



**EMERGENCY**  
*Medicine*  
**LAS VEGAS**  
NEVADA

# ACES

ASSESSMENT OF CORE-CONTENT EDUCATION SERIES

CHAPTER 58

ANKLE  
FOOT

October 9 2013

The background image shows a person in a dark suit and tie sitting at a green poker table. They are holding two cards, the Ace of Hearts and the Ace of Clubs, and several stacks of colorful chips (red, green, blue, black) are on the table.



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# ACES

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**1. The most common ligament injured in an ankle sprain is?**

- A. Talocalcaneal
- B. Calcanealfibular
- C. Deltoid
- D. Anterior Talofibular
- E. Achilles

The background image is the same as the top slide, showing a person in a dark suit and tie sitting at a green poker table with cards and chips.



# ACES



## ASSESSMENT OF CORE-CONTENT EDUCATION SERIES

### 2. Regarding ankle radiographs the following is true:

- A. AP and Mortise view are standard series
- B. Sprains Always requires x-rays
- C. Palpation of lateral foot is part of the Ottawa ankle rules
- D. A negative x-ray excludes fracture
- E. Unilateral lateral malleolus fx above the Tibiotalar joint are usually stable



# ACES



## ASSESSMENT OF CORE-CONTENT EDUCATION SERIES

### 3. Regarding Achilles tendon rupture the following is true?

- A. Caused by forced dorsiflexion against plantar flexed foot
- B. Most common in children
- C. Steroid use is treatment of choice
- D. Squeezing the calf will cause foot dorsiflexion
- E. Surgical management is mandatory



# ACES



## ASSESSMENT OF CORE-CONTENT EDUCATION SERIES

**4. Non-operative management is most appropriate for which of the following?**

- A. Posterior malleolar fractures with 30% of tibial surface
- B. Bimalleolar Fractures
- C. Pilon Fractures
- D. Unilateral lateral malleolar fracture below the tibiotalar joint
- E. Medial malleolar fracture with tenderness at proximal fibula



# ACES



## ASSESSMENT OF CORE-CONTENT EDUCATION SERIES

**5. Which of the following is correct regarding metatarsal shaft fractures?**

- A. 1st metatarsal is the most common shaft fracture
- B. 2<sup>nd</sup> is the most serious shaft fracture
- C. < 10<sup>0</sup> degree apex dorsal angulation is acceptable
- D. 1<sup>st</sup> requires surgery less often than metatarsal 2-4
- E. Metatarsal head/neck fracture require surgery less often



# ACES



## ASSESSMENT OF CORE-CONTENT EDUCATION SERIES

6. A 25 y/o male complaining of severe pain foot after a wake board fall presents to the the ED. Xray shows a fracture of the base of the 2<sup>nd</sup> metatarsal. What is true regarding this injury?
- A. Is usually stable
  - B. Cuboid fracture are uncommon
  - C. Surgery is usually optional
  - D. Delayed diagnosis results in significant complications
  - E. Involves disruption of the subtalar joint



# ACES



## ASSESSMENT OF CORE-CONTENT EDUCATION SERIES

7. A ballet dancer presents to the ED complaining of lateral foot pain for 3 weeks after running a marathon. Xray is negative. What is the most appropriate next step?
- A. Ace wrap and ortho follow-up
  - B. Non weight bearing short leg splint, schedule out patient MRI, and ortho follow-up
  - C. Orthopedic shoe, and ortho follow-up
  - D. Steroid injection, and ortho follow-up
  - E. Non weight bearing short leg splint, CT scan and orthopedic follow up



# ACES



## ASSESSMENT OF CORE-CONTENT EDUCATION SERIES

8. A 35 y/o F twists her ankle going down the stairs. She was able to bear weight but complains of pain and swelling. Which is correct regarding ankle sprains?
- A. Fracture of the base of 1<sup>st</sup> metatarsal should be considered
  - B. Talar dome injuries can occur
  - C. Grade III sprains result in partial ligament tears
  - D. Most require splinting and non-weight bearing for 2 -3 weeks
  - E. Associated with severe pain with passive dorsiflexion of 1<sup>st</sup> toe






# ACES



## ASSESSMENT OF CORE-CONTENT EDUCATION SERIES

9. Which of the following dysrhythmias is associated with commotio cordis?
- A. Asystole
  - B. Atrial fibrillation
  - C. PEA
  - D. V-Fib
  - E. Sinus tach

