Failed Fixation

Resident Comprehensive Fracture Course

Why Study Failures?
Learn from others mistakes
Best chance to get it right is the first time
Know how to fix it when it fails

Goals of Diaphyseal Fracture Treatment

• Stability of Fracture
• Restoration of Limb Axis, Rotation, and Length
• Preservation of Blood Supply
• Motion
• Avoidance of complications
• Return to normal function

Potential Errors

Soft Tissue
• Doing too much
• Doing too little
• Doing it at the wrong time

Bone
• Bad Reduction
• Biology: stripping, gaps
• Mismatch between desired healing method and implant choice
• Bad mechanics

Potential Errors

Soft Tissues: Too Much
• Excessive stripping

Bone
• Large clamps
• Loss of bone contact
• Pointed Reduction clamps
• Percutaneous application
**Soft Tissues: Too Little**

- Inadequate debridement
- Missed compartment syndrome
- Inadequate soft tissue coverage

**Soft Tissue-Wrong Time**

- Patient systemically ill
- Swelling, blisters
- Necrotic or contaminated tissue present

**Soft Tissue: Summary**

- Do the right thing at the right time

**Bone: Bad Reduction**

**Failure to Achieve/Maintain Reduction**
Bad Biology

Bad Mechanics

Bad Mechanics

Balanced Fixation

BONE

WORK BACKWARDS FROM THE POINT OF HEALING

How do I want this fracture to heal?

Then what fixation technique should I use?

What is the job of your implant?

Do you want Absolute or Relative Stability?

Cases
- Long on plate, short on (number of) screws
- Working length may be more important than # of cortices
- Longer if osteopenia or comminution present

Forearm 3.5 mm LCDCP
Humerus 4.5 mm LCDCP
Femur 4.5 mm LCDCP
Tibia 4.5 mm LCDCP
Fibula 1/3 tubular or 3.5 LCDCP
Reconstruction plate not for long bones
• Desired method of healing?
• Technique to achieve that method of healing?
Failure of Fixation

The bending moment for the plate is greater due to the force being applied over a longer distance.

\[ \text{Bending moment} = F \times D \]

- \( F \) = Force
- \( D \) = Distance from force to implant

\[ D_2 > D_1 \]
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76 yo male fell from tractor
3 years post-op

Asymptomatic & apparently united

Renailed

5 months
The optimal plate to fix a fracture is:

1. 4.5 DCP
2. Locking plate
3. Determined by the location, nature and biology of the fracture including soft tissue condition and deforming forces.
4. Plate used to compress a fracture.

Every fracture should be treated:

1. Immediately with open reduction, rigid fixation.
3. According to the specific demands of the biology of the fracture and the patient.
4. With delayed definitive fixation.

The optimal plate length and number of screws is:

1. 8 holes with 6 cortices on each side of fracture
2. With a maximal working length and strategic screws widely placed.
3. 10 holes with 4 cortices each side of fracture
4. 12 holes with 2 cortices each side of fracture

Remember your diaphyseal bone concepts!