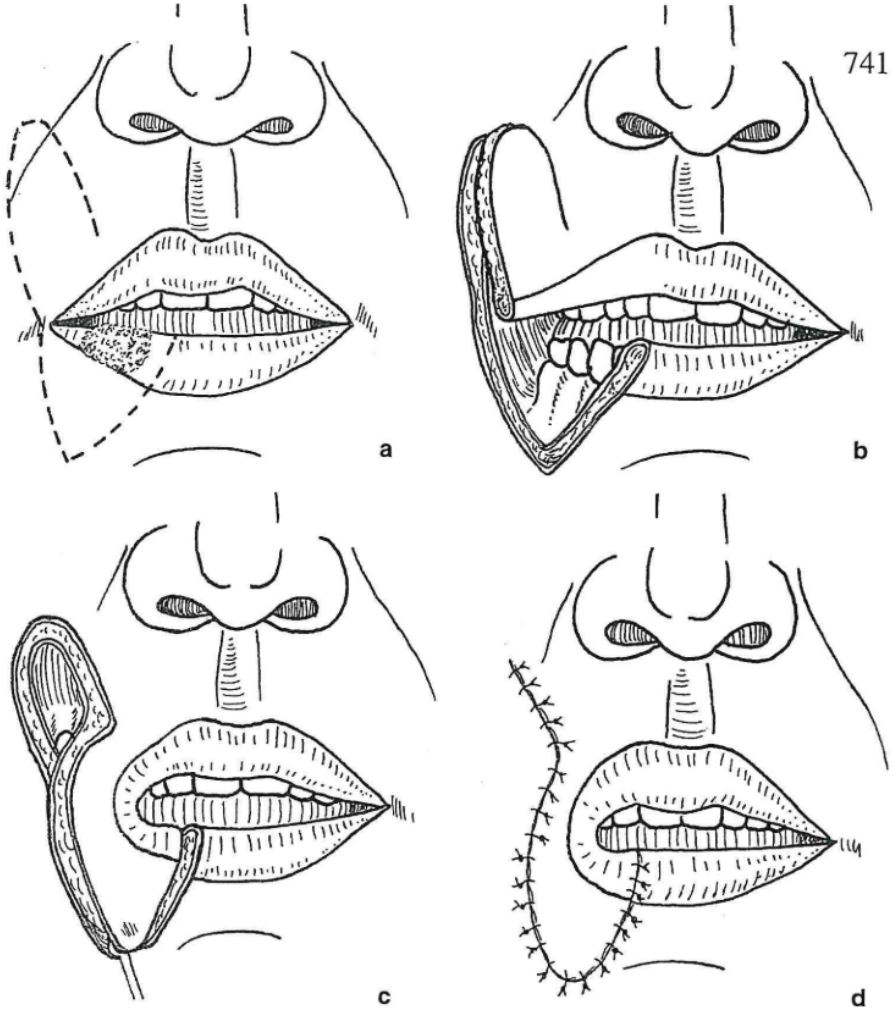


Fig. 14-48 *Tecnica di Estlander. a) Progetto dell'area da demolire e del lembo etero-labiale. b) Demolizione condotta a tutto spessore e mobilizzazione di un lembo pure a tutto spessore, dal labbro superiore. Il peduncolo è posto medialmente e contiene l'arteria labiale. c) Trasferimento del lembo sul deficit del labbro inferiore. d) Sutura.*

L'indicazione all'impiego di questa tecnica è al giorno d'oggi

Ears

- Lacerations of the ear typically involve both **skin and cartilage** because of the thin nature of ear skin and its strong adherence to the underlying cartilage.
- **Debridement of cartilage** should be kept to a **minimum** because extensive cartilage removal results in significant deformities.
- Simple lacerations require skin closure onlywith skin adherence acting as a splinting mechanism. Permanent nonabsorbable sutures are used in most cases, but in young children and infants fast-absorbing gut is preferable.
- Complex lacerations that lack support from cartilaginous injury require cartilage sutures. Absorbable monofilament 5-0 sutures such as vicryl are preferable due to its absorption properties.
- Suture knots should be placed on the **posterior** of the cartilage repair, as knots on the anterior surface are visible and frequently become exposed.

