

# How Much Fixation is Too Much Fixation ?

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Oxford Trauma Unit

# Short Answers

- Just more than too little

# Short Answers

- Who cares as long as it works?

# Short Answers

- Why are you asking me?



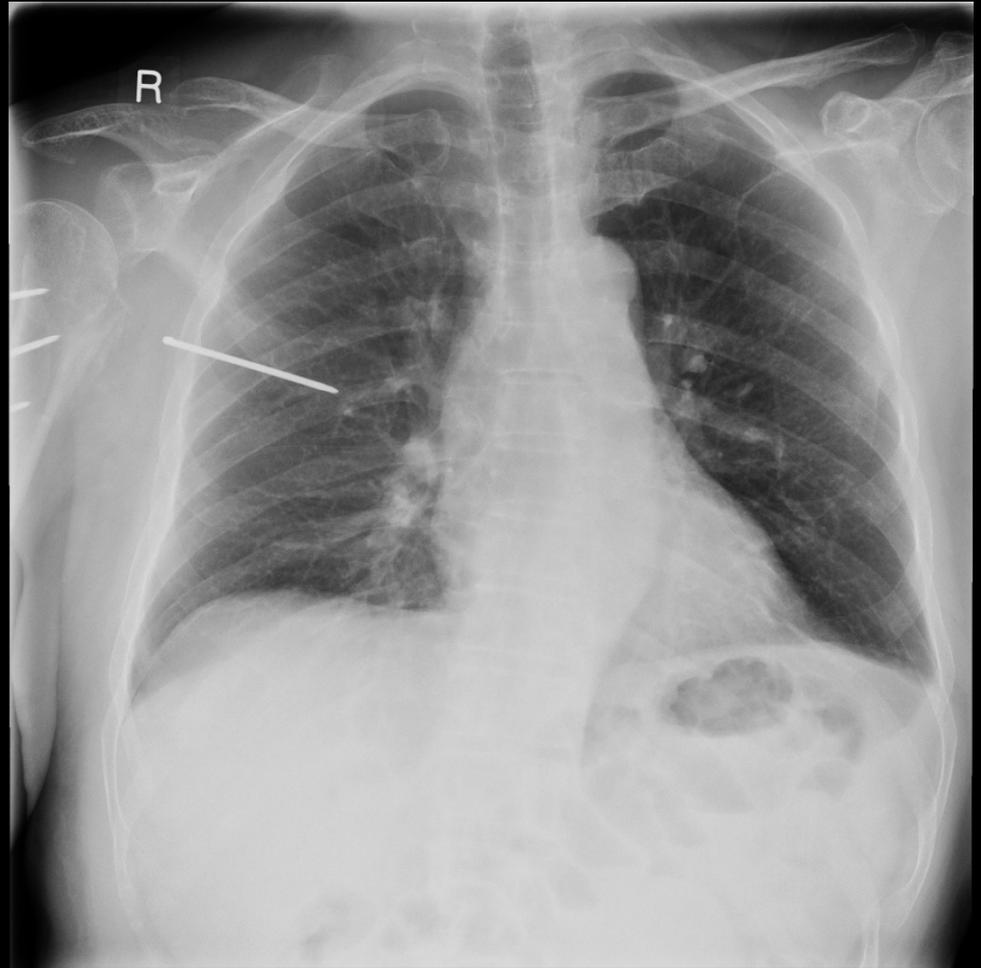
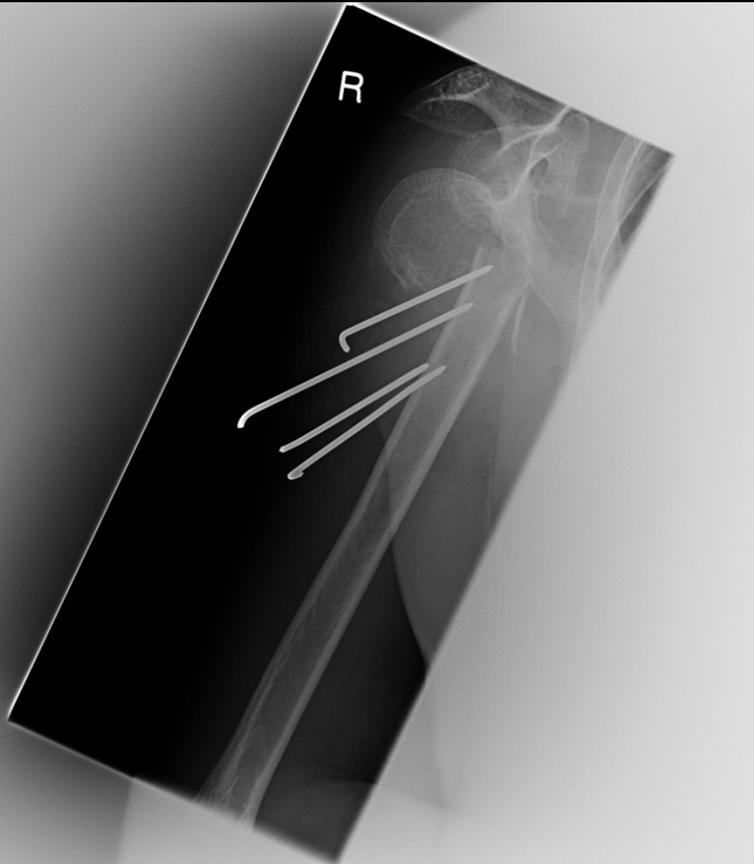
# Long Answer

