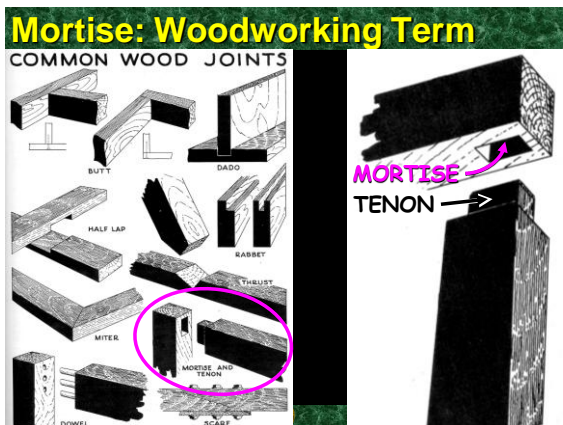
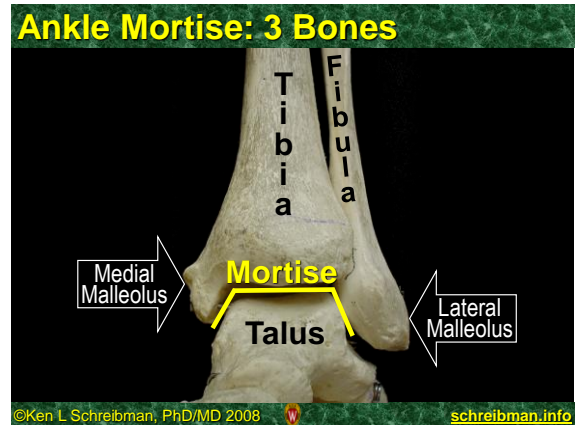
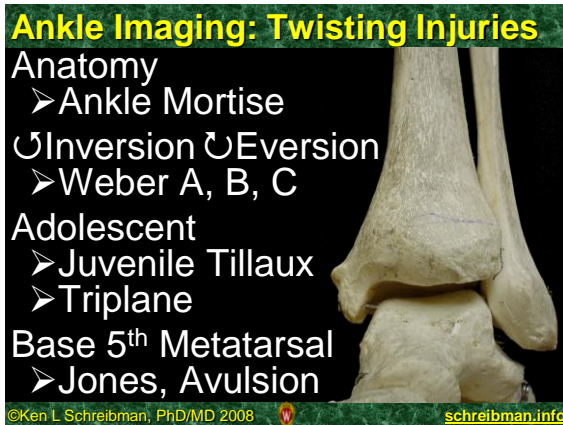
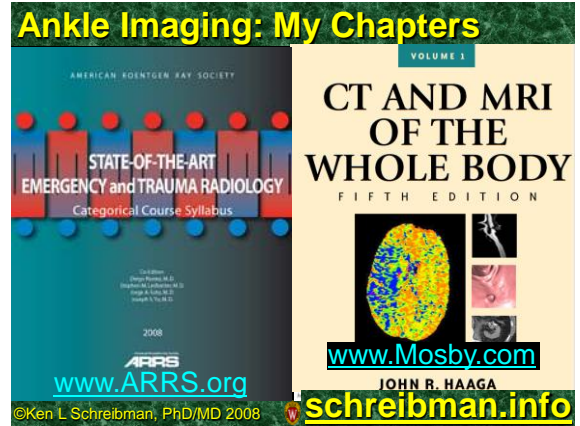
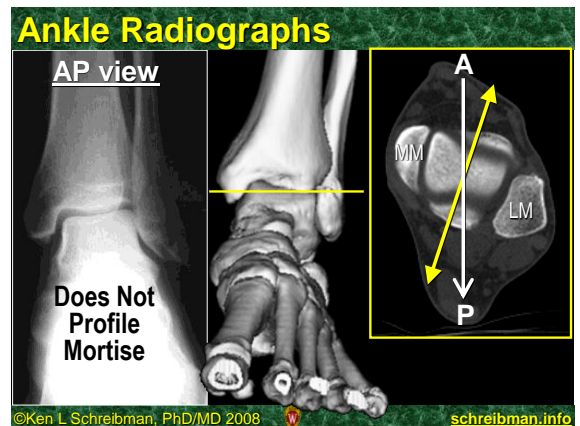