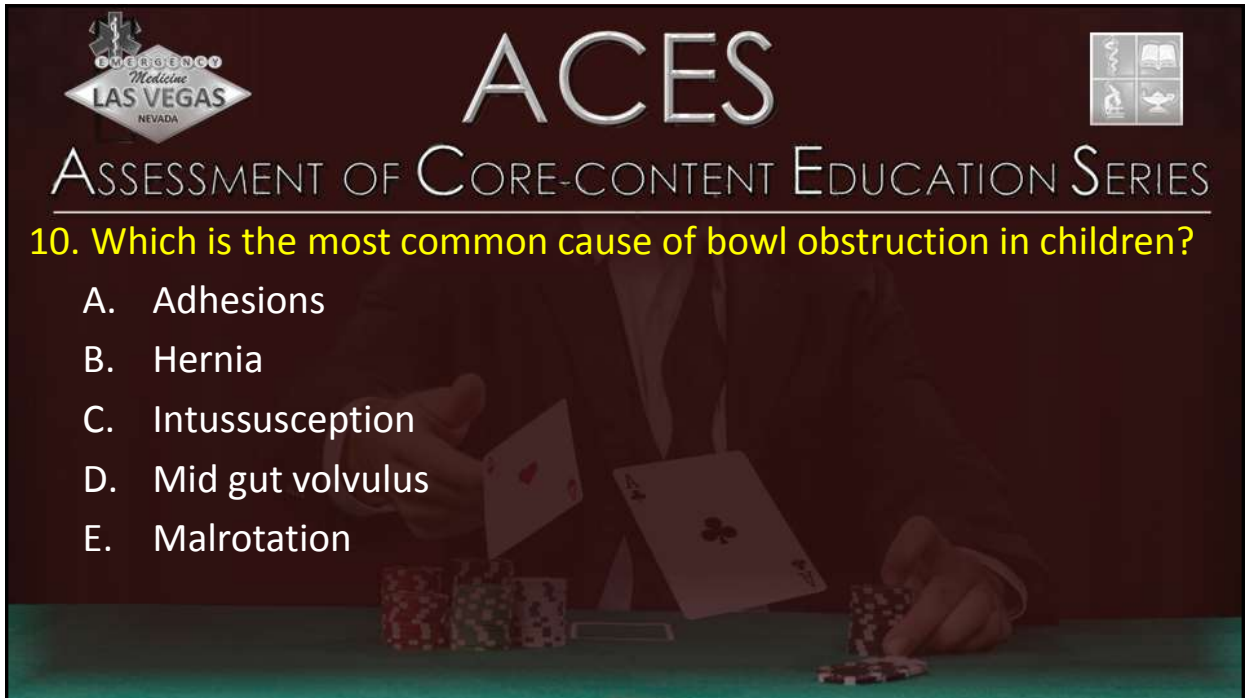


# ACES

## ASSESSMENT OF CORE-CONTENT EDUCATION SERIES

10. Which is the most common cause of bowel obstruction in children?

- A. Adhesions
- B. Hernia
- C. Intussusception
- D. Mid gut volvulus
- E. Malrotation



# ACES

## ASSESSMENT OF CORE-CONTENT EDUCATION SERIES





# ACES



## ASSESSMENT OF CORE-CONTENT EDUCATION SERIES

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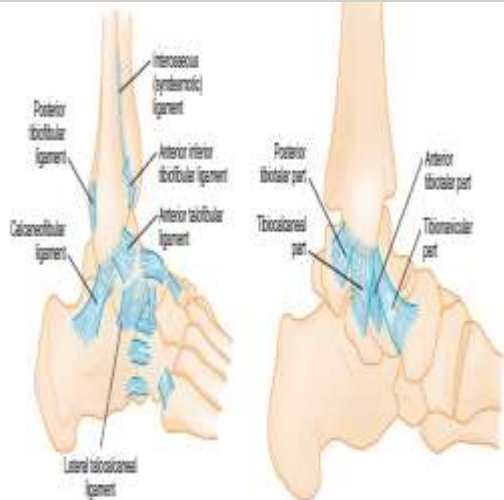


