CURRENT CONCEPTS IN MAJOR MIDFOOT FRACTURES

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ANATOMY

- **HINDFOOT** - Calcaneum, Talus
- **CHOPART’S JOINT** (Midtarsal)
- **MIDFOOT** - Navicular, Cuboid, Cuneiforms
- **LISFRANC’S JOINT** (Tarsometatarsal)
- **FOREFOOT** - Metatarsals, Phalanges
MIDFOOT FRACTURES

- MIDTARSAL (CHOPART’S)
- NAVICULAR
- CUBOID
- CUNEIFORM
- LISFRANC
MIDTARSAL FRACTURES

- TALONAVICULAR AND CALCANEOCUBOID JOINTS
- RARE
- OFTEN MISSED
MIDTARSAL FRACTURES

- OFTEN DIAGNOSED AS ‘ANKLE SPRAIN’
- AP, LATERAL, OBLIQUE X-RAYS
- TOMOGRAM
- 5 MECHANISMS
MIDTARSAL FRACTURES
MECHANISM

1. MEDIAL STRESS - INVERSION OF FOOT

2. LONGITUDINAL STRESS - FOOT IN PLANTARFLEXION
3. LATERAL STRESS - FOREFOOT DRIVEN LATERALLY-CRUSH CUBOID OR ANTERIOR CALCANEUS
MIDTARSAL FRACTURES MECHANISM

4. PLANTER STRESS ON FOREFOOT CAN LEAD TO DORSAL LIP # OF NAVICULAR/ ANTERIOR PROCESS OF CALCANEUM

5. CRUSH INJURY
MIDTARSAL FRACTURES TREATMENT

- EUA IF DIAGNOSTIC DOUBT
- RESTORE ANATOMY
- POP
- CLOSED K-WIRE
- ORIF
- ?ARTHRODESION
NAVICULAR FRACTURES

- 3 TYPES
- CORTICAL AVULSION
- TUBEROSITY
- BODY

- STRESS FRACTURE - ATHLETES, BONE SCAN, POP
NAVICULAR FRACTURES
AVULSION/TUBEROSITY

- USUALLY EVERSION FORCE
- BEWARE ACCESSORY OSSICLES
- POP, K-WIRE, ORIF, EXCISE LATER-DEPENDING ON SIZE / ARTICULAR FRAGMENT
NAVICULAR FRACTURES

BODY

- ASSOCIATED WITH OTHER #'S
- BEWARE BIPARTITE NAVICULAR!

- 3 TYPES-CORONAL, DORSOLATERAL TO PLANTER MEDIAL, COMMINUTED
NAVICULAR FRACTURES

BODY
INTERNALLY FIX DISPLACED NAVICULAR BODY FRACTURES
CUBOID FRACTURES

- UNCOMMON
- ‘NUTCRACKER’ - LATERAL SUBLUXATION OF MIDTARSAL JOINT
CUBOID FRACTURES
CUNEIFORM FRACTURES

- ISOLATED RARE
- OFTEN ASSOCIATED WITH OTHER MID-FOOT #S
- CAN DISLOCATE - USUALLY OPEN REDUCTION
LISFRANC JOINT INJURIES
HISTORY

- 1815 - LISFRANC - AMPUTATION THROUGH TMT JTS.
- 1909 - QUENO & KUSS
- 1982 - HARDCASTLE'S CLASSIFICATIONS
- 1986 - MYERSOHN
LISFRANC JOINT INJURIES

- UNCOMMON
- 1:5500
- OFTEN MISSED
- CHRONIC PAIN
- DEFORMITY
LISFRANC JOINT

- 4 PARTS -(MEDIAL TO LATERAL)- IMPORTANT FOR TREATMENT

- **FIRST**-MEDIAL CUNEIFORM & 1ST METATARSAL

- **SECOND**-MIDDLE CUNEIFORM & 2ND METATARSAL
LISFRANC JOINT

- **THIRD**-LATERAL CUNEIFORM & 3RD METATARSAL

- **FOURTH**- CUBOID & 4TH&5TH METATARSALS
LISFRANC JOINT

- **STABILITY** - BONY AND LIGAMENTOUS
- **BONY** - SHAPE OF METATARSAL BASES & CUNEIFORMS
- 2ND METATARSAL ‘KEYSTONE’
LISFRANC JOINT

- PRIMARY STABILIZER - 2ND MT. FIRMLY KEYED INTO 5 ADJACENT BONES, CONNECTED BY STRONG LIGAMENTS
LISFRANC JOINT

- SECONDARY STABILIZERS - PLANTER FASCIA, INTRINSIC MUSCLES, AND TENDONS
LISFRANC JOINT

- LIGAMENTS
- 12 STRONG LIGAMENTS
- LISFRANC LIGAMENT-2ND MT & MEDIAL CUNEIFORM
LISFRANC LIGAMENT

- BETWEEN MEDIAL CUNEIFORM AND 2ND METATARSAL
LISFRANC JOINT INJURIES
CAUSES

- HIGH ENERGY TRAUMA
- RTA - CAR, MOTORCYCLE
- INDUSTRIAL
- WINDSURFING! - STRAPS HOLDING FEET
- HORSE RIDING
- TWISTING - ATHLETES, ELDERLY
LISFRANC JOINT INJURIES
MECHANISM

