1st MTPJ Arthrodesis

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Disclosures

- MTF: Consultant
- Talar Capital Partners: Director, Financial Investment

INDICATIONS

- Arthritis
  - Hallux Rigidus
  - Inflammatory Arthritis
    - Rheumatoid Arthritis

INDICATIONS

- Severe Hallux Valgus
- Hallux Varus
- Neuromuscular Dx
  - Stroke
  - Cerebral Palsy

INDICATIONS

- Salvage of Failed Surgery
  - Keller Arthroplasty
  - Implant Arthroplasty
  - Joint Preserving HAV

1st MTPJ Arthrodesis

Disadvantages

- Loss of Motion
- Shoe Limitation
- Risk of Adjacent Joint Arthritis

1st MTPJ Arthrodesis

Advantages

- Pain Relief
- Deformity Correction
- Maintains 1st Ray Weight-Bearing
- Durability
- Predictable Results
- Definitive Procedure

Surgical Technique
Incision and Exposure

- Incision
  - Dorsomedial
  - Medial
- Revisional Surgery: Full thickness
  - Excess cicatrix
  - Minimize wound complications

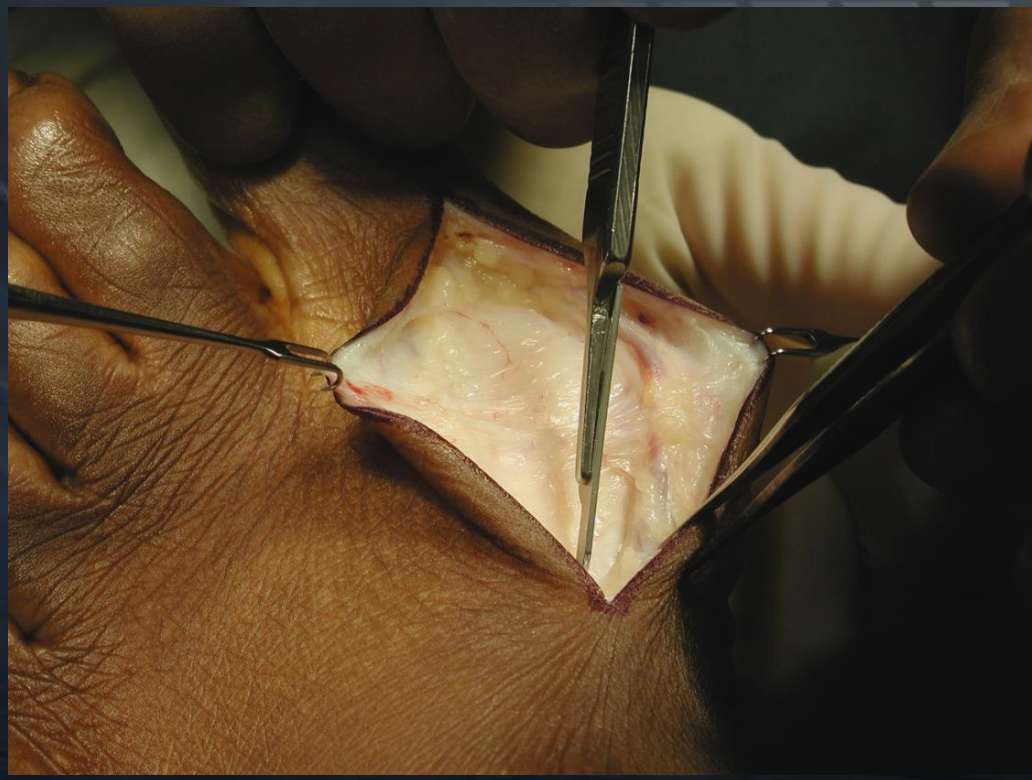
Surgical Technique
Incision and Exposure

Lateral Release

- Adductor Hallucis
  - High IM Angle

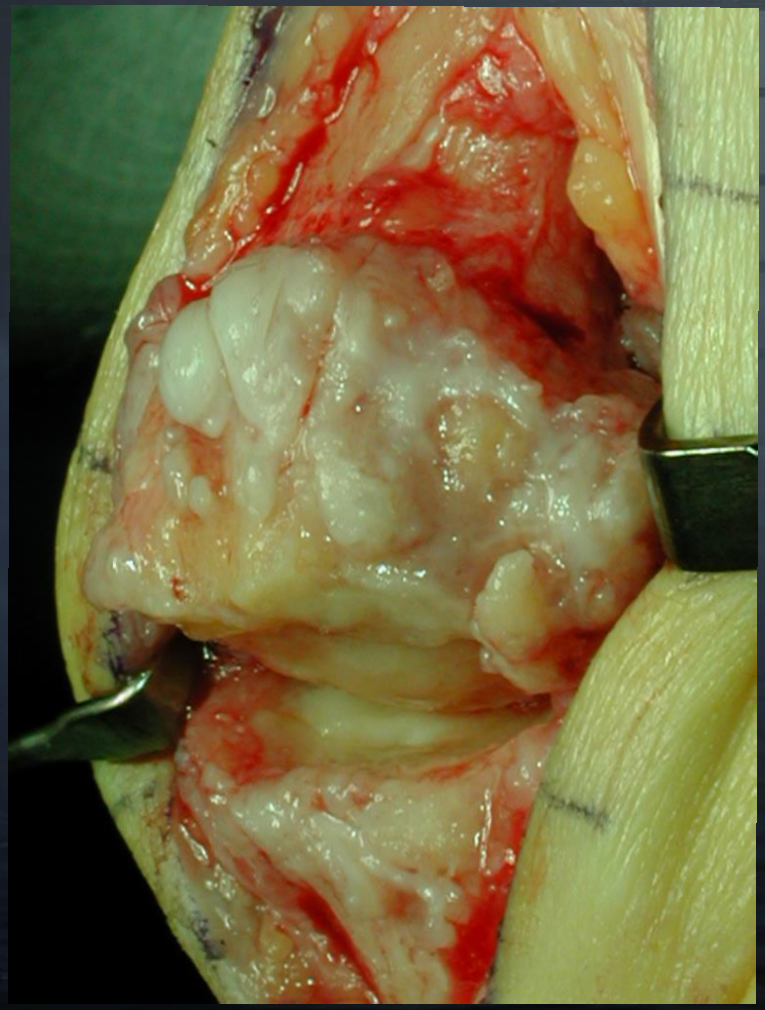
Capsular incision

- Straight linear
- T or inverted L
  - Plantar exposure
  - Obstruction to positioning & fixation



Joint Preparation

- Remove exostosis prior to cartilage resection
- Recreate normal joint architecture
- Helps with positioning of hallux

