Ep 02 Notes- Preoperative Planning - Dr. Earhart

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Bone Healing:

- Primary bone healing

A. Direct osteoblasts remodeling . Cutting cones at bone and haversian modeling. No Callus Production.

- Secondary bone healing

A. Inflammatory phase- Hematoma; vasodilation; cytokines and macrophages; stem cells migrate to the fracture site and stimulate growth factors.
B. Soft callus- Cartilaginous scaffold; Type 2 collagen ; Osteoblasts
C. Hard callus- soft callus transition to woven bone; Mainly Type 1 Collagen
D. Remodel phase- Woven to Lamellar bone along the lines of stress over years (Wolff's Law - Bone grows and remodels in response to the forces that are placed upon it)

https://youtu.be/Ovbqx5Uwmic - **Dr. Nabil Ebraheim Fracture Healing - Youtube**

Relative vs Absolute stability

Fracture personality - Factors that should be considered when deciding how to fix fracture

- anatomic location, blood supply, etc.
- Fracture pattern- (simple fx patterns vs complex and comminuted fractures,(Inherent Stability)
- Bone quality (Osteoporotic bone)
- Soft tissue status

Fixation

- **Lag Screw**

Technique- By technique vs design

A. Drill near hole as outer diameter of screw perpendicular to fracture (Glide/Near Hole)

B. Drill far hole as core diameter of screw perpendicular to fracture (Pilot/Far Hole)
C. +/- Countersink to increase surface area head have to apply force and decrease point stress at cortex of bone
D. Insert screw: Purchase at far hole and compress bone

Design - Partially threaded screw
Thread must not cross fracture line

Does not resist bending/shear forces well- Can use a neutralization plate to assist with this

https://youtu.be/6riMX7Mg0DQ **- OrthoFilms Fracture Fixation: Lag Screw - Youtube**

Plates

A. **Neutralization**

Can be used to neutralize lag screws from shear bending or torsional forces across the fracture

B. Buttress

Applied to metaphysical fractures to support intra articulations fragments. Neutralize vertical shear forces during axial loading
(Tibial Plateau/ Distal Femur)

C. Tension Band

Tensile forces are converted into compression forces.. Plate/band placed applied to tension side of bone
(Patella, olecranon) Simple fxs

D. Compression

Rigid fixation helpful with transverse fractures
Technique
Screw in neutral position on one side of fracture
Eccentric screw placement. Drill away from fracture
Cause bone to compress as screwed in place

W/wo lag placement

Locking
Head of screw has threads which corresponds with threads in plate
Fixed angle construct. Increases Pull Out strength
Failure in Series
Good For Osteoporotic bone

E. Bridge

Not anatomic reduction or absolute stability
Plate Span ratio ?
(Comminuted metaphyseal or diaphyseal fractures)

F.

- **IMN**
  Ream vs Non reamed
  Static vs Dynamic
  Dynamizing nail
  Less periosteal Stripping

- **Ex fix / Cast**

Nailed It Ortho podcast episode 2

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