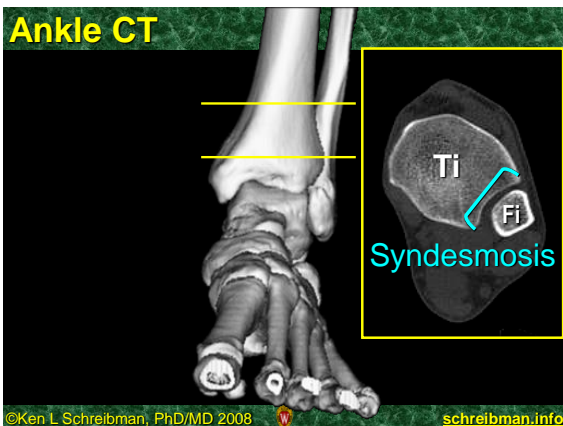
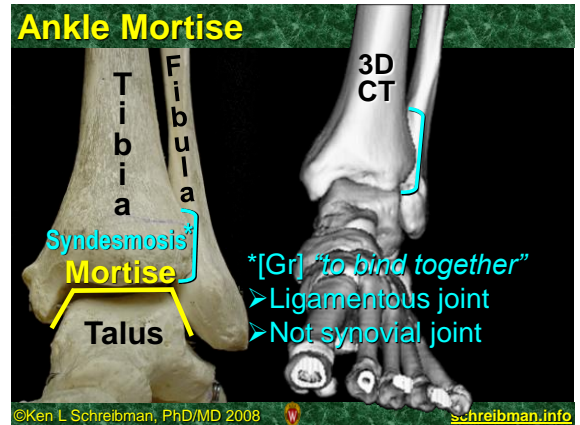
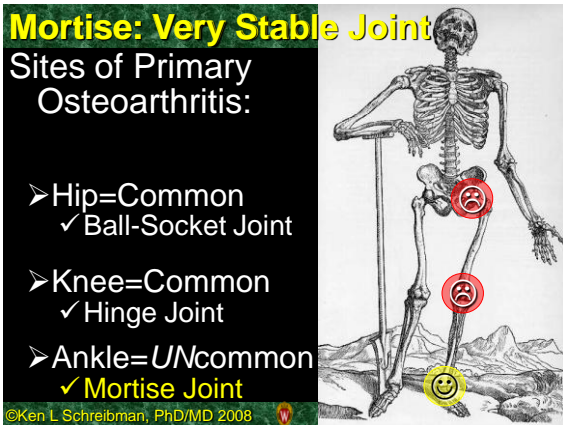
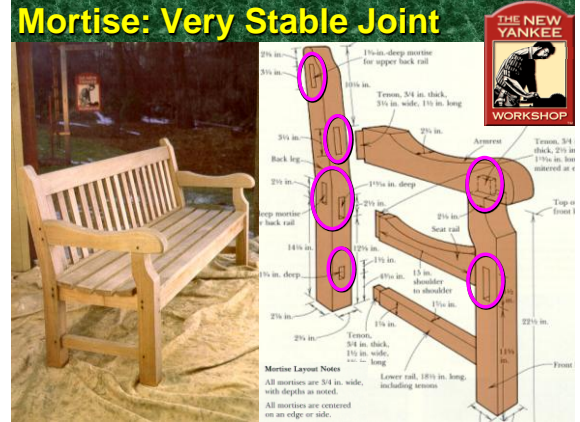