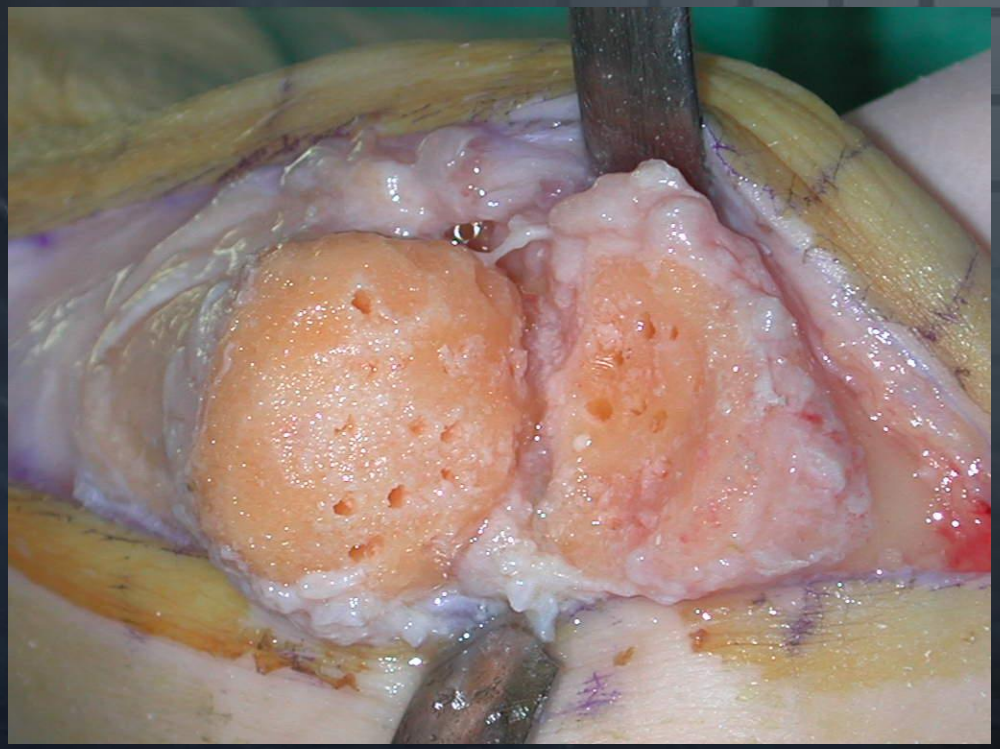


Joint Preparation

- Medial eminence
  - Have no fear
  - Hallux varus should not live here
  - Preserve proximally for screw placement

Joint Resection

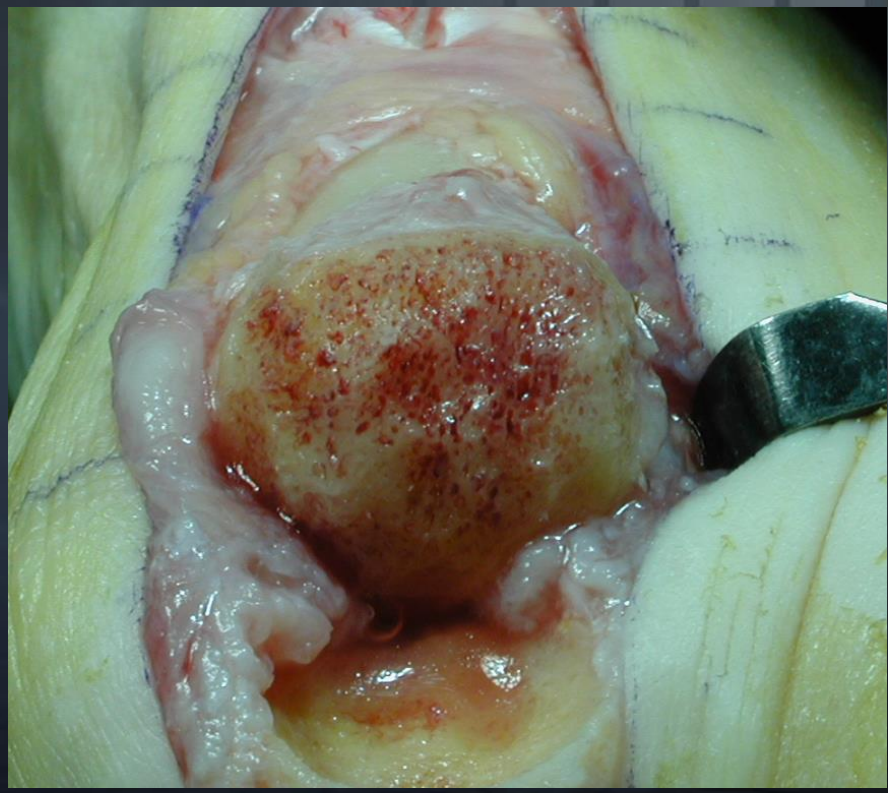
- Curettage
- Conical or Cup Reamer
- Planal Resection
- Interpositional Bone Graft



Less is Best

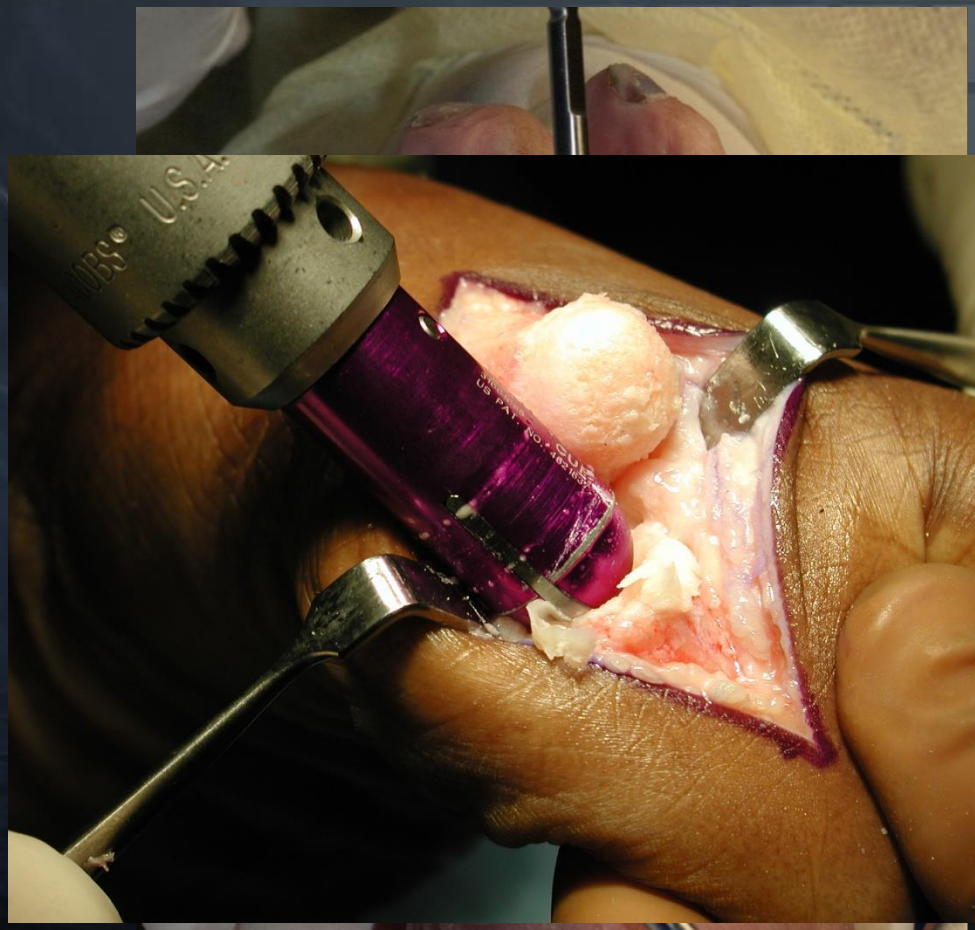
Joint Resection

- Curettage
  - Remove subchondral bone plate
  - Fenestration
  - Preserves length
  - Preserves joint contour
  - Easy positioning
  - Rigid Internal Fixation