- DIRECT
- INDIRECT
LISFRANC JOINT INJURIES
MECHANISM

DIRECT - BLOW, CRUSH

- PATTERN OF DISLOCATION VARIES

- SIGNIFICANT SOFT TISSUE DAMAGE
DIRECT MECHANISM

1. FORCE ON MT. BASES LEADS TO PLANTAR DISLOCATION (57%)
DIRECT MECHANISM

2. FORCE ON CUNEIFORM / CUBOID LEADS TO DORSAL DISLOCATION (43%)
LISFRANC JOINT INJURIES

MECHANISM

INDIRECT - LONGITUDINAL FORCE

WITH ADDED TORQUE, ROTATION, AND COMPRESSION
INDIRECT MECHANISM

- LONGITUDINAL FORCE
- PLANTARFLEXION OF FOREFOOT
- GROUND REACTION FORCE
INDIRECT MECHANISM

- DORSAL LIGAMENTS & CAPSULE RUPTURE (3%)
- SUBLUXATION
INDIRECT MECHANISM

- MT. BASES FRACTURE (97%)
- FRACTURE / SUBLUXATION
INDIRECT MECHANISM

- ROTATIONAL FORCE LEADS TO DISPLACEMENT
- DIVERGENCE NOT FULLY UNDERSTOOD
DIAGNOSIS OF LISFRANC INJURY

- HIGH INDEX OF SUSPICION
- IF PAIN ON PASSIVE PRONATION AND ABDUCTION OF FOREFOOT
- SWELLING
- LOCAL TENDERNESS
DIAGNOSIS OF LISFRANC INJURY

- X-RAYS
- AP, LATERAL, OBLIQUE X-RAYS (+2 VIEWS WITH FOOT IN EXTERNAL ROTATION)
- STRESS VIEWS
- TOMOGRAMS
- EUA
X-RAY SIGNS OF LISFRANC INJURY

- WIDENING BETWEEN METATARSALS
- WIDENING BETWEEN CUNEIFORMS
- SMALL # BASE 2ND MT.-‘FLECK SIGN’
X-RAY SIGNS OF LISFRANC INJURY

- DISPLACEMENT OF LATERAL 3 MTS.

- LINE DRAWN ALONG SHAFT OF MT. SHOULD NOT INTERCEPT CORRESPONDING CUNEIFORM
X-RAY SIGNS OF LISFRANC INJURY

- ANGULATION OF MT. SHAFT
- ASSOCIATED CUBOID INJURY
- # DISTAL MT./MTP JTS
CLASSIFICATION OF LISFRANC INJURIES

TYPE A - TOTAL INCONGRUITY OR HOMOLATERAL
CLASSIFICATION OF LISFRANC INJURIES

TYPE B - PARTIAL INCONGRUITY,
B1-MEDIAL, B2-LATERAL
CLASSIFICATION OF LISFRANC INJURIES

TYPE C - DIVERGENT, C1-PARTIAL, C2- TOTAL DISPLACEMENT
PRINCIPLES OF TREATMENT

PRINCIPLES OF TREATMENT

- LISFRANC JOINT INJURIES SHOULD BE TREATED WITH REDUCTION AND INTERNAL FIXATION
- CLOSED OR OPEN
PRINCIPLES OF TREATMENT

- RESTORE ANATOMIC ALIGNMENT
- MUA & POP - LOSES POSITION
- STABLE ANATOMIC REDUCTION
- REDUCE # DISLOCATION ASAP
PRINCIPLES OF TREATMENT

- SOFT TISSUE MANAGEMENT
- CRUSH INJURY - COMPARTMENT SYNDROME
- FASCIOTOMY IF PRESSURE > 30MMHg IN CENTRAL OR INTEROSSEOUS COMPARTMENT - MYERSON
FASCIOTOMY FOR COMPARTMENT SYNDROME

● 3 INCISIONS

● 2 DORSAL - OVER 1ST & 4TH INTERMETATARSAL SPACES

● 1 LONGITUDINAL - ALONG PLANTAR MEDIAL ASPECT OF FOOT
PRINCIPLES OF TREATMENT

KEY TO REDUCTION IS FRACTURE-DISLOCATION OF 2ND METATARSAL
SURGICAL APPROACH

- DORSAL LONGITUDINAL INCISION CENTERED ON 2ND TARSOMETATARSAL JOINT
- PROTECT EHL, DORSALIS PEDIS ARTERY, AND SENSORY BRANCH OF PERONEAL NERVE
SURGICAL APPROACH

- LATERAL OVER SHAFT OF 4TH METATARSAL
- LEAVE ADEQUATE BRIDGE
- TIB. ANT. TENDON CAN BLOCK REDUCTION OF 2ND MT.
SUGGESTED FIXATION TECHNIQUE

- IDEALLY CORTICAL SCREWS
- AVOID COMPRESSION ACROSS ARTICULAR SURFACES
- K-WIRES LATERALLY ONLY
SUGGESTED FIXATION TECHNIQUE
AN EXAMPLE OF LISFRANC INJURY
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