- How much is enough?
- Is too much a bad thing?

# 2 Questions

- How much is enough?
- Is too much bad?

# Not enough



# Failure

- Can occur at any point in the construct
- Construct only as good as the weakest link
- Dependent on mechanical environment at the fracture site

# 2 Questions

- How much is enough?
- Is too much bad?

# Too Much Fixation - Bad

- Detrimental to biology
- Detrimental to construct
- Detrimental to optimum strain
- Economics

# How much fixation is too much fixation?

- How much is enough?
- Is too much a bad thing?

# Evidence?

- Literature
  - Lab based
  - Clinical based
- Experience
  - Eminence based
  - Personal based
  - Providence based

# Plan

- How much is enough?
- Is too much a bad thing?
  
- Keep it simple!

# Patients

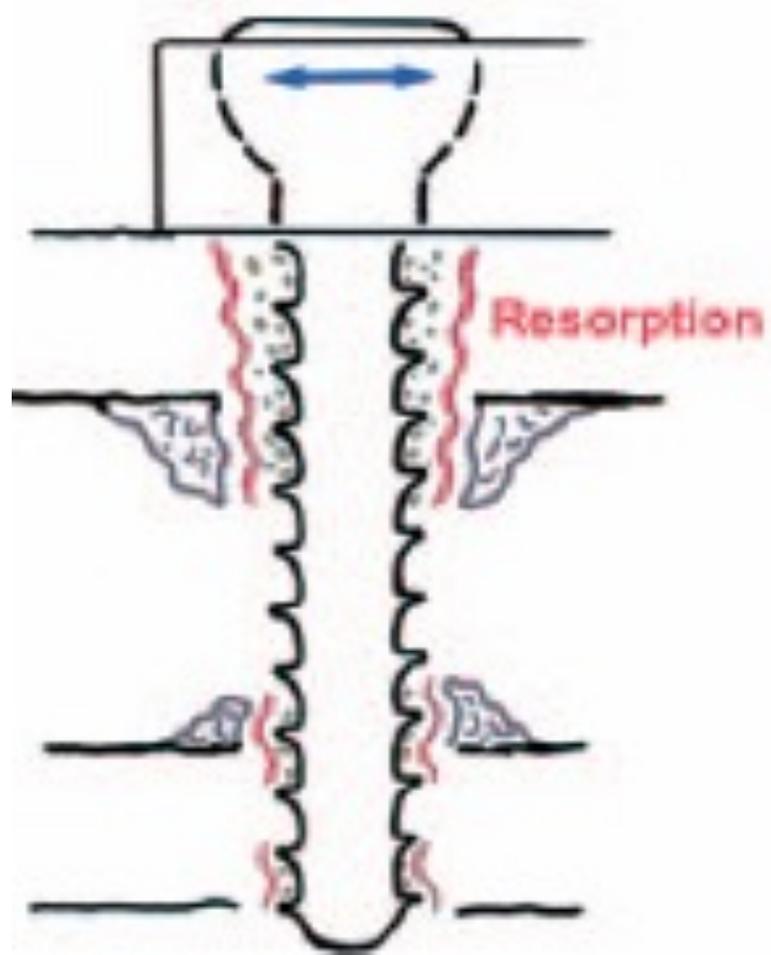


# Bone – Implant Interface

- Screws
  - Type
  - Cortices
  - Number
- Interface
  - Bone type
  - Technique