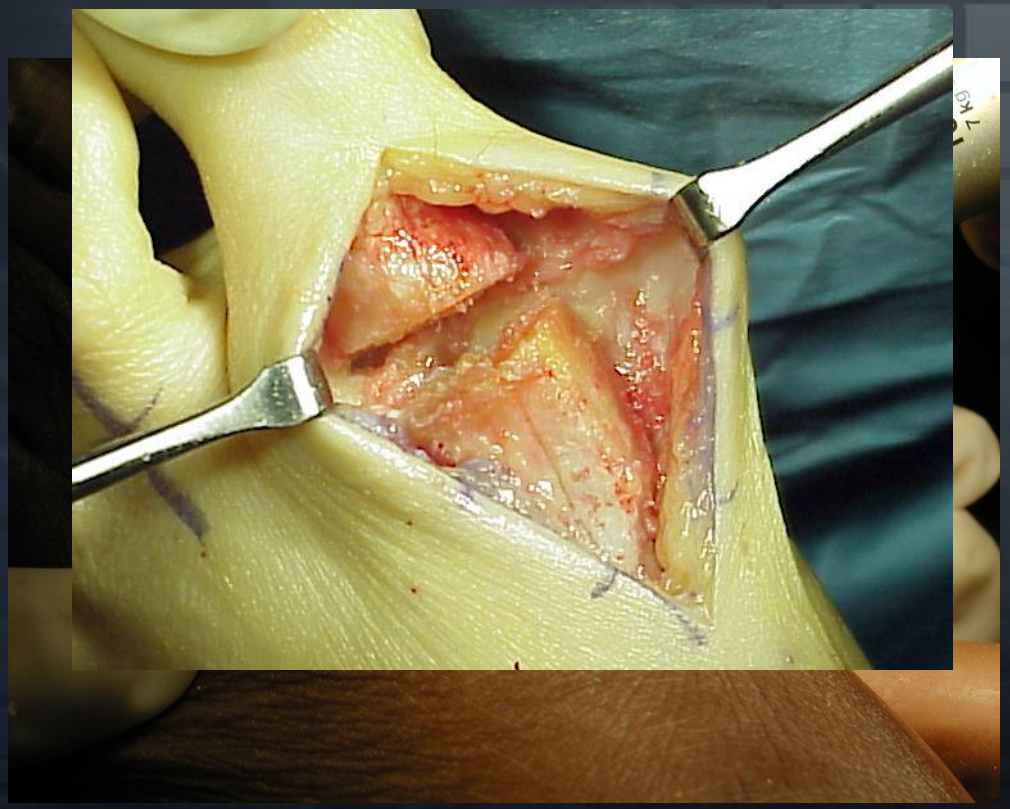
Joint Resection

- Conical or Cup Reamer
  - Ball and socket configuration
  - Stable joint contour
  - Preserves length
  - Caution: Osteoporotic bone



Joint Resection

- Planal Resection
  - Accommodate severe angular deformities
  - Bone Grafting
  - Shortening
  - Positioning difficult
  - Non-Union/Mal-Union



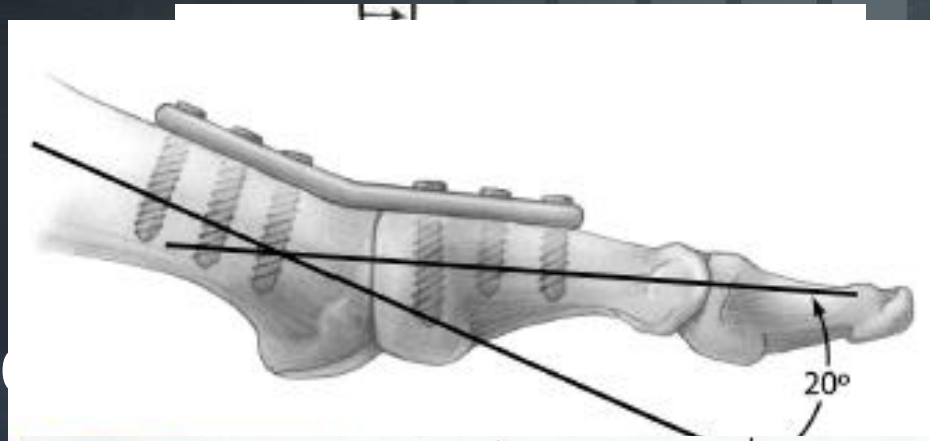
Joint Resection

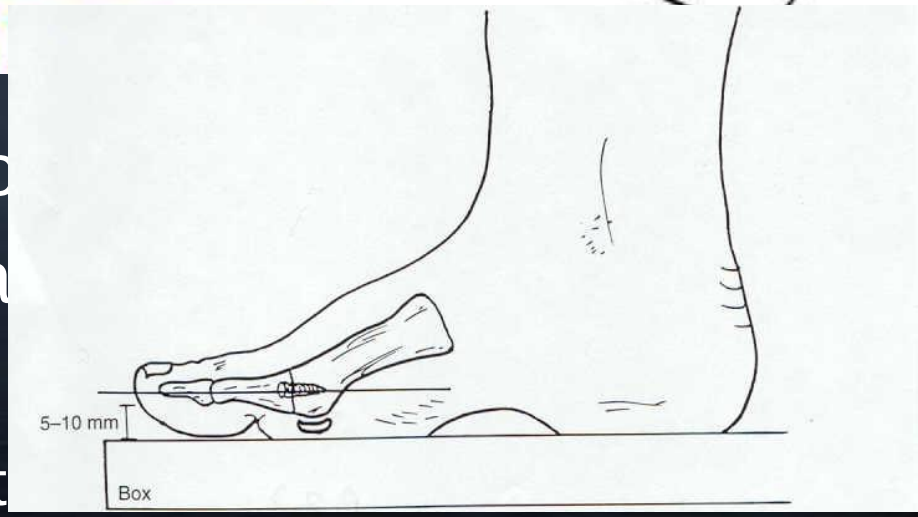
Significant bone loss

- Infection
- Failed implant/Keller
  - 1-2 cm. Defect - bone grafting
  - 2-3 cm. Defect – restoration of proximal segment (callus distraction/ osteotomy)