Ears

- Apply a **contouring bandage** to provide support as well as prevent hematoma or serosa forma-tion under the skin, which can result in a cauliflower ear deformity.
- Contours are filled, applications of 4-by-4 gauze front and back are placed followed by a mastoid bandage, kept for 7-8 days.
- Injuries that are sharp avulsion have much better success of revascularization than those that are shearing and crushing in nature.

Parotid duct

- Parotid Duct Lacerations of the cheek that lie in a line from the **tragus** to the **ipsilateral mid-upper lip** and extend deep to the superficial muscular aponeurotic system (SMAS) need to be explored for parotid duct injuries and facial nerve injuries.
- **Cannulation** can most easily be performed with a J-wire and followed by a catheter placed over the J-wire. Injection of materials such as **methylene blue** or propofol allows documentation of duct injury.
- This type of laceration repair should be done in the **operating room**.
- Anastomosis should be performed over the catheter with 8-0 nylon under microscopic **or loop magnification**.
- The catheter should be sutured in place intraorally and left for a minimum of 2 weeks.

Soft Tissue Injuries

Animal bites

- Special problems e.g. dog bite wounds in children
- Tearing-type soft-tissue wounds
- Aggressive cleaning
- Meticulous repair − salvage Form

Animal and human bites

- Most **dog bite** wounds occur in children. The head and neck is the most common site of injury in children younger than 9 years old, whereas in children 10 years or older the extremities are the most commonly involved site.
- Due to their rounded teeth and strong jaws, dog bite wounds are often crush-type injuries often **polymicrobial** with Pasturella multocida, Pasturella canis, Staphylococcus species and Capnocytophagia canimorus.
- **Amoxicillin/clavulanic** acid provides coverage for some penicillin-resistantS. aureus species and Pasturella species and is the preferred prophylactic antibiotic.
- Immediate closure of bite wounds is typically safe; grossly contaminated crush wounds with delayed presentation (> 24 hours) deserve careful consideration of primary versus delayed closure.

Animal and human bites

- Good lighting, sterile technique, thorough **irrigation** of wounds using tap water or normal saline, removal of foreign bodies, and debridement of tissue are the mainstays of wound management.
- **Cat bites** are more likely to cause a puncture injury with deep penetration, leaving only a small opening through which fluids can drain, associated with a **twofold higher risk** of **infection** than dog bites.
- Copious irrigation of wounds with normal saline or tap water is recommended along with primary closure in the majority of cases.
- Aug-mentin is the prophylactic antibiotic of choice with good coverage of the most common pathogens.
- Human bite wounds often compress the skin, but rarely cause avulsion injuries as in dog or cat bites. However, left untreated, open human bite wounds can cause significant morbidity.