# Screws



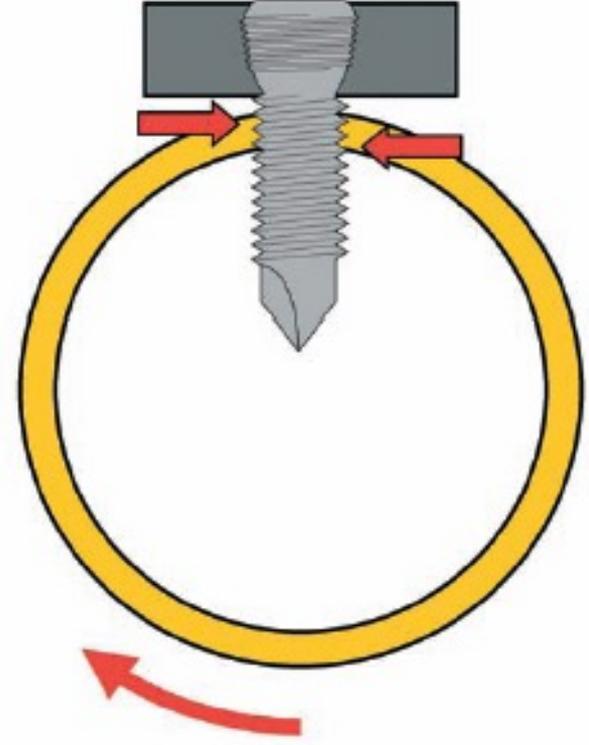
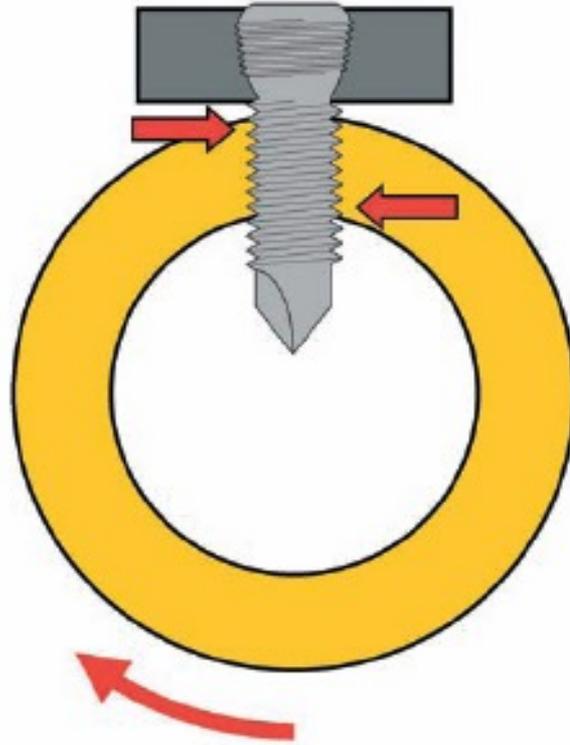
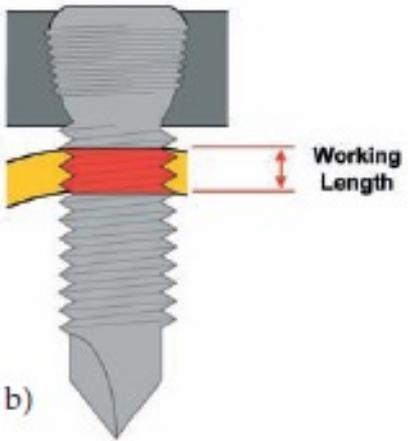
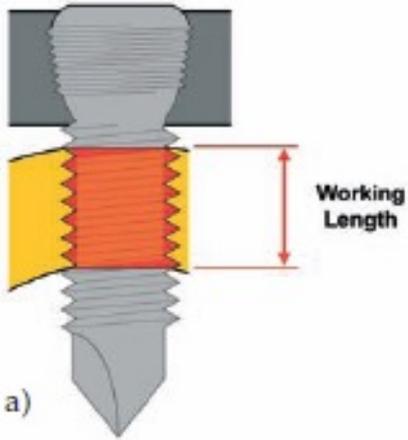


