Immobilisation techniques

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GOAL OF FRACTURE MANAGEMENT

- to ensure that the involved limb segment, when healed, has returned to its maximal possible function
- This is accomplished by obtaining and subsequently maintaining a reduction of the fracture with an immobilization technique that allows the fracture to heal and provides the patient with functional aftercare
- Either nonoperative or surgical means may be employed

Fracture management

- 3 R PRINCIPLE!!!!
- Reposition /reduction/
- Retention of bone alligment
- Rehabilitation /as soon as possible

- FRACTURE – BONE, SOFT TISSUES

- Appendix:

Pediatric fractures are generally much more tolerant of nonoperative management, owing to their significant remodeling potential

Reduction/reposition

- reduction is needed if the fracture is significantly displaced or angulated

- Closed vs. Open
- Indirect vs. Direct
- Local anesthesia vs. General anesthesia
- Myorelaxans
- Usually principle of traction and countertraction

- If closed reduction is inadequate, surgical intervention may be required

Nonoperative (closed) therapy
-casting-

- Splints and casts- made from fiberglass or gypsum
- Closed reduction should be performed initially for any fracture that is displaced, shortened, or angulated
- achieved by applying traction to the long axis of the injured limb, reversing the mechanism of injury/fracture
- finally immobilizing the limb through casting or splinting

Indications for casts

- Fractures
- Sprains
- Joint infections
- Tendosynovitis
- Acute arthritis/gout
- Laceration over joints
- Puncture wounds, animal bites

Aims of casting

- To reduce/prevent contracture
- To increase grip strenght
- To stabilize and rest joint in ligamentous injury
- To correct deformity
- To support and immobilize joints and limbs postoperatively until healing has occured

Indications for surgical intervention

- Failed nonoperative (closed) management
- Unstable fractures that cannot be adequately maintained in a reduced position
- Displaced intra-articular fractures (>2 mm)
- Patients with fractures that are known to heal poorly following nonoperative management (eg, femoral neck fractures)
- Large avulsion fractures that disrupt the muscle-tendon or ligamentous function of an affected joint (eg, patella fracture)
- Impending pathologic fractures
- Multiple traumatic injuries with fractures involving the pelvis, femur, or vertebrae
- Unstable open fractures, any type II or type III open fracture
- Fractures in individuals who would poorly tolerate prolonged immobilization required for nonoperative management (eg, elderly patients with proximal femur fractures [)
- Fractures in growth areas in skeletally immature individuals that have increased risk for growth arrest (eg, Salter-Harris types III-V)
- Nonunions or malunions that have failed to respond to nonoperative treatment

Contraindications to surgical reconstruction

- Active infection (local or systemic) or osteomyelitis
- Soft tissues that compromise the overlying fracture or the surgical approach because of poor soft-tissue quality due to soft-tissue injury or burns, excessive swelling, previous surgical scars, or active infection
- Medical conditions that contraindicate surgery or anesthesia (eg, recent myocardial infarction)
- Cases in which amputation, rather than attempted fracture fixation, would better serve the limb and the patient

Splinting material

- Plaster of Paris- made from gypsum (calcium sulfate dehydrate)
- Exothermic reaction when wet- recrystallizes (may burn patient!)
- Setting time 3-9 min.
- Drying time 24-72 hours
- Advantages: easier to mold, cheap
- Disadvantages: more difficult to apply, gets soggy when wet

Ready made splinting material

- Plaster- 10-20 sheets of plaster with padding and cloth cover
- Fiberglass (orthoglass)- cure rapidly, less messy, stronger, lighter, less moldable/ more expensive
- Prefabricated splints
- Air splints
- Vacuum splints


GERMA
PROTEC

Pre/post splints check

- F- function
- A- arterial pulse
- C- capillary refill
- T- temperature (skin)
- S- sensation

Splitting the cast

- Most casts should be split after they have dried to accommodate post-reduction swelling
- Three grades of split:

1. A single split is carried out at the end of the operative or reduction procedure. This is routine for most cast applications

2. The split is opened with spreaders and all the encircling bandages are divided if there is significant swelling or any signs of neurovascular compromise

3. Two complete splits in the cast convert it to a "bivalve" for crush injuries, open fractures and fractures with overlying burns