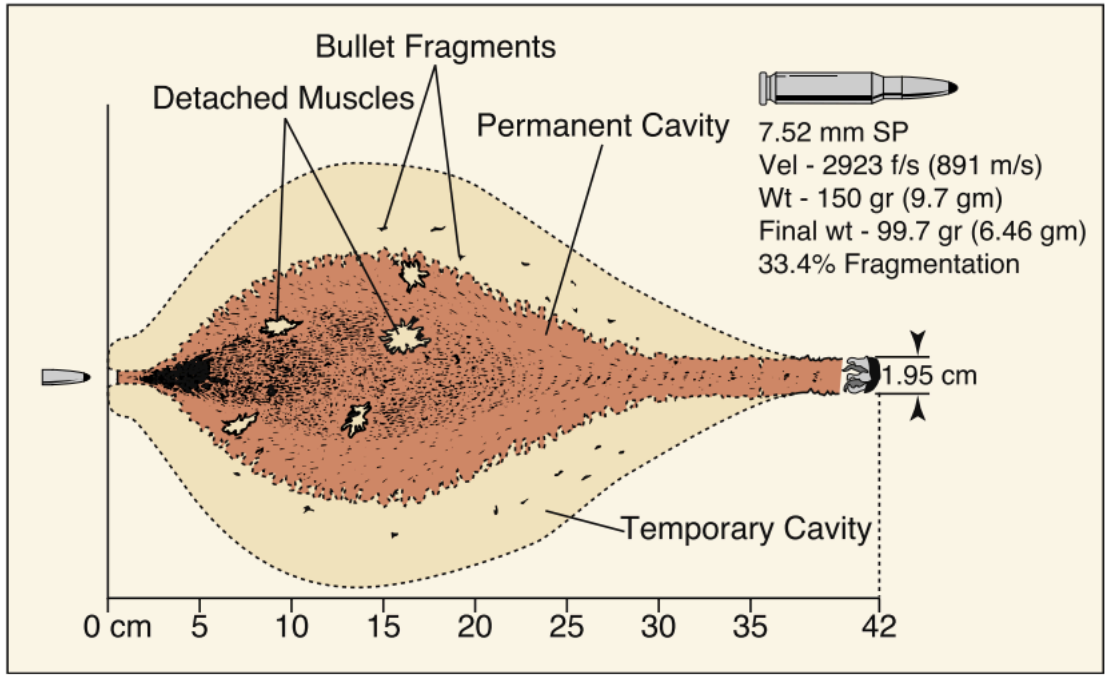
Gunshot injuries

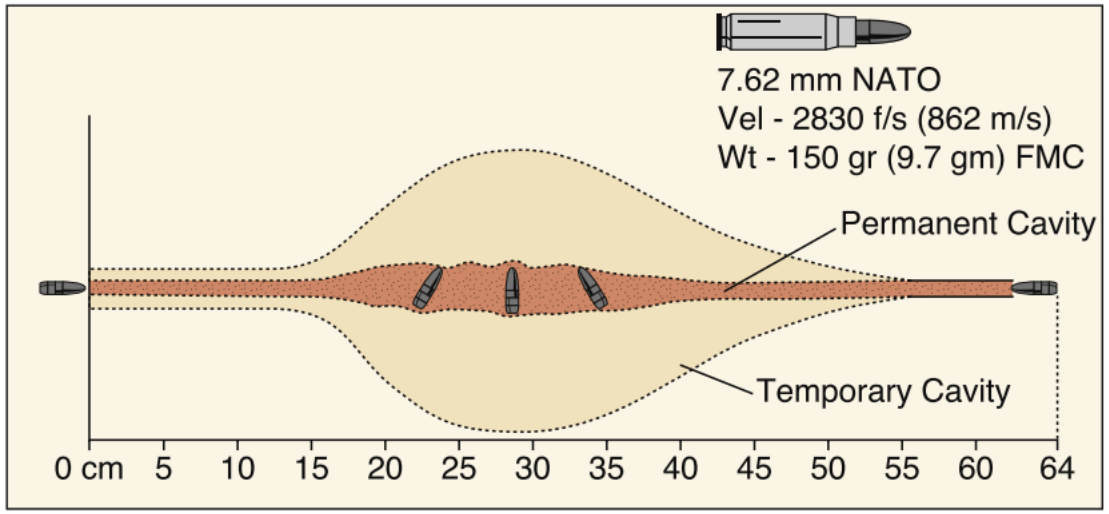
- Gunshot injuries are categorized as follows: (1) **penetrating**, where the missile strikes the victim without exiting the body; (2) **perforating**, with entrance and exit wounds without appreciable tissue loss; and (3) **avulsive injuries**, where there is an entrance and exit wound with an **acute loss of tissue** associated with the passage of the projectile out of the victim.
- The projectile's wounding capacity is directly related to the amount of KE transferred to the tissue; higher KE, which is increased by increasing bullet mass or velocity, has higher potential for wounding. However, if the exit KE is still high, then relatively minor tissue damage may result. A bullet that passes cleanly through the target and exits with significant velocity will not cause as much damage as a bullet with similar KE that completely decelerates and comes to rest within the target.