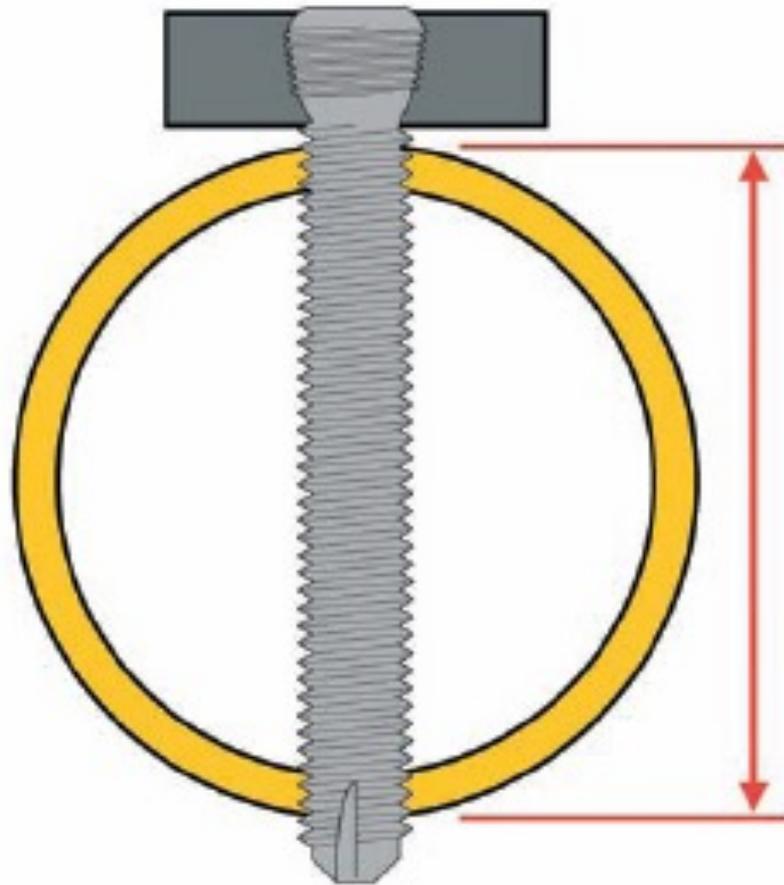
Movement



# Number of locking screws

- At least 2 on each side
  - Young vs Old
- Unicortical vs Bicortical
  - Does not reduce risk of screw breakage