Complications-Compartment syndrome

- the most serious condition
- increased pressure within a closed space that compromises blood flow and tissue perfusion, causes ischemia and potentially irreversible damage to the soft tissues within that space
- If an immobilized patient experiences worsening pain, tingling, numbness, or any sign of vascular compromise (severe swelling, delayed capillary refill, or dusky appearance of exposed extremities) an immediate visit to the nearest emergency department or urgent care office is indicated for prompt removal of the cast

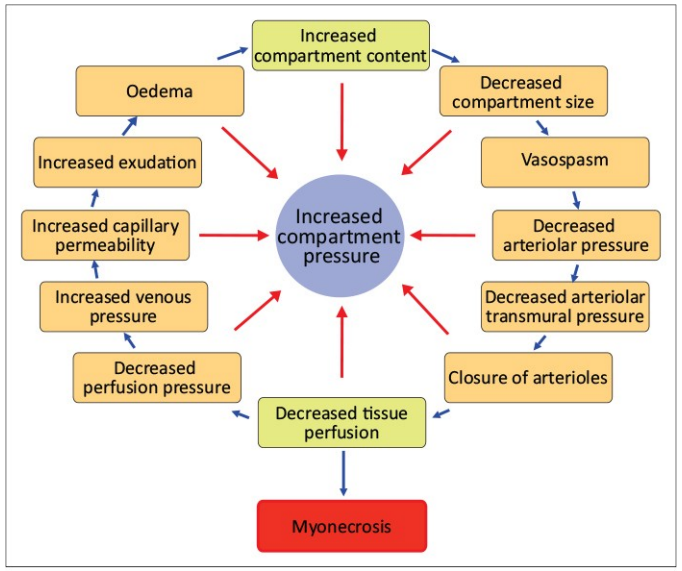


FIGURE 1: Algorithm detailing the pathophysiology of compartment syndrome, based on the theory of Matsen.

Complications- Skin injuries

- Thermal injury can occur as a result of the casting or splinting process
- Skin breakdown- often caused by focal pressure from a wrinkled, unpadded, or underpadded area over a bony prominence or underlying soft tissue
- can be minimized by ensuring that the padding is adequate and smooth, without indentations during application
- Infection, pruritic dermatitis

Complications-Function

- Stiffness
- Partial or complete loss of function
- Prevention: adequate reduction, imobilisation, early rehabilitation

Traction

- Pulling effect exerted on a part of skeletal system
- For hundreds of years, traction has been used for the management of fractures and dislocations that cannot be treated by means of casting
- With the advancement of orthopedic implant technology and operative techniques, traction is rarely used for definitive fracture/dislocation management

Traction

- Reduce muscle spasms
- Realign bones
- Relieve pain
- Prevent deformities

Types of traction

- Manual
- Skin
- Skeletal

Manual traction

- Pulling on body using s person´s hands and muscular strenght
- Used to realign dislocated fracture, replace dislocated bone within a joint

Skin traction

- traction tapes are attached to the skin of the limb segment that is below the fracture or a foam boot is securely fitted to the patient's foot
- usually 10% of the patient's body weight (up to a maximum of 10 lb) is recommended
- At weights greater than 10 lb, superficial skin layers are disrupted and irritated
- Because most of the forces created by skin traction are lost and dissipated in the soft-tissue structures, skin traction is rarely used as definitive therapy in adults
- temporary measure until definitive therapy is achieved

Buck´s traction

- Femoral fractures
- Acetabular fractures
- Lower back pain

Gallows traction

Femoral shaft fracture in children under 2 years

Skeletal traction

- a pin (eg, a Steinmann pin) is placed through a bone distal to the fracture
- Weights are applied to this pin
- patient is placed in an apparatus to facilitate traction and nursing care
- most commonly used in femur fractures: A pin is placed in the distal femur or proximal tibia 1-2 cm posterior to the tibial tuberosity
- Once the pin is placed, a Thomas or Bohler-Braun splint is used to achieve balanced suspension

Skeletal traction

- More powerful than skin traction
- Up to 20% of patient body weight can be pulled up
- Requires local anaesthesia
- Long bone, pelvic/acetabular fracture