Ankle Imaging: Twisting Injuries

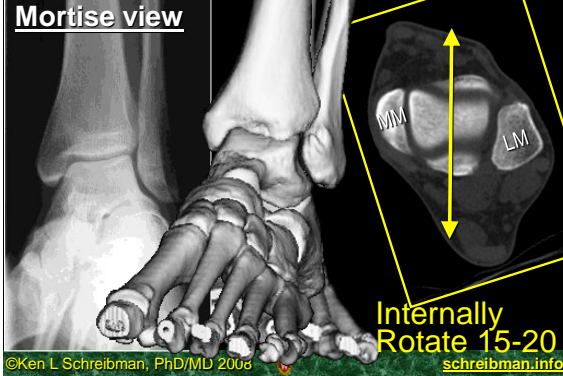


Ankle Imaging: Twisting Injuries

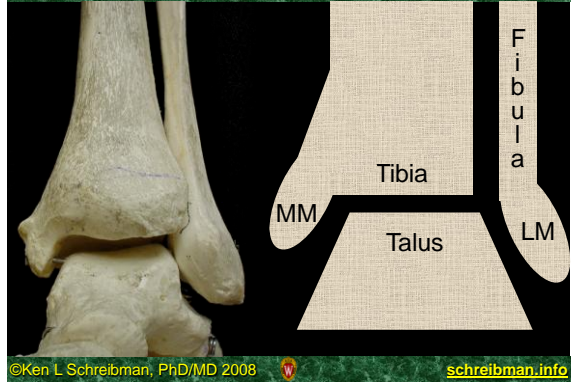


Ankle Imaging: Twisting Injuries

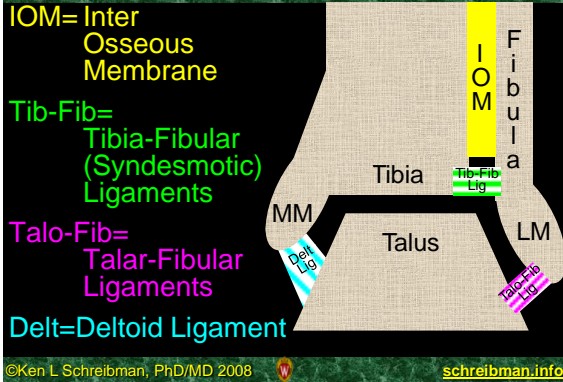
Ankle Radiographs



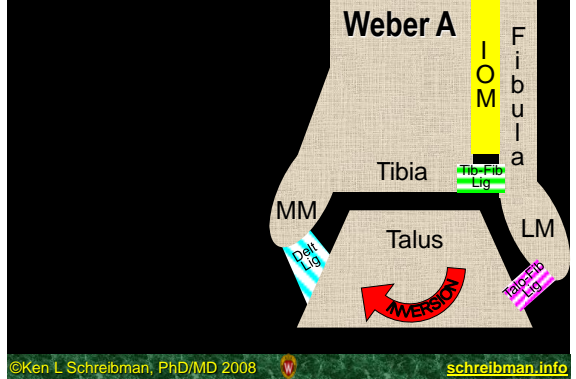
Ankle Model



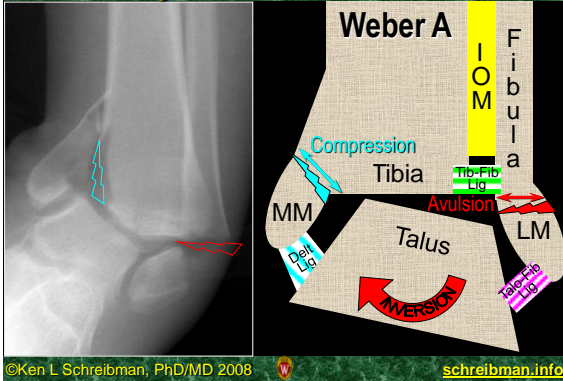
Ankle Model



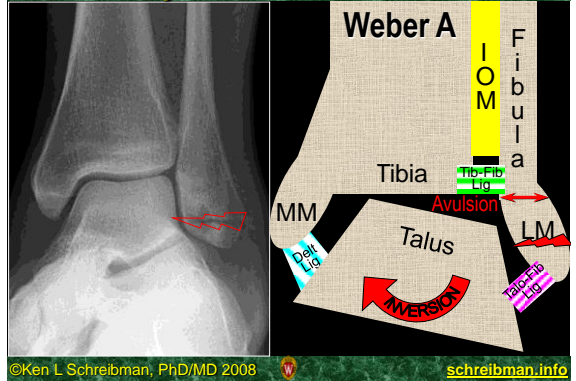
Weber: Syndesmosis Intact?