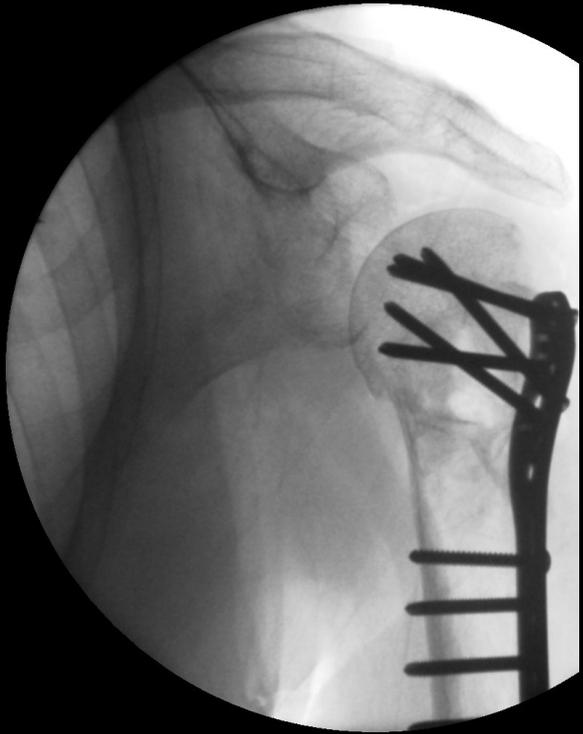




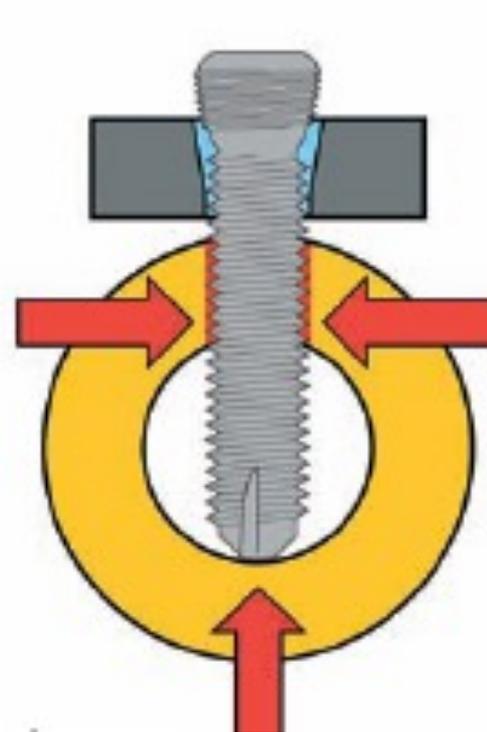
**Working  
Length**

# Interface

- Materials
- Distribution of load
  - Number of screws
  - Reduction



# Self drilling screws



# Screw - Implant Interface

- Locking vs Non Locking

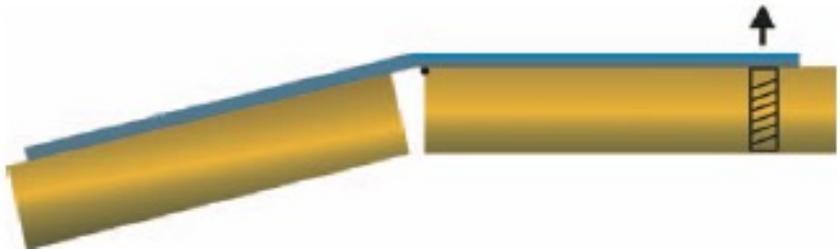
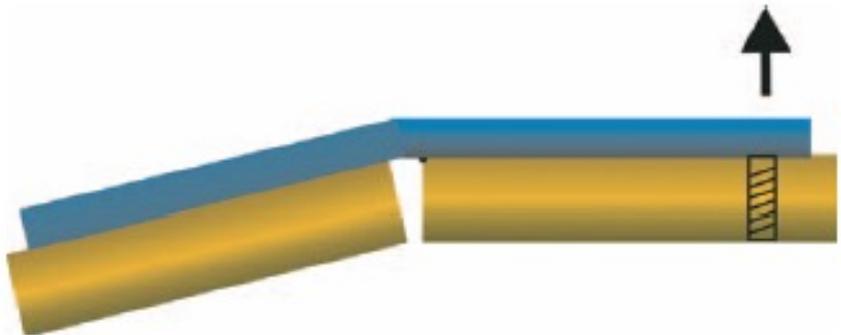
# Answers

- How much is enough?
- Is too much a bad thing?