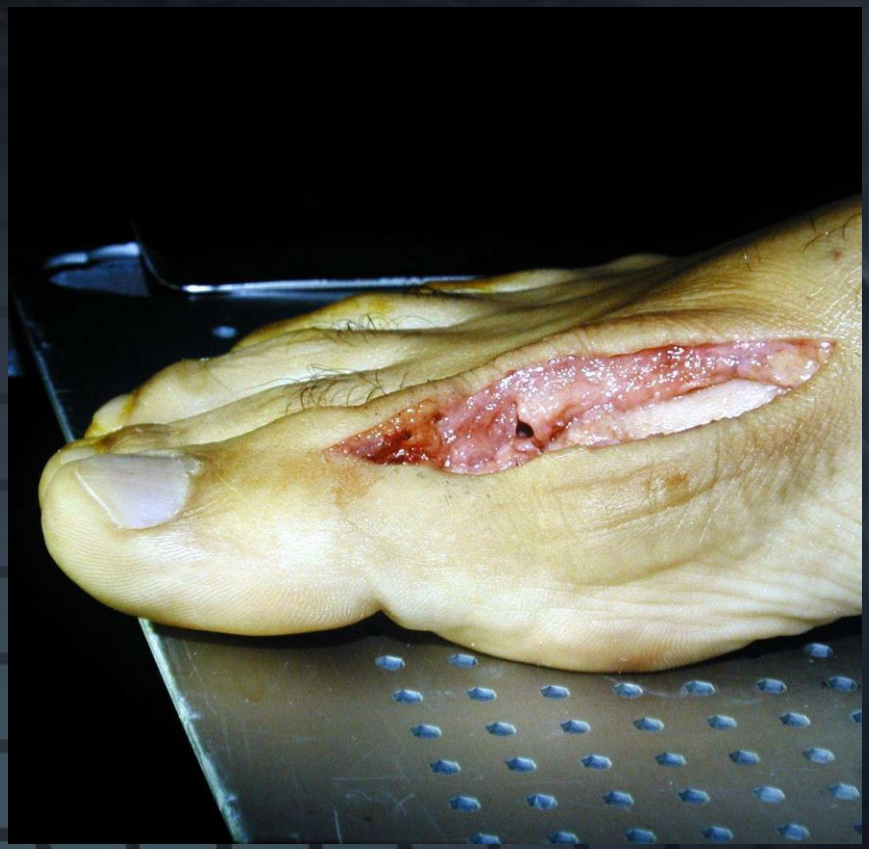
Position

- Slight Valgus
  - Parallel to 2nd toe
- NO frontal plane rotati
- Dorsiflexion
  - 10-20º Relative to Floo
  - First Metatarsal Inclina
    Angle Varies
    - 20-30º Relative to First
  - Hallux Tip Slightly off Foot Plate





POSITION ASSESSMENT



POSITION

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Fixation Options

- Recommended
  - Crossed Screws
  - Dorsal Plate with Lag Screw or Offset screws
- Others
  - K-wires
  - Steinmann Pins
  - Staples
  - Ex-Fix
- Remember principles

Screw Fixation Options

- Non-cannulated screws
  - 2.7mm
  - 3.5mm
  - 4.0mm
- Cannulated screws
  - 3.0mm
  - 4.0mm
- Other

Crossed Screw Fixation

- Requires good bone stock
- Excellent compression
  –Bicortical
- Stable Construct

Screw Fixation Technique

- **Screw #1**
  - Proximal medial to distal lateral
  - ***PLANTAR*** distal exit
- **Screw #2**
  - Distal medial to proximal lateral
  - ***DORSAL*** proximal exit