Weber: Syndesmosis Intact?

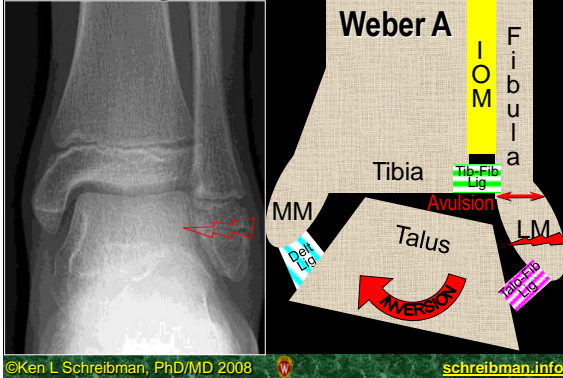


Weber: Syndesmosis Intact?

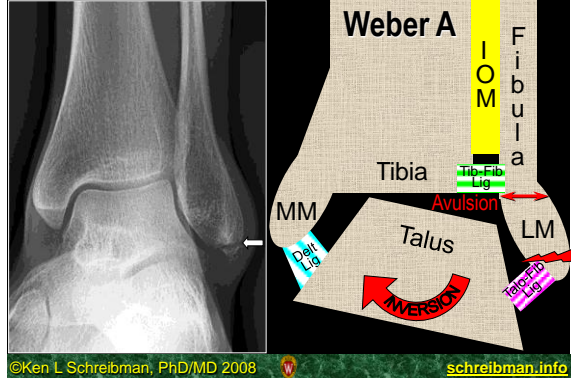


Ankle Imaging: Twisting Injuries

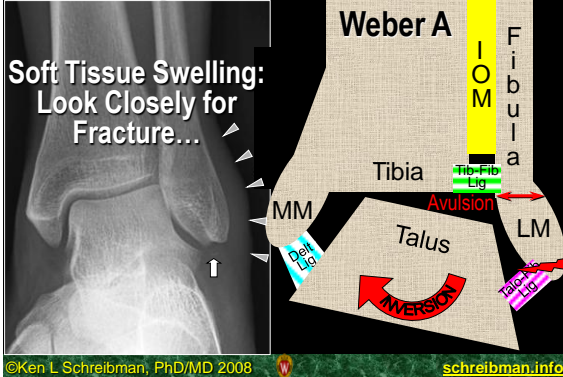
Weber: Syndesmosis Intact?



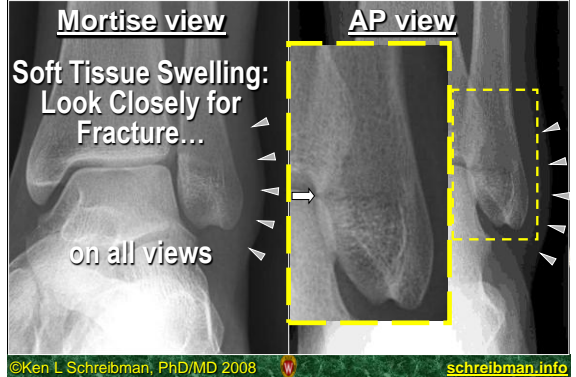
Weber: Syndesmosis Intact?