# Plates

- Material
- No. of plates
- Size
- Mode



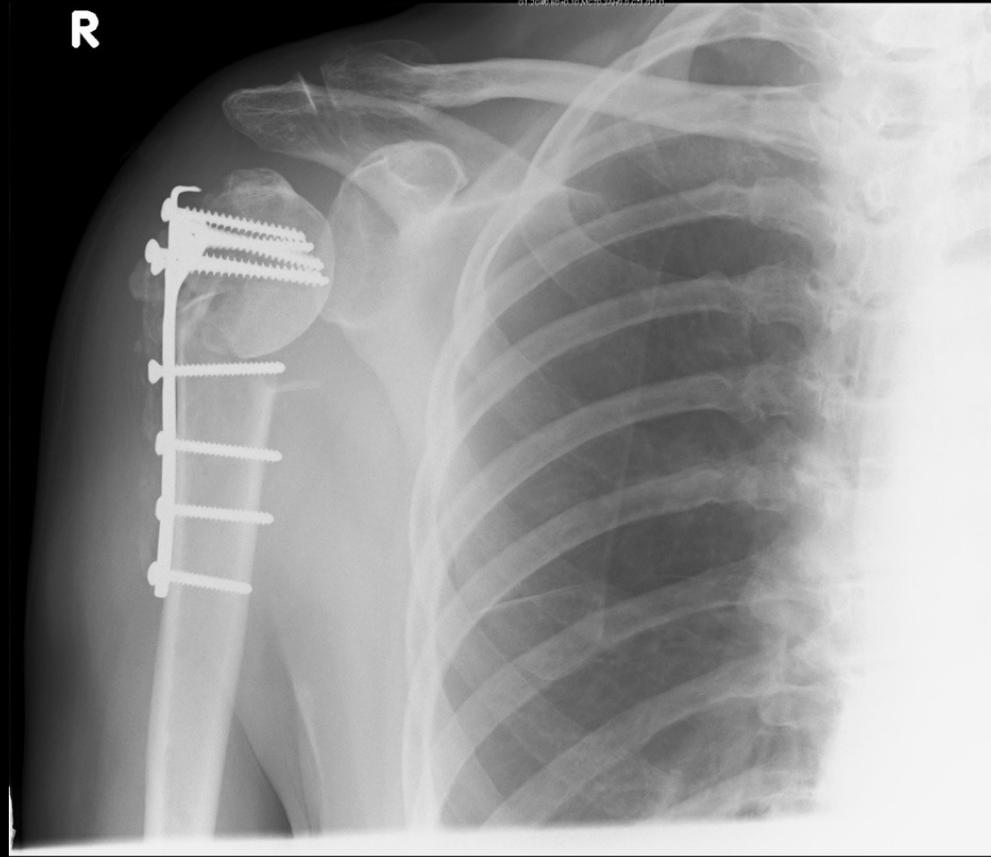
# Mode

- Neutralisation
- Compression
- Bridging
- Tension band
- Anti-glide
- Buttress

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# Answers

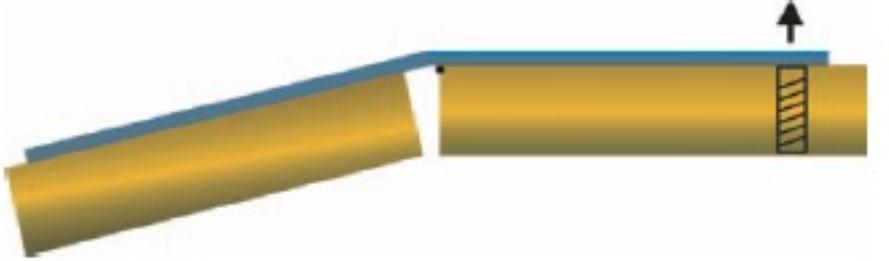
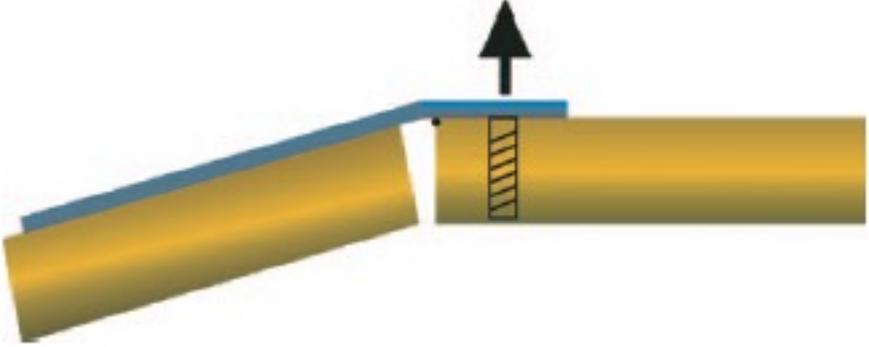
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- Is too much a bad thing?

# Construct Mechanics

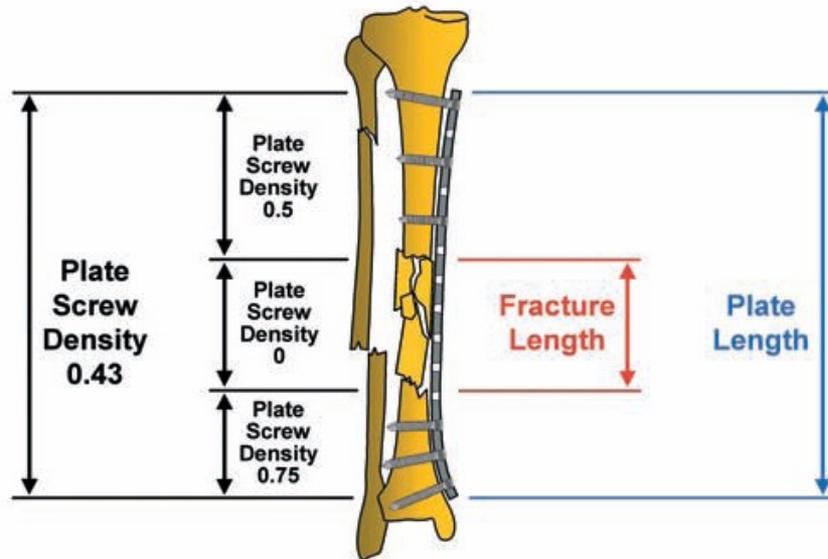
- Mechanical failure
- Strain environment
- Changes with time

# Mechanical Failure

- Screw pull-out
- Implant breakage

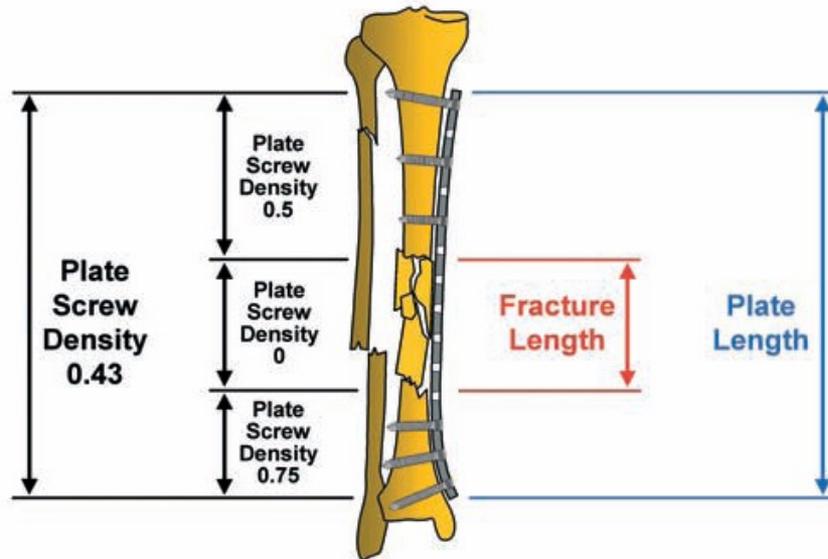


# Plate Span Width



- Length of plate / overall length
- 2 - 3 comminuted
- 8 -10 simple

# Plate Screw Density



- No. of screws inserted / No. of plate holes
- $<0.5$

# Strain Environment

- Art vs Science

# Strain Environment

- Art vs Science
- What do we know ?