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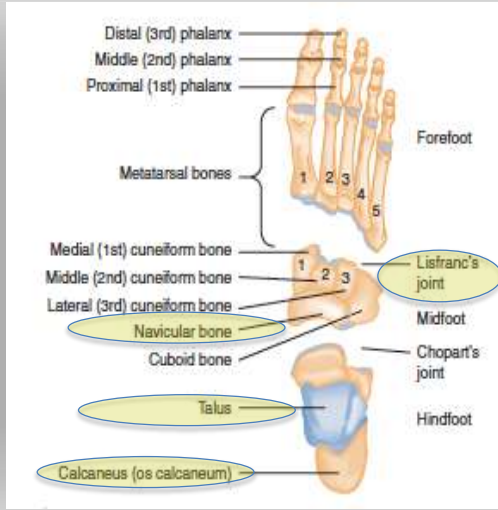
CONTENT  
TOPICS

**Anatomy**

**Ankle**  
**Foot**

MOI / PE  
Radiology  
Ankle Injuries  
Foot  
Injuries  
Misc.

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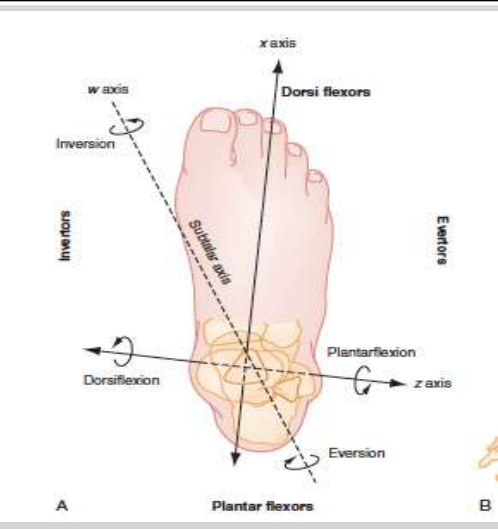
**CONTENT TOPICS**

**Anatomy**

**Ankle Foot**

MOI / PE  
Radiology  
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Foot Injuries  
Misc.

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Key Movements

- Inversion
- Eversion
- Plantar flexion
- Dorsiflexion
- Rotation

**CONTENT TOPICS**

Anatomy

**Hx/ PE**

**MIO**

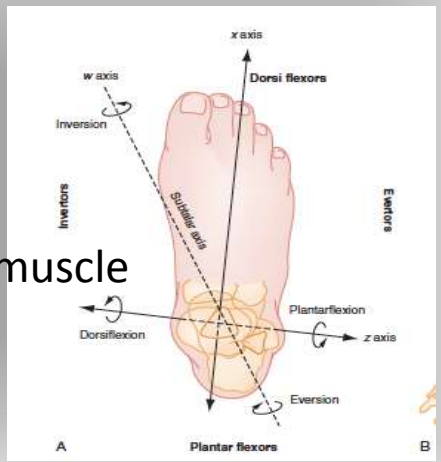
**Specific Inj.**  
Ottawa Ankle rules

Radiology  
Ankle Injuries  
Foot Injuries  
Misc.



### Mechanism of Injury

- Inversion
- Eversion
- Axial Loading
- Tendon Stretching + muscle contraction



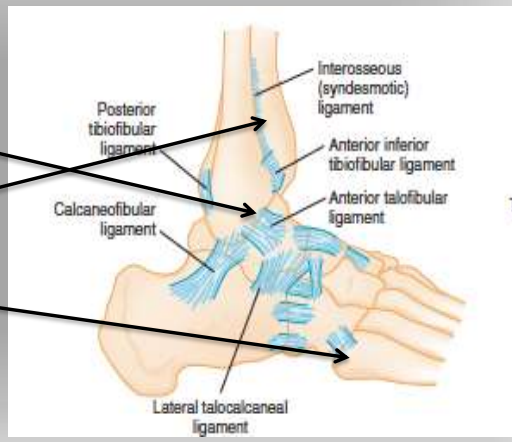
### CONTENT TOPICS

- Anatomy
- Hx/ PE**
- MIO
- Specific Inj. Ottawa Ankle rules
- Radiology
- Ankle Injuries
- Foot Injuries
- Misc.



### Mechanism of Injury

- Inversion
  - Sprain
  - Fracture (stable vs. Unstable)
  - Avulsion



### CONTENT TOPICS

- Anatomy
- Hx/ PE**
- MIO
- Specific Inj. Ottawa Ankle rules
- Radiology
- Ankle Injuries
- Foot Injuries
- Misc.



