

Basic Science Focus Forum Wednesday, October 17 2018
Symposium: Optimal locking plate Configuration

Locking Plate Fixation: Lag Screws & Miniplates

Utku Kandemir, MD
University of California San Francisco

- Goal of Fracture Treatment: To achieve bone healing and restore the function of the injured limb in the shortest possible time without compromising safety
- Ideal environment for fracture healing: Low strain, No shear
- Fracture patterns amenable for Lag screws /Miniplates: Simple or Wedge
- Benefits of Locking Plate:
 - Increased rigidity in Osteoporotic bone
 - Fixation of short epiphyseal fragments with limited length/points for stable fixation
 - Biological Fixation (Bridging – MIPO)
 - Longer time before failure of fixation =Longer fatigue life

LAG SCREWS

- Goal of a Lag screw:
 - Achieve stability by Compression across fracture site (Neutralization plate)
 - Improve stability by Approximation (Bridging plate)
- Decide on Healing response to be achieved:
 - Primary/Direct vs. Secondary/Indirect healing
 - Primary: Anatomic reduction, Absolute stability, Neutralization plate (lag screw)
 - Secondary: Functional reduction, Relative stability, Bridging plate + Lag screw
- Epiphyseal: Primary
Diaphyseal/Metaphyseal: Secondary
- Simple Fracture -Bridge Plating
 - Pitfall: Do NOT change (i.e. NOT shorten) the plate length
- Do you need a Locking plate when you have Lag screw(s) in simple fx pattern?
 - **NO** if ORIF (Anatomic reduction)

- **YES** if you are using the locking plate because of severe osteoporosis or small fragment or CR/MIPO (nonanatomic reduction)

MINIPLATES

- Goal when you use miniplates?
 - Aid of Reduction (length, rotation, angulation) Putting the puzzle together
 - Provisional fixation
- Miniplates: Leave it or Remove it?
- LEAVE it on
 - If reduction may get compromised with removal
 - If provides additional stability
- REMOVE
 - Mechanically problematic (cannot compress across)
- Location
 - under the definitive plate
 - 90 degrees, opposite
- Size: Thickness & length
 - 2.3 mm miniplate with 4.5/5.0 mm plate
 - 2.7 mm plate with 3.5 mm plate
 -

References:

1. Horn C¹, Döbele S, Vester H, Schäffler A, Lucke M, Stöckle U. Combination of interfragmentary screws and locking plates in distal meta-diaphyseal fractures of the tibia: a retrospective, single-centre pilot study. *Injury*. 2011 Oct;42(10):1031-7.
2. Wenger R¹, Oehme F², Winkler J², Perren SM³, Babst R², Beeres FJP⁴. Absolute or relative stability in minimal invasive plate osteosynthesis of simple distal meta or diaphyseal tibia fractures? *Injury*. 2017 Jun;48(6):1217-1223.