# Strain Environment

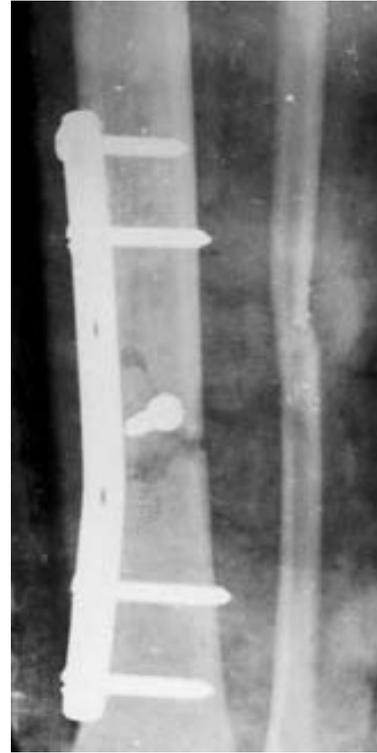
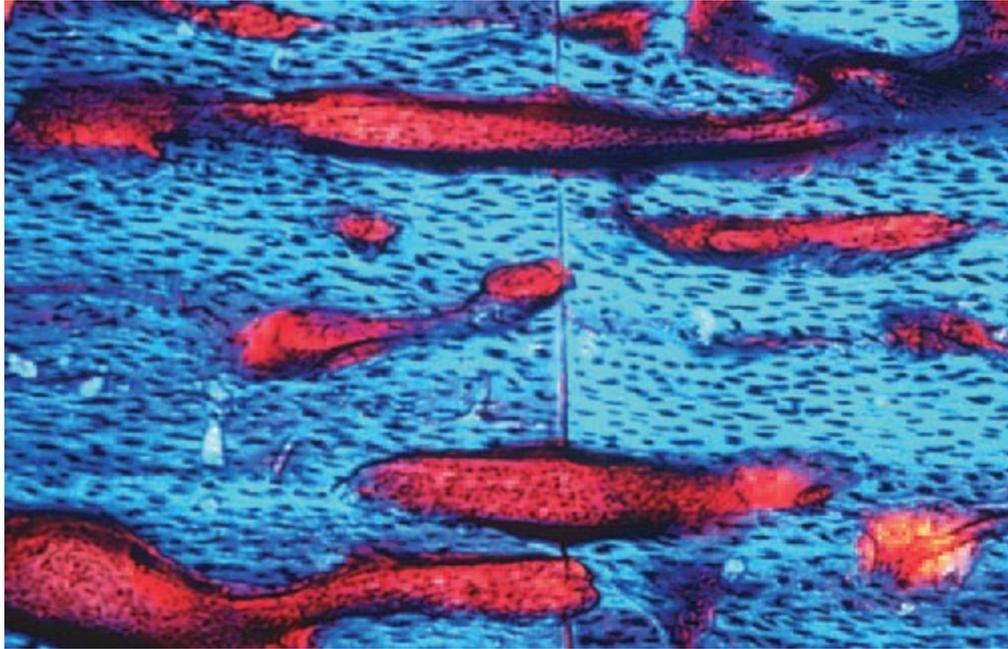
- Art vs Science
- What do we know ?
  - Wolff's law

# Strain Environment

- Art vs Science
- What do we know ?
  - Wolff's law
  - Perren's strain theory

# Strain Environment

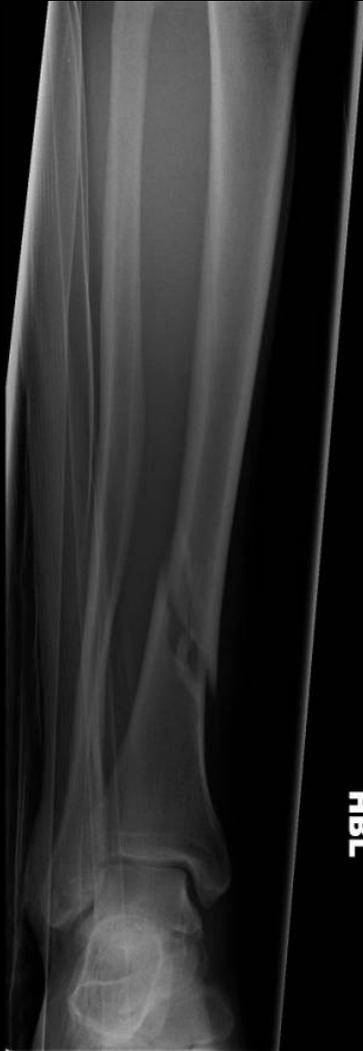
- Art vs Science
- What do we know ?
  - Wolff's law
  - Perren's strain theory
    - Primary bone healing