Gunshot injuries

- There is rapid energy release upon penetration, and as energy is absorbed, the tissue starts to flow forward with the projectile. A large cavity is formed that may be 30 to 40 times the diameter of the bullet in a few milliseconds. The cavity produced is vapor filled, with a sub-atmospheric pressure, and is pulsatile in nature, expanding and collapsing repeatedly with decreasing amplitude. The target tissue comes to rest, leaving a **permanent cavity**.
- Some of the ballistic energy may be transferred to bone fragments, teeth, and dental prostheses, converting them to **secondary projectiles** that cause additional injuries.
- A permanent cavity is created as the missile penetrates the wound and crushes the stricken tissue.
- The effect and damage of the **temporary cavitation** can vary greatly depending on the elasticity of the injured tissue, the size of the cavity, and its anatomic location.

Gunshot injuries





Gunshot injuries

- The **temporary cavity** has a very damaging effect on **inelastic organs** such as the liver, and in the cranial cavity, where the brain tissue is unable to move aside due to the restraint by the cranium.
- The nature of the wound is determined by both the missile and tissue characteristics. The elasticity and density of a tissue and the thickness of the body part wounded strongly affect the wound produced.

Gunshot injuries: treatment sequence

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- Basic Life Support
- Advanced Trauma Life Support
- Evaluation/Treatment plan-trauma team
- Ophtalmology/Neurosurgery evaluation
- Completion of head & neck exam and location of missiles
- Initial procedures in Operating Room

Gunshot injuries: treatment sequence

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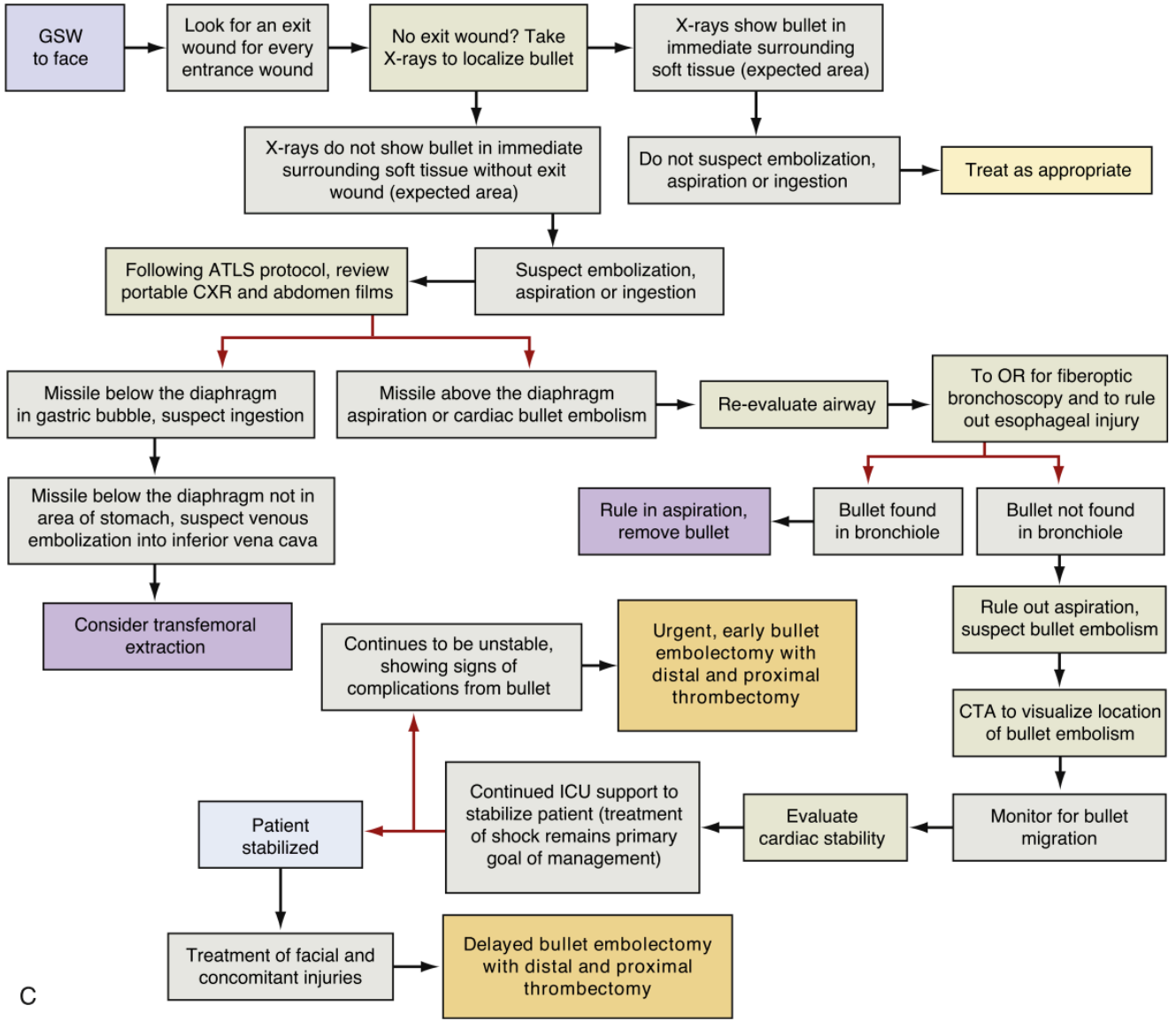