*****Avoid collision at screw intersection***

Avoid Screw Collision at Intersection

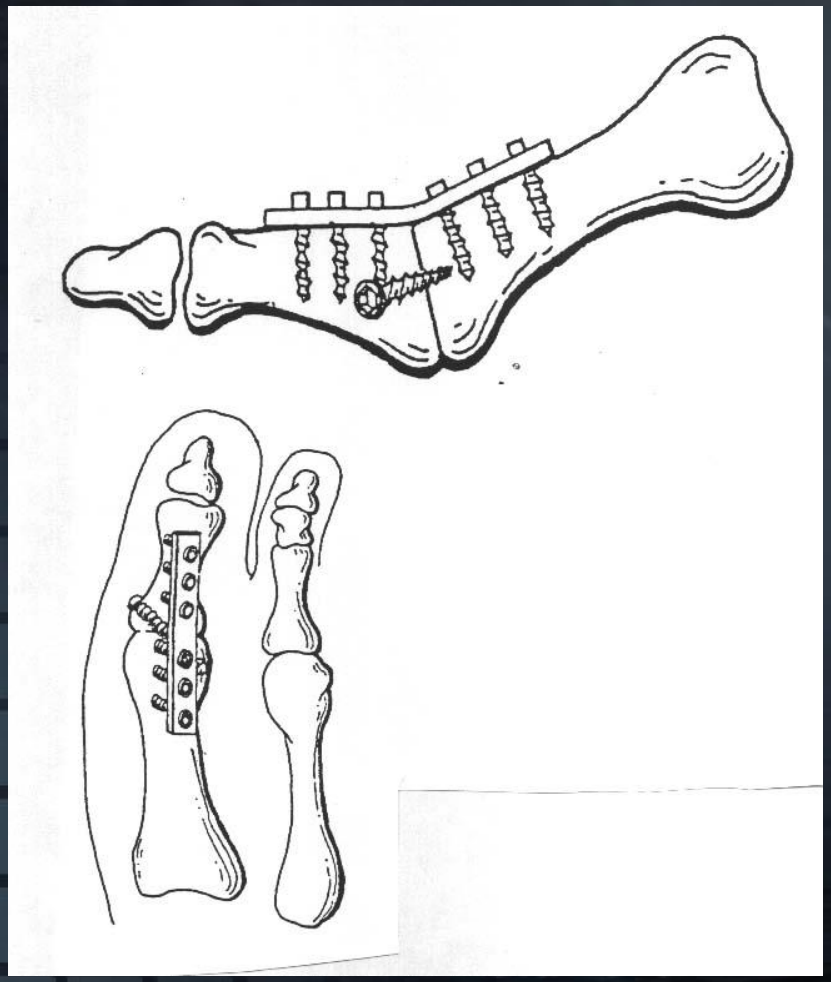
Dorsal Distal screw

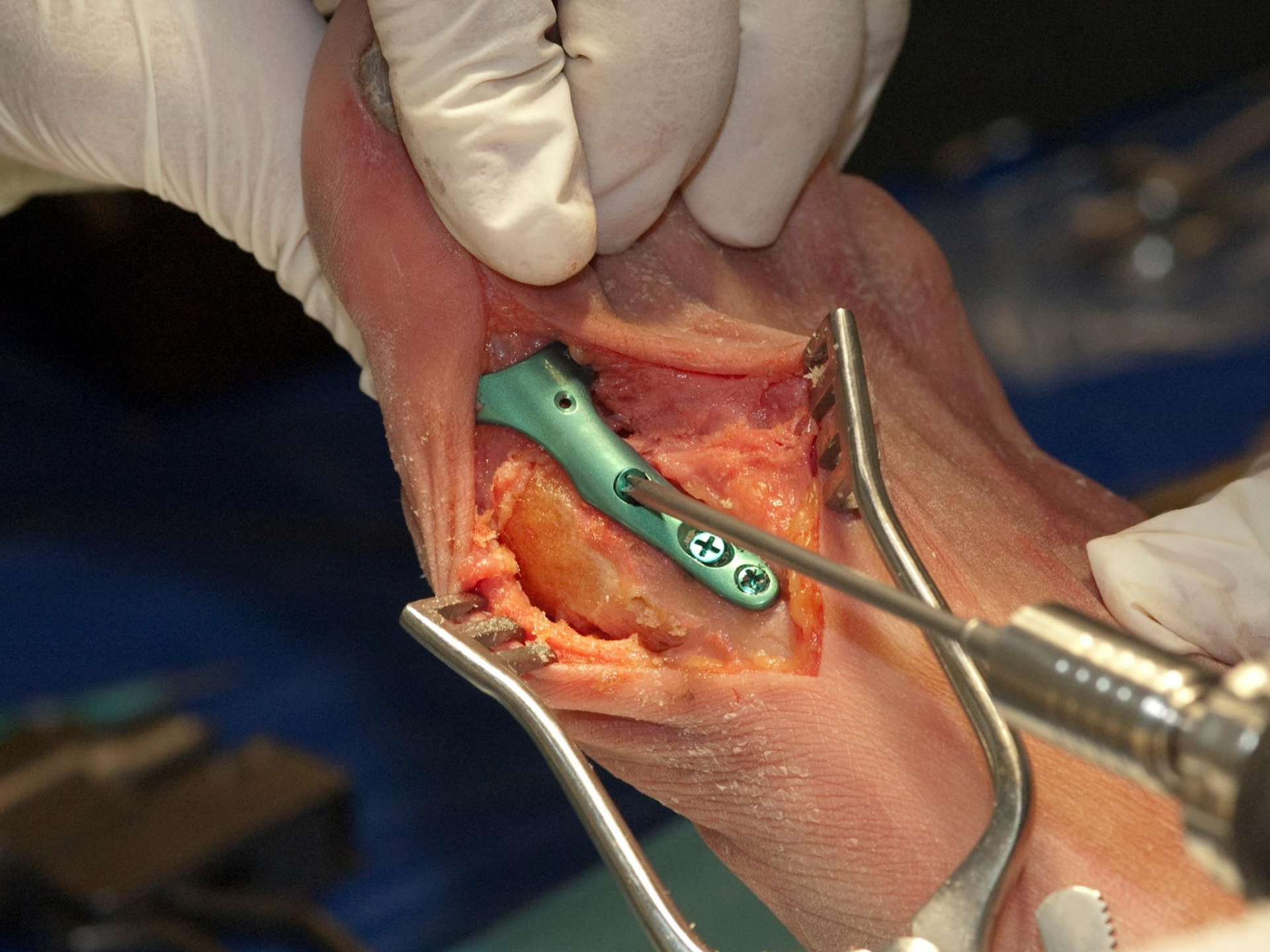
Medial

Lateral

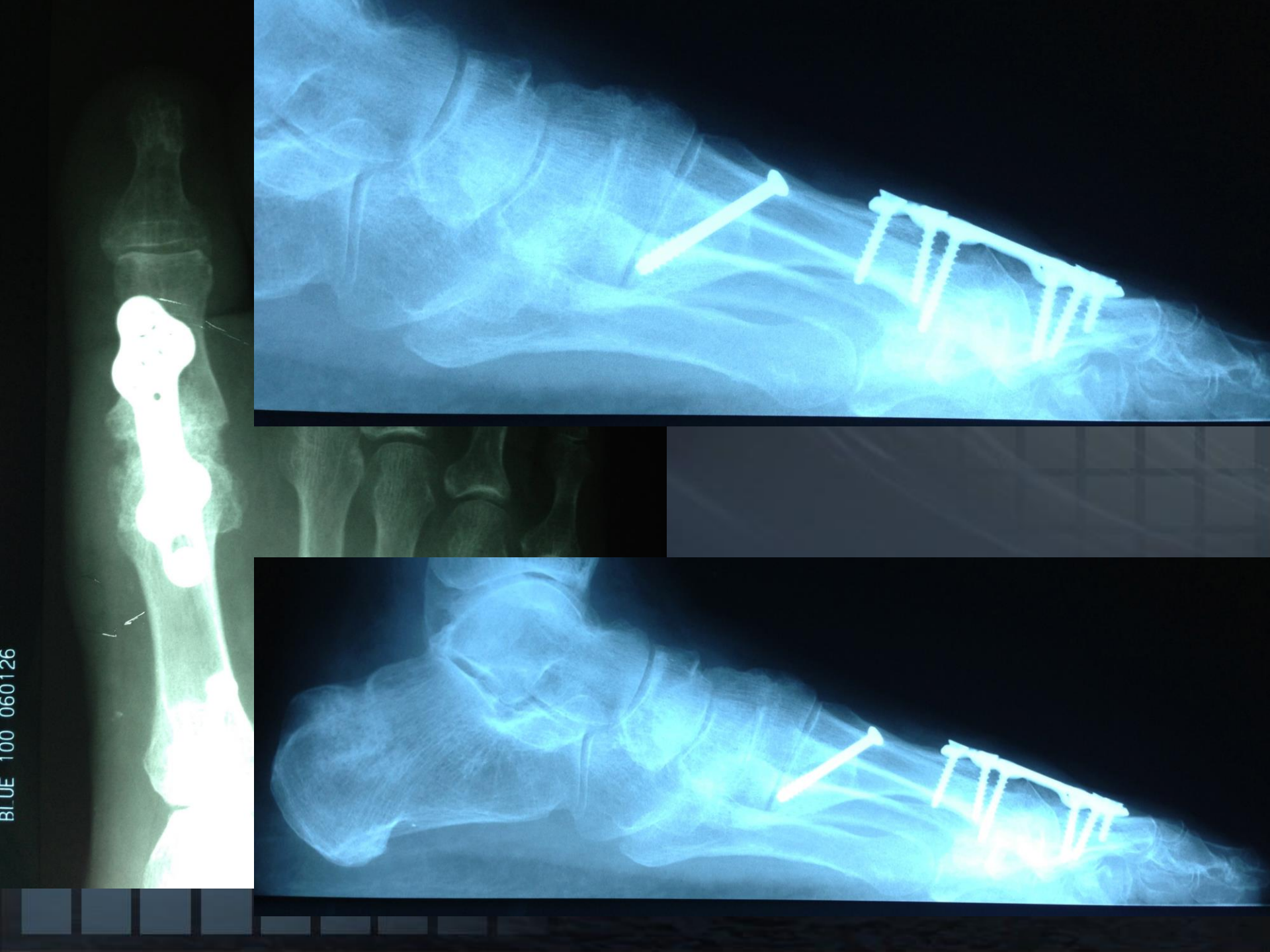
Plantar Proximal Screw

Screws and Plate Fixation





Fixation with Bone Grafting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Comparison of Fixation Techniques

- Politi J, et al. *FAI* 24:332-337, 2003.
- Synthetic bone model, 4 fixation techniques
- Best: cup/cone + 3.5 lag + 4 hole dorsal miniplate
- 2 x stronger than oblique lag alone
- Weakest: dorsal plate without lag or crossed K-wire fixation

- Sharma et al. *JFAS* 47(1):2-7, 2008
- Single compression screw vs. single screw with ¼ tubular plate
- Overall fusion 97%
- No significant associations between
  - Type of fixation and time to union
  - Patient satisfaction
  - complications

Cost Comparison of Fixation

- Hyer et al. JFAS 47(1) 2008
- Crossed screw vs. plating
- Fusion rate 91.1%, no diff between groups
- $374 vs. $603
- Equal complications
  - Nonunion
  - Delayed union
  - Hardware
  - Revisions

“The precise operative technique is not important provided it maintains the position obtained at operation until the arthrodesis is sound.”