## Mechanism of Injury

- Eversion
  - Posterior tibias rupture
  - Navicular Avulsion fracture
- External rotation + Dorsiflexion
  - Deltoid ligament injury (isolated rare)
  - Lateral malleolus Fx
  - Prox fibula fracture



CONTENT TOPICS

Anatomy

**Hx/ PE**

MIO

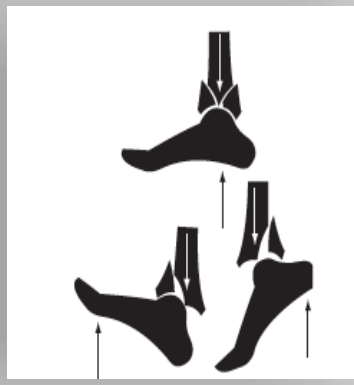
**Specific Inj.**  
Ottawa Ankle rules

Radiology  
Ankle Injuries  
Foot Injuries  
Misc.



## Mechanism of Injury

- Axial Loading (Ankle)
  - Tibia
  - Talus
  - Calcaneus
- Associated injuries common
  - Tibial plateau
  - Prox Femur/ acetabulum
  - Lumbar Vertebrae
  - Compartment syndrome



Pilon Fracture

CONTENT TOPICS

Anatomy

**Hx/ PE**

MIO

**Specific Inj.**  
Ottawa Ankle rules

Radiology  
Ankle Injuries  
Foot Injuries  
Misc.

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## Specific Mechanism of Injury

- Achilles tendon rupture
  - Forced Dorsiflexion + muscle contraction
  - Foot push off with knee extension (out of the blocks)
- Lisfranc Fx dislocation
  - Rotation on fixed forefoot
  - Axial load hind foot/mid foot into Metatarsal bases
  - Crush



CONTENT TOPICS

Anatomy

**Hx/ PE**

MIO

Specific Inj.

Ottawa Ankle rules

Radiology

Ankle Injuries

Foot Injuries

Misc.

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## Ottawa Ankle Rules: XRAY?

**Lateral view**      **Medial view**

**A** Posterior edge or tip of lateral malleolus - 6 cm

**B** Posterior edge or tip of lateral malleolus - 6 cm

**C** Base of fifth metatarsal

**D** Navicular

**Malleolar zone**

**Mid-foot zone**

A series of ankle x ray films is required only if there is any pain in malleolar zone and any of these findings:

- Bone tenderness at **A**
- Bone tenderness at **B**
- Inability to bear weight both immediately and in emergency department

A series of ankle x ray films is required only if there is any pain in mid-foot zone and any of these findings:

- Bone tenderness at **C**
- Bone tenderness at **D**
- Inability to bear weight both immediately and in emergency department

CONTENT TOPICS

Anatomy

**Hx/ PE**

MIO

Specific Inj.

Ottawa Ankle rules

Radiology

Ankle Injuries

Foot Injuries

Misc.