# Strain Environment

- Art vs Science
- What do we know ?
  - Wolff's law
  - Perren's strain theory
    - Primary bone healing
    - Secondary bone healing

# Non-operative treatment

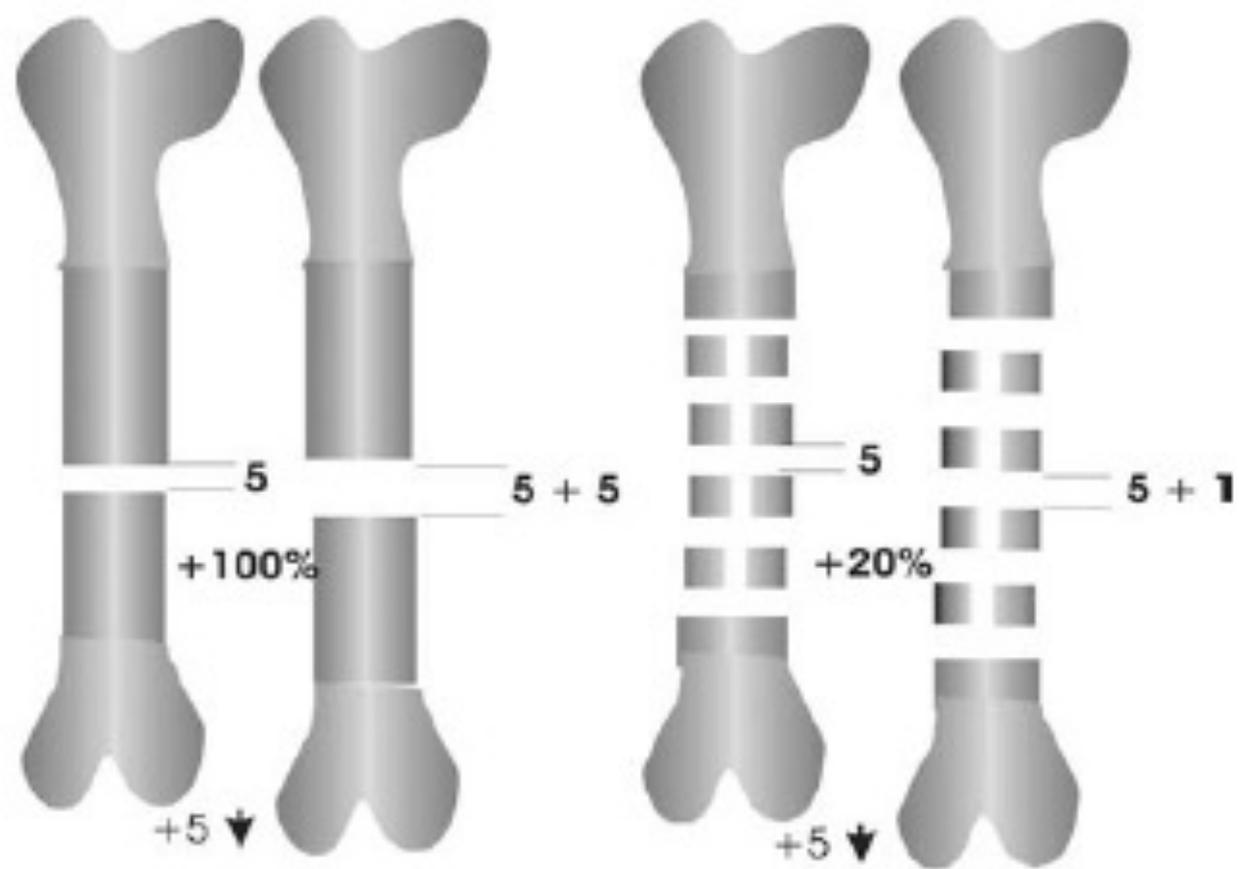


R  
HBL



R  
RS





# Operative treatment



# Construct Mechanics

- Mechanical failure
- Strain environment
- Changes with time

# Answers

- How much is enough?
- Is too much a bad thing?
  
- Primary bone healing (re-modelling)
  - Mechanics
  - Specific
  
- Secondary bone healing
  - Type C
  - Type A

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R  
CLC



01.8250.00+0.40.MC70.3A0.4.C1\*01.0



R  
HS







# Evidence based medicine ?



L



L  
RS

# Future

- Provision of guidance
  - Animal
  - Cadaver
  - Computer modelling
  - Intra-operative testing