Remember the fundamentals!!

Fitzgerald, JAW. JBJS (Br) 51, 1969

POSTOP MANAGEMENT

- Protected WB is the universal standard
  - Quality of fusion
  - Stable fixation
- Bone Grafting - NWB Cast is essential

- Berlet et al, FA Spec, 2008
- Crossed screws vs. dorsal plate
- Fusion 92%
- Time 69 days
- Full WB in post-op shoe can be allowed with adequate fixation

COMPLICATIONS

- **Poor Positioning**
  - Difficult walking
  - Shoe gear problems
  - Skin lesions
  - Nail problems
  - Metatarsalgia
- HIPJ problems
  - Subluxation
  - Arthritis

COMPLICATIONS

- Bone Healing
  - Malunion
  - Delayed union
  - Nonunion
- Internal Fixation
  - Prominence
  - Loosening
  - Fracture

FINDINGS

- Literature > 90% Fusion Rate
  - Higher with Rigid Fixation
- 6-20% HIPJ Arthritis
- Near Normal Gait
  - Slight Earlier Toe Off
- Lateral Metatarsalgia
  - Usually Resolves
- Fusion Position Critical!

SUMMARY

- Proper patient selection
- ***Position***
- Minimal joint resection
- ***Position***
- Stable fixation
- ***Position***
- Predictable results
- High patient satisfaction