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Gunshot injuries: treatment sequence

- Copious **irrigation** with warm, normal saline with baci- tracin solution
- **Exploration** of wounds under general anesthesia— unfolding and exploration
- Removal of any skin **contaminants** and road-rash-type debris that may cause permanent tattooing; may need to scrub skin
- Assessment of **regional neurovascular** bundles, arteries, veins
- Assessment of **parotid duct**
- Assessment of **nasolacrimal duct**
- Early surgical **debridement of devitalized tissue**
- Removal only of bony fragments **smaller than 1 cm**, free floating, without periosteal attachment

Gunshot injuries: treatment sequence

- When soft tissue defects cannot be closed primarily using sterile fine mesh, **moist gauze** may be gently packed into the defect. The gauze is changed daily to successively smaller gauze as the wound begins to heal by secondary intention.
- **External fixators** for comminuted fractures

avulsioni

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Soft Tissue Injuries

Avulsion Injury

- Severely deforming & psychologically crippling injury
  - scalp avulsion
- Challenging
  - If avulsed portion very large
  - Cannot be replanted by micro vascular technique

Complicanze

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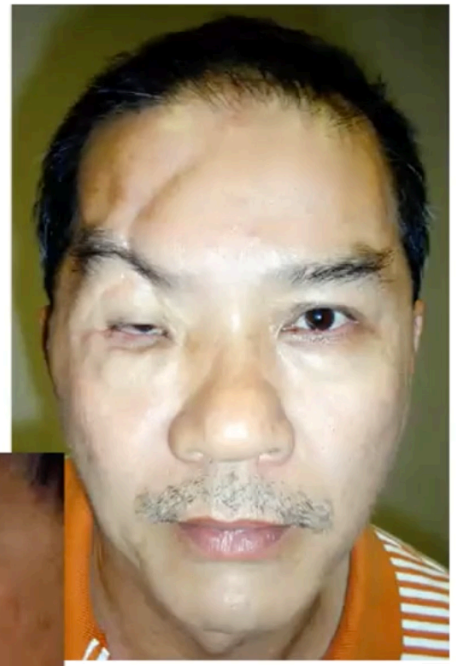
Soft Tissue Injuries

Complications

- Eyelid deformities 2' to original injury / surgery 10%
- Contour deformities 4%
- Infection (proximity of the sinuses) 3%
- Globe dystopia, Diplopia, visual disturbances 2%
- Alopecia
- Soft tissue sagging
- Scarring



Cheng et al, 2003. 105 patients 4 year follow-up. IJOMS