Bohler Braun splint

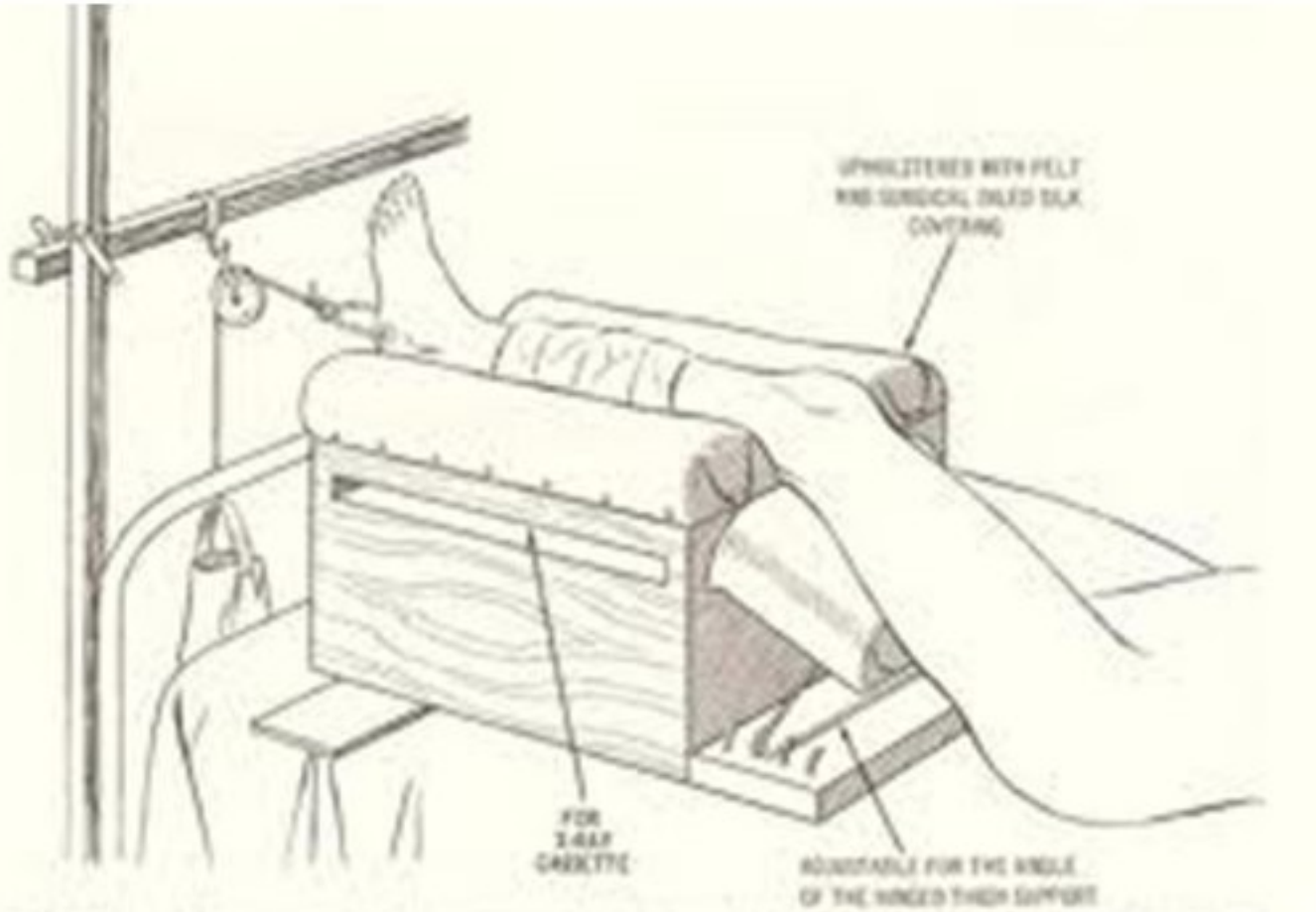


FIGURE 8.—Management of compound fractures of both bones of leg in improvised traction cradle.

Skeletal traction

Kirschner´s bow

Upper limb- shoulder and arm

- Figure of eight - clavicle fracture
- Patient standing with hands on iliac crest, abducted shoulders

Upper limb- shoulder and arm

- Sling and swathe
- Shoulder and humeral injuries
- Sling supports weight of shoulder
- Swathe holds arm against chest to prevent shoulder rotation
- Placing with elbow flexed in 90°