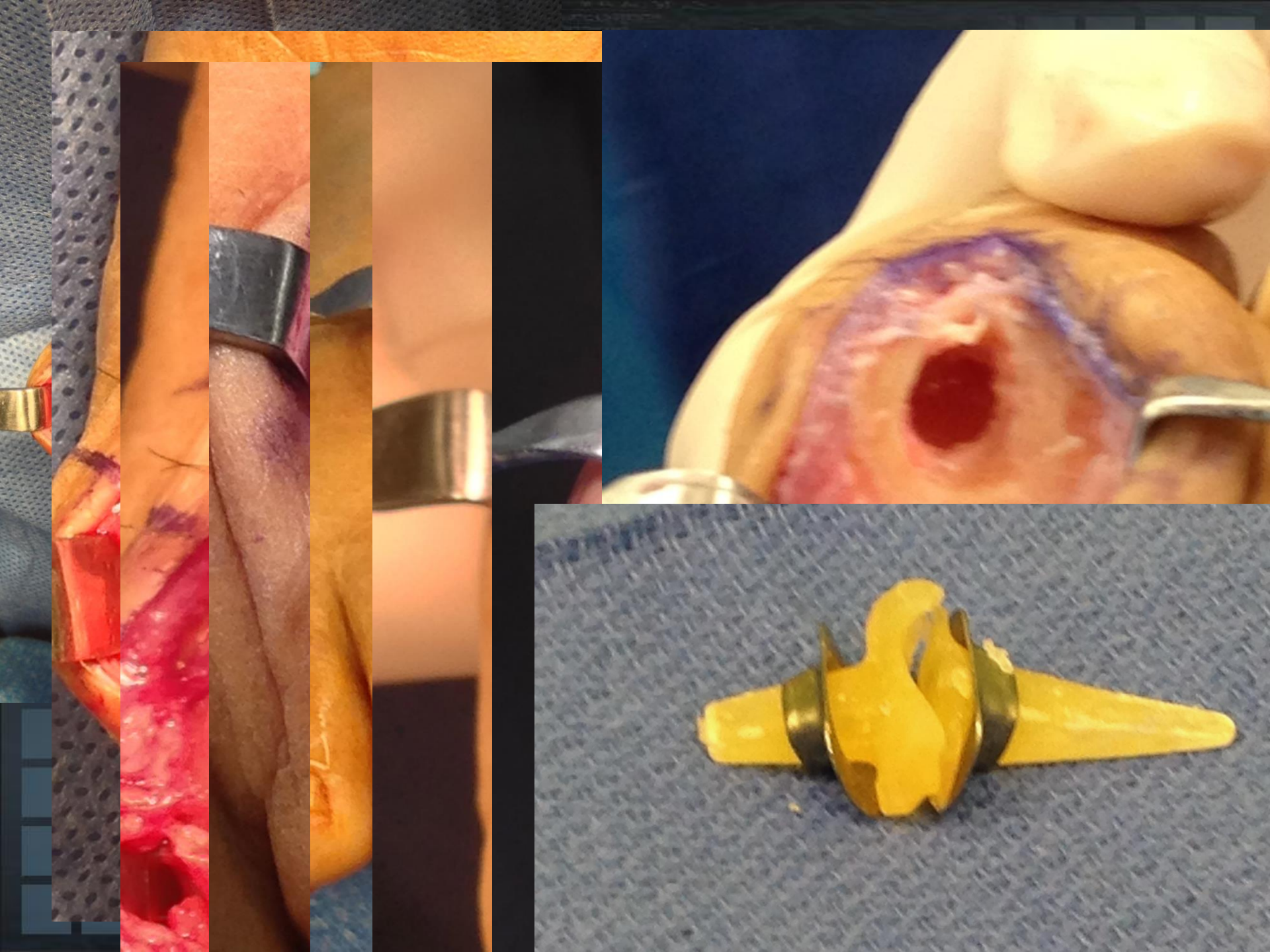
POSITION ASSESSMENT

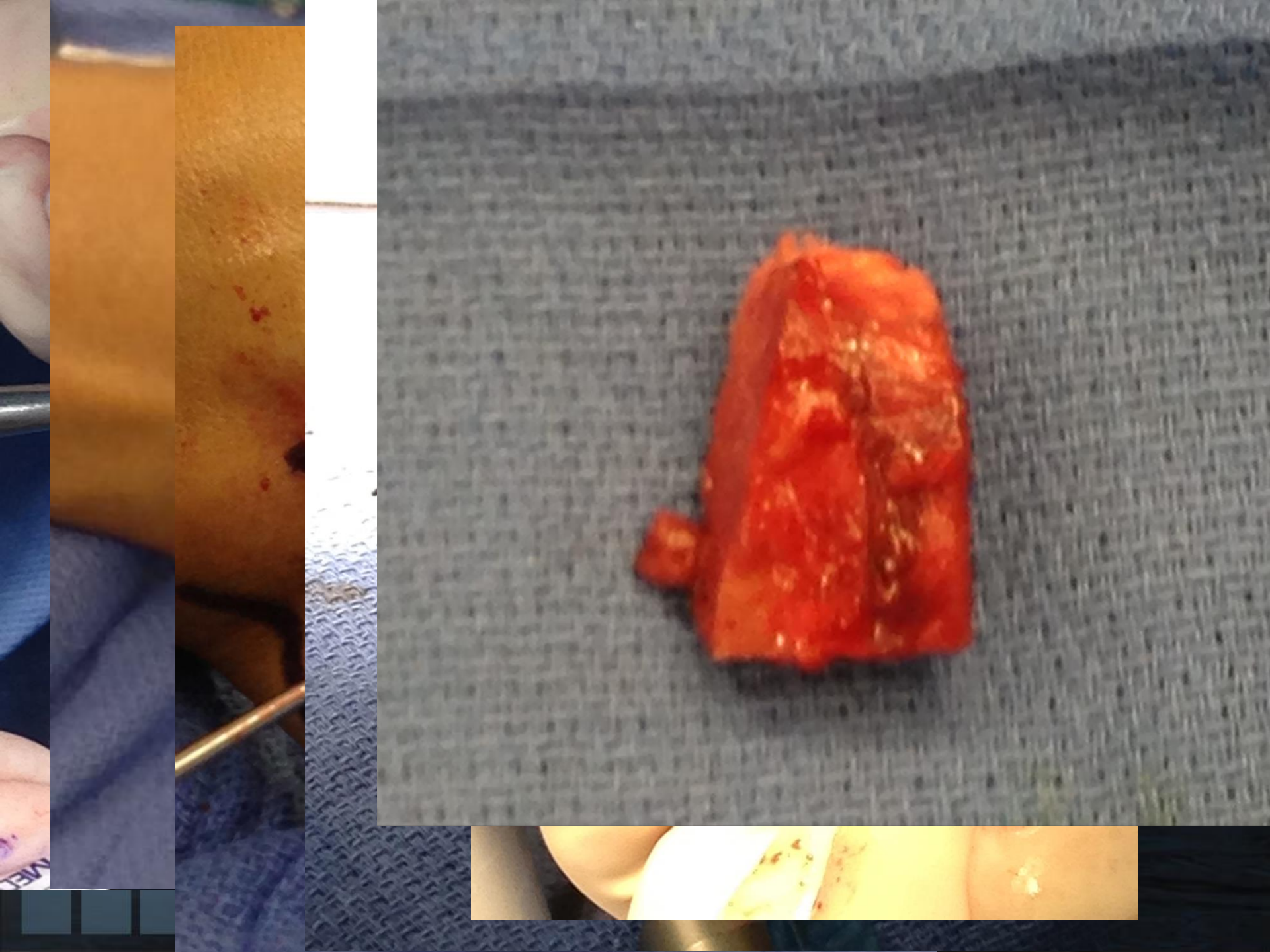
Screw Fixation Technique

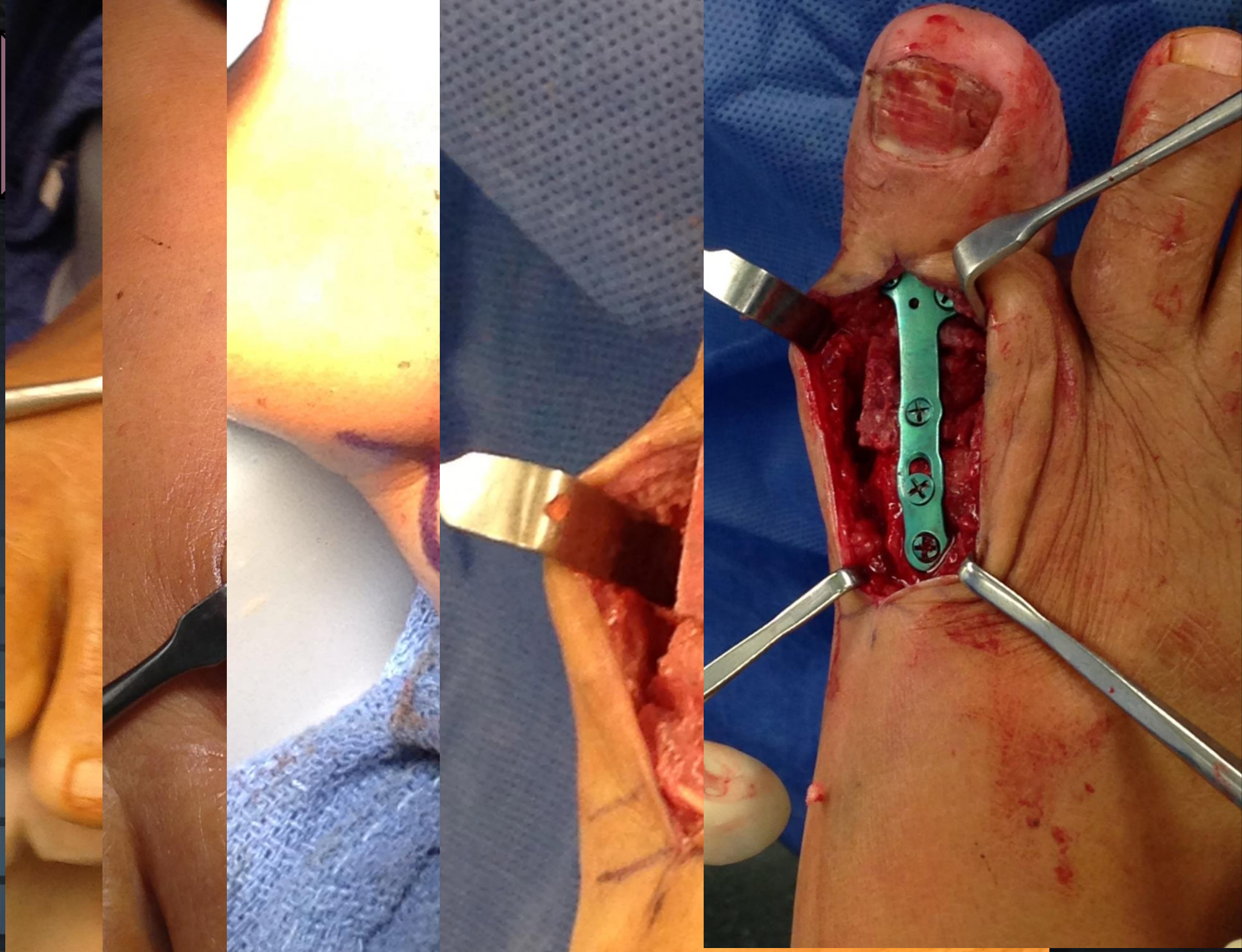
- Requires good bone stock
- Excellent compression
- Stability