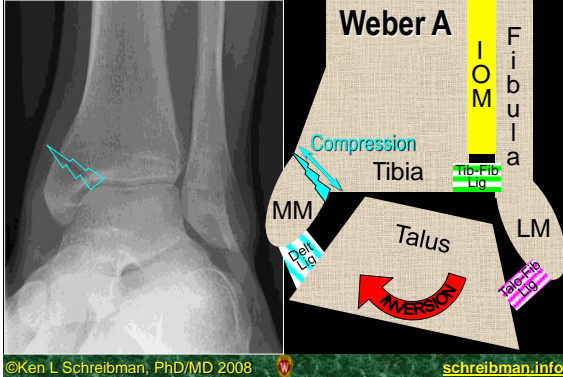
Weber: Syndesmosis Intact?



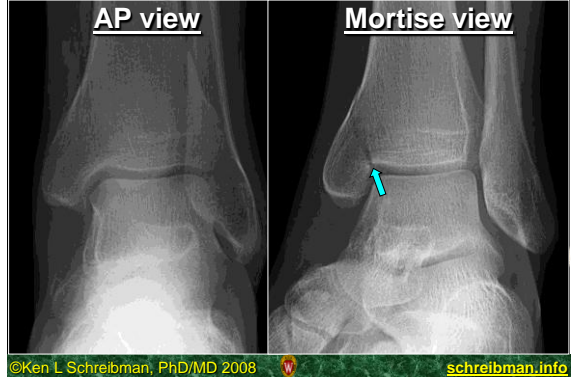
Weber: Syndesmosis Intact?



Weber: Syndesmosis Intact?



Weber: Syndesmosis Intact?

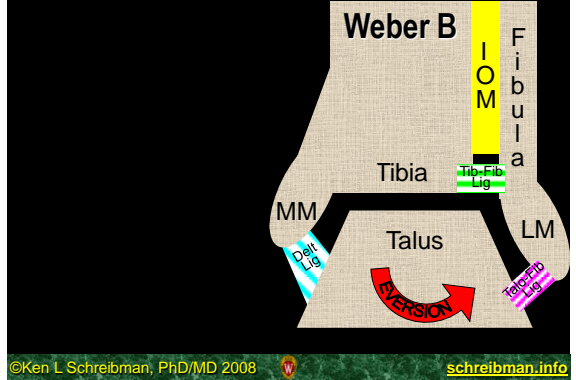


Ankle Imaging: Twisting Injuries

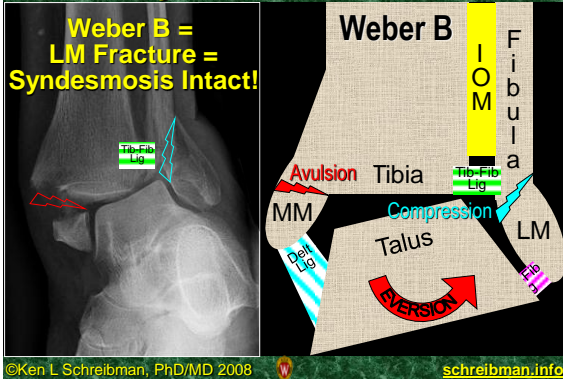
Weber: Syndesmosis Intact?



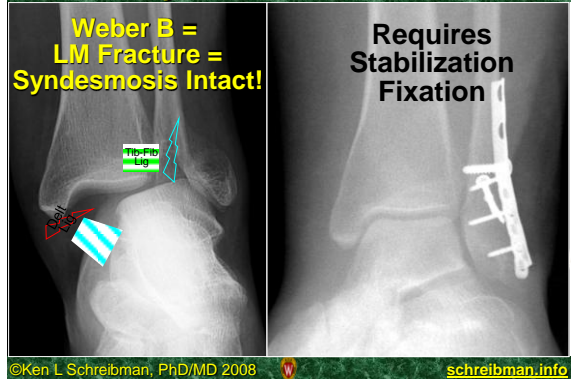
Weber: Syndesmosis Intact?