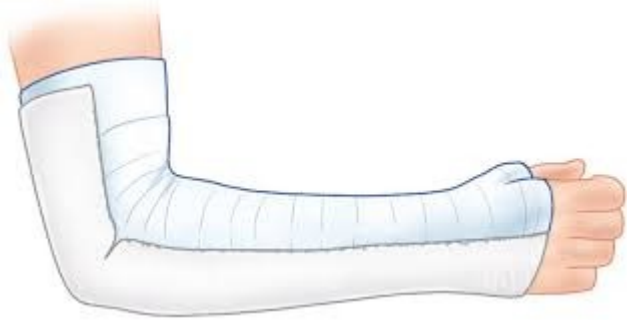
Upper limb- shoulder and arm

- Aeorplane splint
- Injury of brachial plexus

Elbow-forearm

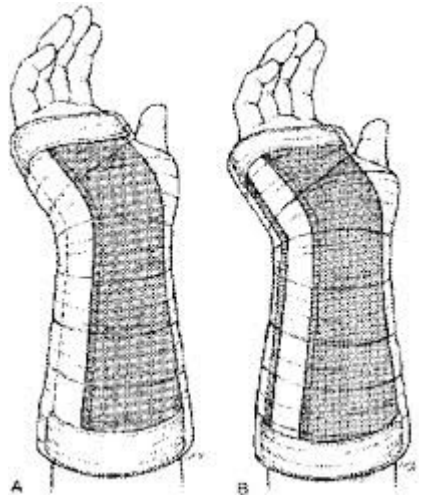
Long arm posterior

- Forearm and elbow injuries
- Olecranon and radial head fr.
- Distal humeral fr.
- Not recommended for unstable fr.
- Doesn´t completely eliminate pronation/supination



Volar forearm

- Distal forearm/ wrist
- Not used for distal radius or ulna
- Soft tissue injuries, sprains
- From volar palmer crease to 2/3 forearm
- Allows elbow and finger ROM



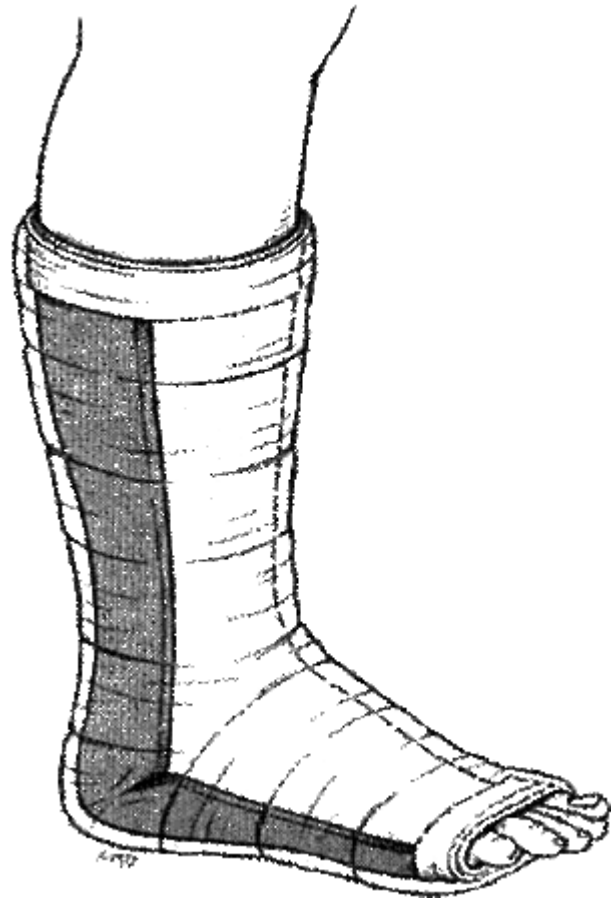
Finger splints

Lower limb-knee splint

- Knee/ proximal tibia injuries
- Full extension of knee/ROM

Ankle- posterior ankle split

- Distal tibia/fibula fractures
- Reduced dislocations
- Severe sprains,tarsal/MTT fr.
- 12-15 layers
- Placed from metatarsal heads on plantar side, extends up back of leg to level of fibular neck
- Coaptation splint (stirrup) eliminates inversion/eversion



Buddy strapping

- Phalang fr. of toes
- Small piece of padding between fingers to prevent maceration
- Fractured to secured to adjacent with tape

Spine- Cervical collar

- Flexible foam/adjustable/rigid
- Encircled the neck
- Motion control, keeping warm
- Soft tissue injury, minor sprains, postoperative immobilisation

Spine- Cervical collar

Philladelphia- semi-rigid
Access to trachea

Stiffneck- emergency, transport

SOMI- Sternal Occiptal Mandibular Immobilizer

- Cervical spine injury
- Rigid frame
- Limits flexion/ extension
- Extends inferior into thoracic level for greater control of all cervical levels

Spine- Jewett brace

- Stable spinal compression fracture
- Th7-L2
- hyperextension

I hope you find

this humerus.