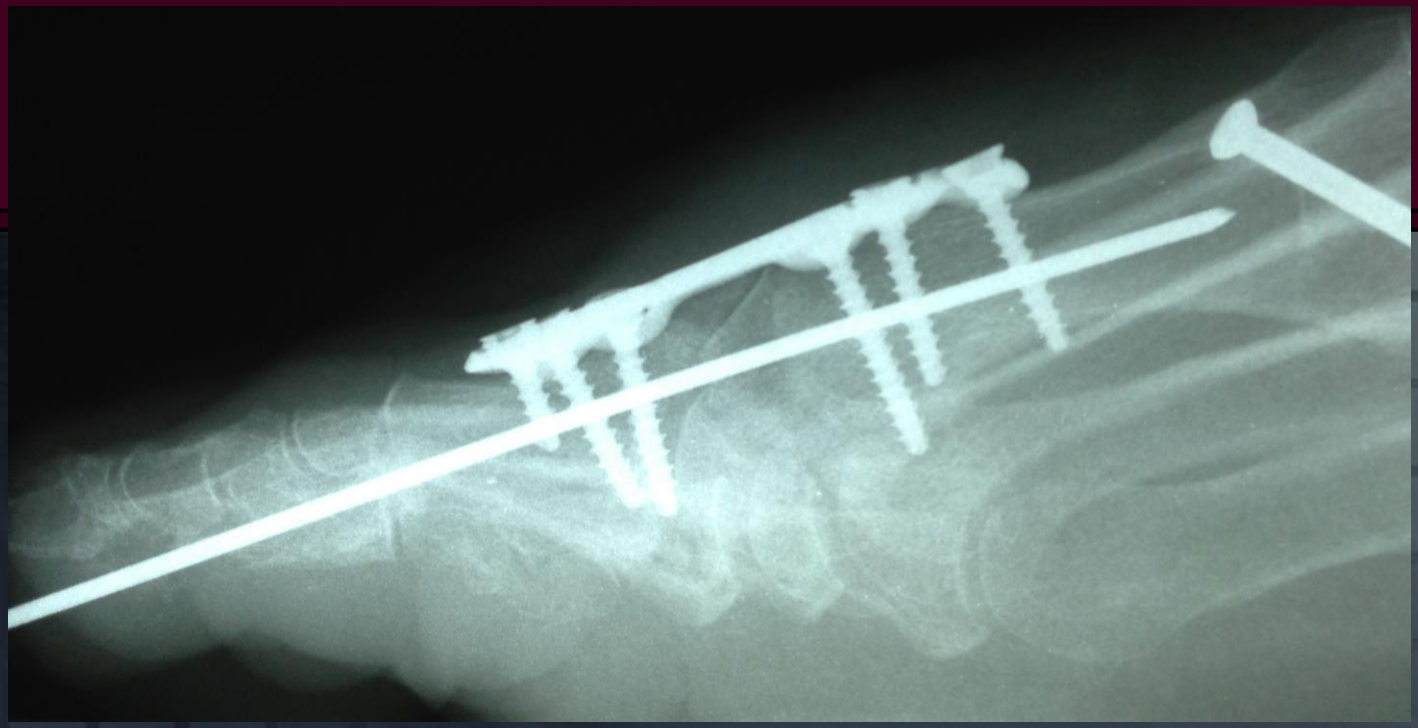
Pitfalls

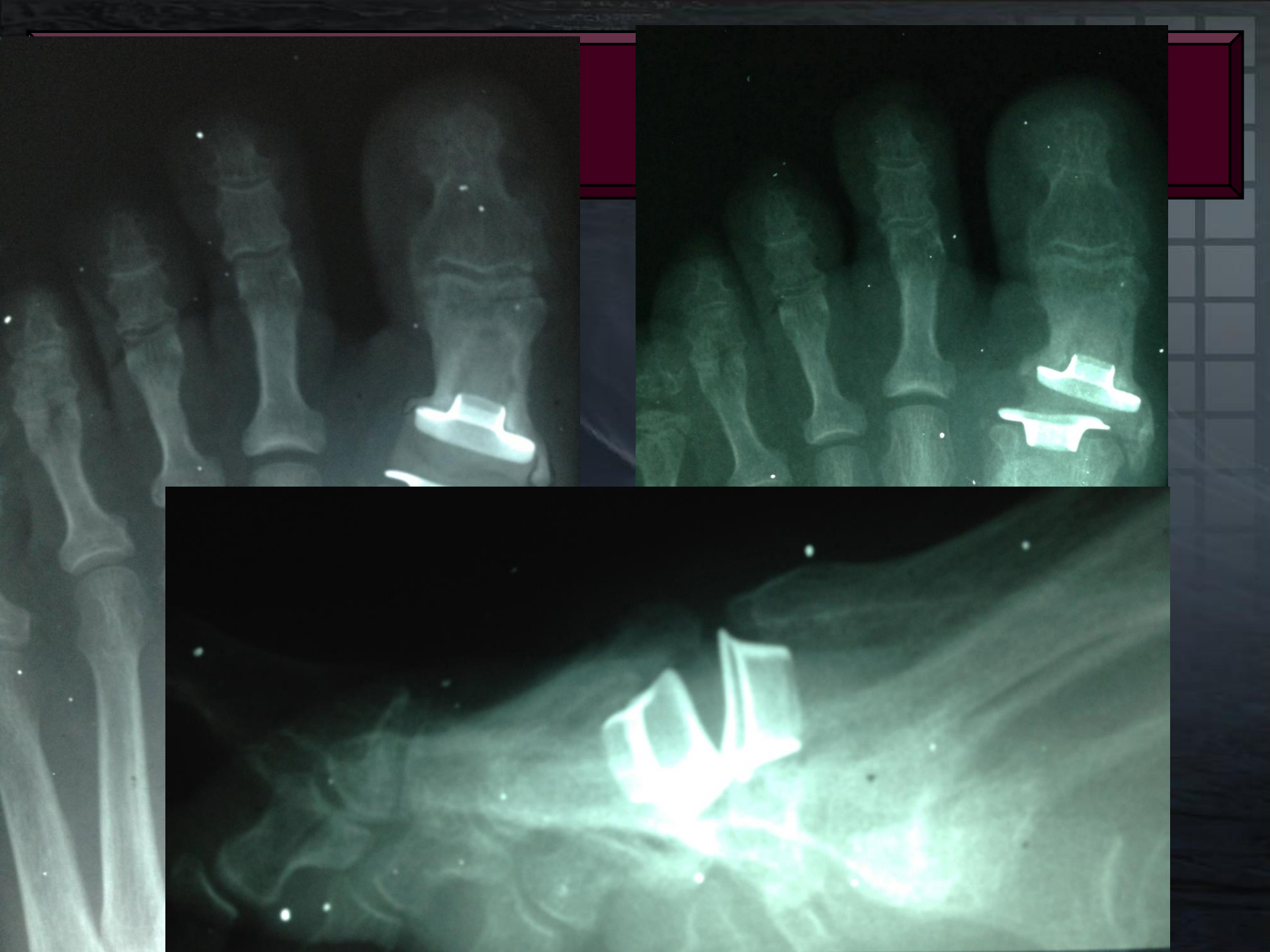
- Excessive Dorsiflexion
  - Shoe gear
  - Nail problems
  - HIPJ arthritis
  - 1st Metatarsalgia
- Lack of Dorsiflexion
  - distal hallux irritation
  - inability to roll over MTPJ during gait
- Varus alignment (straight)
  - abutment against medial shoe
  - Increased HIPJ DJD
- Excessive valgus
  - Impingement 2nd toe
  - Callus between hallux and 2nd
  - 2nd toe crossover…MTPJ instability
- Malrotation
  - irritation of medial or lateral nail border
- Excessive shortening
  - lesser metatarsalgia











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