Wound Closure

- A vascularized "superfascial" flap for middle cranial Fossa reconstruction: technical note
- Surgical Management of a Marjolin's Ulcer of the Scalp Following Recurrent Chemical Burns
- The repair of large meningomyelocele defects using perforator artery-based non-island fasciocutaneous flaps
- Decompression with Intradural Dissection for the Chiari Malformation Type I: Toward Eliminating Wound Complications
- Risk analysis for delayed cerebrospinal fluid leak as a late complication of endoscopic transnasal surgery: effects of irradiation and insights into reconstruction methods
- Biomimetic trilayered silk-based electrospun scaffolds for regeneration of dura mater
- Progress in tension-relieving suturing surgery: revolutionary surgical techniques and patient prognosis evaluation methods
- Achieving water-tight open spina bifida closure through a novel three-port three-layer fetoscopic repair

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Wound closure refers to the medical process of bringing the edges of a wound together to promote healing, reduce infection risk, and optimize functional and cosmetic outcomes. The method used depends on multiple factors such as wound type, size, contamination, tension, and patient-specific factors.

Types of Wound Closure

1. Primary Closure (Primary Intention)

- **Definition**: Immediate closure of wound edges.
- **Indications**: Clean, incised wounds (e.g., surgical incisions, lacerations < 6–8 hours old).
- **Techniques**:
  - Sutures
  - Staples
  - Adhesive strips (e.g., Steri-Strips)
  - Tissue adhesives (e.g., Dermabond)
- **Advantages**: Fastest healing, minimal scarring.

2. Secondary Closure (Secondary Intention)

- **Definition**: Wound left open to heal by granulation, contraction, and epithelialization.
- **Indications**: Contaminated, infected, or large tissue loss wounds.
- **Examples**: Pressure ulcers, abscess cavities, avulsions.
- **Disadvantages**: Slower healing, more scarring.

3. Tertiary Closure (Delayed Primary Closure)

- **Definition**: Wound is initially left open (3–5 days) and then closed surgically.
- **Indications**: Contaminated wounds with high infection risk.
- **Purpose**: Allows decontamination and observation prior to closure.

Closure Techniques

Technique	Use Case	Comments
Sutures	Most common method	Absorbable for deep layers; non-absorbable for skin
Staples	Scalp, trunk, extremities	Fast technique, may leave track marks
Adhesive strips	Small, low-tension wounds	Non-invasive, often used in children
Tissue adhesives	Clean facial wounds	Excellent cosmetic results in low-tension areas
Skin grafts/flaps	Large or complex wounds	Requires surgical expertise

Special Considerations

- **Facial wounds**: Use fine sutures or tissue glue for cosmetic results.
- **Scalp wounds**: Bleed heavily; staples preferred.
- **Joint areas**: High tension; reinforce with deep sutures.
- **Bite wounds**: Often left open or managed with delayed closure due to infection risk.

Sealing incisions with sutures and staples is the gold-standard of wound closure.

Wound closure is the final step of surgical intervention. There are two major types of wound closure: primary and secondary. In primary closure, the skin is closed at the end of the surgery, whereas in secondary closure the wound is left open at the end of surgery and heals by granulation and contraction.

Biological glues have challenged this technique. While neurosurgical wounds, particularly those made in the dura, are less dynamic and under less fluid pressure than those of the pulmonary and cardiovascular system, biological glues that increase the reliability and resilience of these closures would significantly reduce morbidity from postoperative cerebrospinal fluid leak. Currently, the only Food and Drug Administration (FDA) approved dural sealant is DuraSeal (Integra, Waltham, Massachusetts), a polyethylene glycol hydrogel, which has both cranial and spinal formulations, and has been demonstrated to be safe and effective [1)].

Vacuum-assisted closure

Vacuum-assisted closure

1)
Cosgrove GR, Delashaw JB, Grotenhuis JA, Tew JM, Van Loveren H, Spetzler RF, Payner T, Rosseau G, Shaffrey ME, Hopkins LN, Byrne R, Norbash A. Safety and efficacy of a novel polyethylene glycol hydrogel sealant for watertight dural repair. J Neurosurg. 2007 Jan;106(1):52-8. PubMed PMID: 17236487.