

Principles of Internal Fixation of the Craniomaxillofacial Skeleton



Principles of Internal Fixation of the Craniomaxillofacial Skeleton: Trauma and Orthognathic Surgery by Adolph Barr

★★★★★ 5 out of 5

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Internal fixation plays a crucial role in the management of craniomaxillofacial trauma, as well as in orthognathic and reconstructive surgeries. A thorough understanding of the principles of internal fixation is essential for surgeons involved in these procedures. This comprehensive guide will delve into the principles guiding internal fixation of the craniomaxillofacial skeleton, exploring surgical techniques, materials, complications, and bone healing.

Surgical Techniques

The choice of surgical technique for internal fixation depends on factors such as the location of the fracture, the severity of the injury, and the surgeon's preference. Common surgical techniques include:

- **Interosseous wiring:** This technique involves passing wires through drill holes in adjacent bone fragments and twisting them together to achieve fixation.
- **Bone plating:** In this technique, metal plates are secured to the bone fragments using screws or bolts. It provides rigid fixation and is often used for larger fractures.
- **Intraosseous suspension:** This technique involves attaching wires or sutures to the bone fragments and suspending them from the intact bone structures. It is less invasive than bone plating and is suitable for smaller fractures.
- **Endosseous wires:** These are small-diameter wires inserted into the bone fragments and secured with knots or locking mechanisms. They provide minimal interference with the bone's blood supply and are often used in pediatric cases.

Materials

The materials used for internal fixation in the craniomaxillofacial skeleton include:

- **Titanium:** Titanium alloys are commonly used due to their strength, biocompatibility, and resistance to corrosion.
- **Stainless steel:** Stainless steel is a less expensive alternative to titanium, but it is more prone to corrosion and requires careful selection of alloys.
- **Bioabsorbable materials:** These materials, such as polylactic acid and polyglycolic acid, degrade over time, eliminating the need for

hardware removal.

Complications

Potential complications associated with internal fixation include:

- **Infection:** Infection can occur at the surgical site or around the implanted hardware.
- **Hardware failure:** Implant failure, such as screw breakage or plate bending, can occur due to excessive forces or poor surgical technique.
- **Bone resorption:** Internal fixation can interfere with bone healing, leading to resorption and loss of bone mass.
- **Nerve damage:** Hardware placement near nerves may result in nerve damage and sensory or motor deficits.

Bone Healing

Understanding bone healing principles is crucial for successful internal fixation. Bone healing involves three main stages:

- **Inflammatory phase:** Immediately after injury, the body initiates an inflammatory response, forming a blood clot and releasing growth factors.
- **Reparative phase:** In this phase, soft tissue fills the fracture gap and cartilage is formed. Osteoblasts begin to form new bone.
- **Remodeling phase:** The new bone is remodeled to match the surrounding anatomy and biomechanical demands.

Factors Affecting Bone Healing

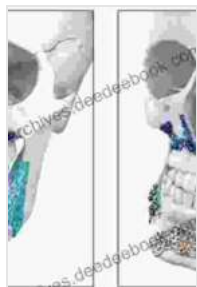
Several factors can influence bone healing, including:

- **Stability:** The stability of the fracture affects the healing process. Rigid fixation, such as bone plating, promotes faster healing.
- **Blood supply:** Adequate blood supply to the fracture site is essential for tissue repair and bone formation.
- **Patient factors:** Age, nutrition, and overall health can impact bone healing rates.

Internal fixation is a fundamental technique in craniomaxillofacial surgery. Surgeons must have a comprehensive understanding of the principles of internal fixation, including surgical techniques, materials, complications, and bone healing. By applying these principles judiciously, surgeons can achieve successful outcomes and optimize patient recovery.

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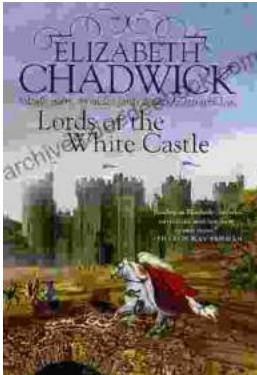
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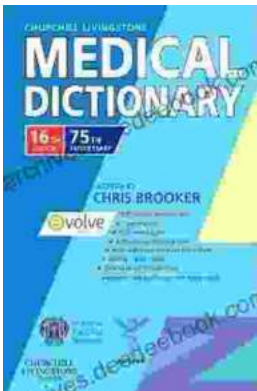
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