# ACES ASSESSMENT OF CORE-CONTENT EDUCATION SERIES



## Standard Ankle



### CONTENT TOPICS

Anatomy  
MOI / PE

### Radiology

- Standard
- Specific findings
- Advanced Imaging

Ankle Injuries

Foot

Injuries

Misc



# ACES ASSESSMENT OF CORE-CONTENT EDUCATION SERIES



## Standard Foot



### CONTENT TOPICS

Anatomy  
MOI / PE

### Radiology

- Standard
- Specific findings
- Advanced Imaging

Ankle Injuries

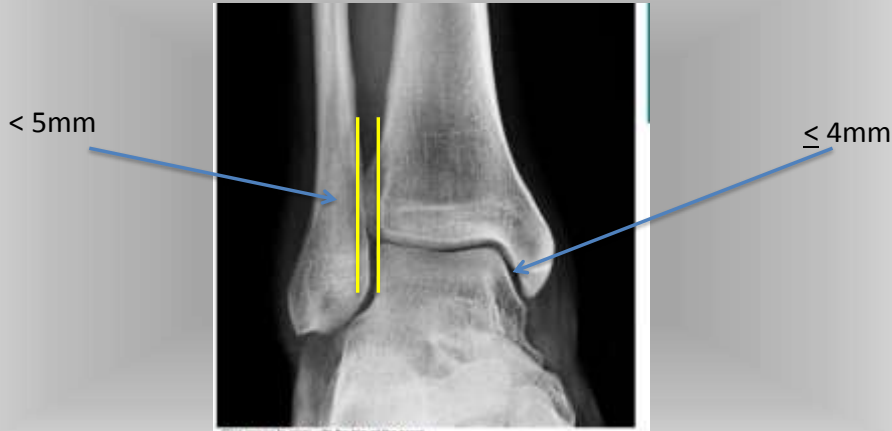
Foot

Injuries

Misc



Specific Findings



CONTENT TOPICS

Anatomy  
MOI / PE

**Radiology**

- Standard
- Specific findings
- Advanced Imaging

Ankle Injuries

Foot

Injuries

Misc



Specific Findings

Palpate for Fibular fracture



Maisonneuve fracture

CONTENT TOPICS

Anatomy  
MOI / PE

**Radiology**

- Standard
- Specific findings
- Advanced Imaging

Ankle Injuries

Foot

Injuries

Misc



## Advanced Imaging

- Negative x-ray ⇒ No Fracture
- CT
  - Mid/hind foot
    - Talus/Calcaneus
    - Subtalar joint
    - Lisfrac Joint complex
- MRI
  - Tendon ruptures
  - Stress Fractures considered



### CONTENT TOPICS

Anatomy  
MOI / PE

#### Radiology

- Standard
- Specific findings
- Advanced Imaging

Ankle Injuries

Foot

Injuries

Misc



## Lateral Malleolar

- Predicts value of Operative repair
- Fib FX to Tibialtalar joint
  - Below nonoperative
  - At Level : Depends on stability
  - Above usually require surgery



### CONTENT TOPICS

Anatomy  
MOI / PE  
Radiology

#### Ankle Injuries


- Fractures
- Sprains
- Tendon

Foot


Injuries

Misc.





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Medial Malleolar

- Eversion + external rotation
- Avulsion fracture
- Deltoid ligament tear
- Isolated fracture uncommon
- Proximal fibula may be fractured

CONTENT TOPICS


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Anatomy  
MOI / PE  
Radiology


Ankle Injuries

- Fractures
- Sprains
- Tendon

Foot Injuries  
Misc.



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Posterior Malleolar

- Rare
- > 25% Tibial surface require surgery

Bi - Tri Malleolar

- Disruption of 2 elements of ankle ring
- Bi: Operative vs. non operative ?
- Tri: Operative

CONTENT TOPICS


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Anatomy  
MOI / PE  
Radiology

Ankle Injuries


- Fractures
- Sprains
- Tendon

Foot Injuries  
Misc.



# ACES

ASSESSMENT OF CORE-CONTENT  
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## Ankle Sprains

- Inversion Plantar flexion
- Isolated Talofibular ligament (2/3 sprains)
- Isolated deltoid ligament (5%)
  - Eversion + external rotation
  - R/O Maisonneuve or Weber C Fracture
  - Attention to mortise measurements


### CONTENT TOPICS

Anatomy  
MOI / PE  
Radiology

Ankle Injuries


- Fractures
- Sprains
- Tendon

Foot  
Injuries  
Misc.



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## Achilles Tendon Rupture

- Pop or snap
- Weak plantar flexion possible (P.Tibialis, toe flexors)
- Thompson Test (intact tendon)
  - Knee flexed 90°
  - Calf squeezed
  - Foot plantar flexes
- Operative vs. non-operative ?

### CONTENT TOPICS

Anatomy  
MOI / PE  
Radiology

Ankle Injuries

- Fractures
- Sprains
- Tendon

Foot  
Injuries  
Misc.



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## Talar Fracture

- Joint less stable plantar flexed foot
- High risk avascular necrosis
- 2<sup>nd</sup> most common tarsal bone fx
- Neck Fx 50%, extreme dorsiflex (MVC)



### CONTENT TOPICS

Anatomy  
MOI / PE  
Radiology  
Ankle Injuries

**Foot**

Injuries

Hind foot

Mid foot

Forefoot

Misc.



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## Sub-Talar Dislocations

- Medial most common
- Rapid closed reduction
- Avascular necrosis uncommon



### CONTENT TOPICS

Anatomy  
MOI / PE  
Radiology  
Ankle Injuries

**Foot**

Injuries

Hind foot

Mid foot

Forefoot

Misc.



# ACES ASSESSMENT OF CORE-CONTENT EDUCATION SERIES



## Calcaneal Fractures

- Assessment
  - Subtalar involvement
  - Bohler's angle (degree of depression of posterior facet)
    - $20^{\circ}$ - $40^{\circ}$  normal.
    - $< 20^{\circ}$  abnormal
- Operative vs. Non ??



Figure 58-22. Bohler's angle is obtained by measuring the angle

### CONTENT TOPICS

Anatomy  
MOI / PE  
Radiology  
Ankle Injuries

**Foot**

**Injuries**

**Hind foot**

**Mid foot**

**Forefoot**

Misc.



# ACES ASSESSMENT OF CORE-CONTENT EDUCATION SERIES



## Navicular Fractures

- Eversion
  - Dorsal avulsion
  - Tuberosity avulsion
- Axial loading
  - Body fracture
- Middle third avascular
  - Nonunion
  - AVN

### CONTENT TOPICS

Anatomy  
MOI / PE  
Radiology  
Ankle Injuries

**Foot**

**Injuries**

**Hind foot**

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**Forefoot**

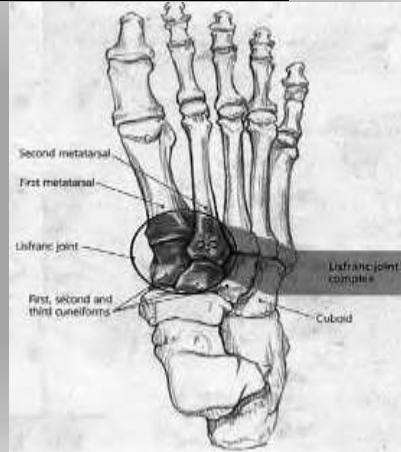
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## Lisfranc Fx and dislocation



### CONTENT TOPICS

Anatomy  
MOI / PE  
Radiology  
Ankle Injuries

**Foot**

**Injuries**

**Hind foot**

**Mid foot**

**Forefoot**

Misc.



# ACES ASSESSMENT OF CORE-CONTENT EDUCATION SERIES



## Lisfranc Fx and dislocation

- Tarsal-metatarsal joint
  - Metatarsal base fracture
  - Metatarsal dislocation
- Delay in diagnosis associated with long-term morbidity
- Usually 2° MVA
- Second metatarsal is critical for stability of the midfoot (both transverse and longitudinal arches)
- May require ORIF

### CONTENT TOPICS

Anatomy  
MOI / PE  
Radiology  
Ankle Injuries

**Foot**

**Injuries**


**Hind foot**

**Mid foot**

**Forefoot**


Misc.





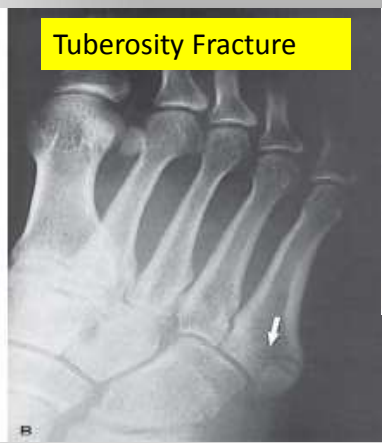
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ASSESSMENT OF CORE-CONTENT  
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## Fifth Metatarsal Base Fracture

Tuberosity Fracture



B



A

Diaphyseal Fracture

**CONTENT TOPICS**

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Anatomy  
MOI / PE  
Radiology  
Ankle Injuries

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Hind foot  
Mid foot  
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# ACES

ASSESSMENT OF CORE-CONTENT  
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## Fifth Metatarsal Base Fracture

- Dancer's
  - Avulsion fracture base of 5<sup>th</sup> metatarsal tuberosity
  - At attachment of peroneus brevis
  - Inversion injury
  - Cast shoe only
- Jones'
  - Transverse fracture 15mm distal from prox end
  - Proximal diaphysis
  - Common in athletes
    - Running or jumping sports
  - Increased incidence nonunion
  - ORIF or cast

**CONTENT TOPICS**

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Anatomy  
MOI / PE  
Radiology  
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 **ACES** ASSESSMENT OF CORE-CONTENT EDUCATION SERIES

CONTENT TOPIC 1

Insert key points for ITE review here

**CONTENT TOPICS**

- Anatomy
- MOI / PE
- Radiology
- Ankle Injuries
- Foot
- Injuries
- Misc.