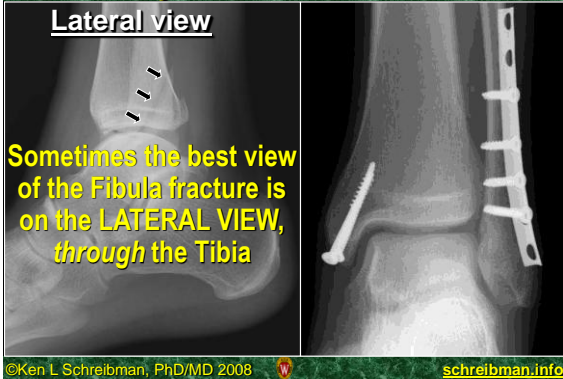
Weber: Syndesmosis Intact?



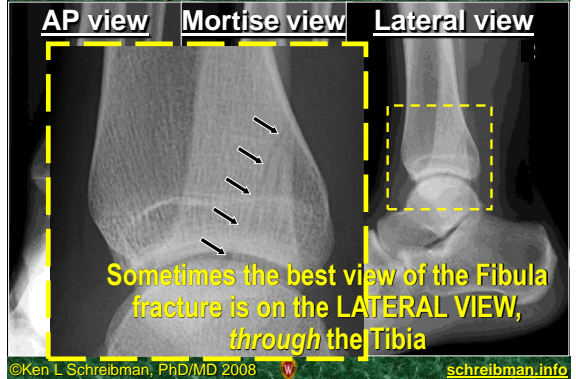
Weber: Syndesmosis Intact?



Weber: Syndesmosis Intact?



Weber: Syndesmosis Intact?



Ankle Imaging: Twisting Injuries

Weber: Syndesmosis Intact?

Weber B = LM Fracture = Syndesmosis Intact!

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Weber: Syndesmosis Intact?

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Weber: Syndesmosis Intact?

Weber C
Fibular Fracture above Syndesmosis

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Weber: Syndesmosis Intact?

Weber C

Coronal CT: Fibular Fracture above Syndesmosis
Syndesmosis wide?

Axial CT = Good for Syndesmosis
Normal Syndesmosis (RIGHT)
Wide Syndesmosis (LEFT)

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Weber: Syndesmosis Intact?

Why is Syndesmosis integrity important?
If Syndesmosis is NOT intact, it must be stabilized with a screw.

Weber C

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Weber: Syndesmosis Intact?

AP view
Fibular shaft Fx = Weber C
even though syndesmosis may appear intact →

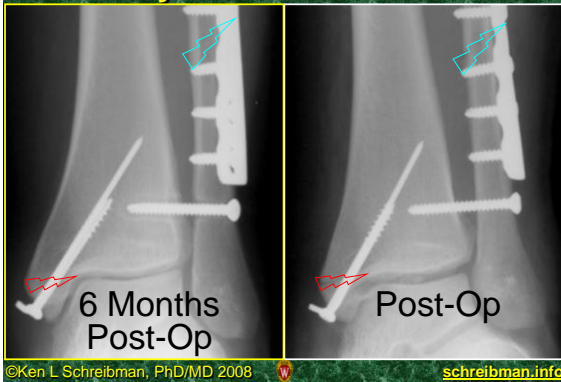
Mortise view

Post-Op
Syndesmotic Screw

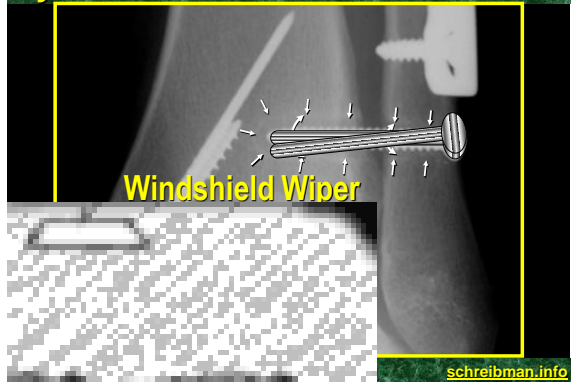
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Ankle Imaging: Twisting Injuries

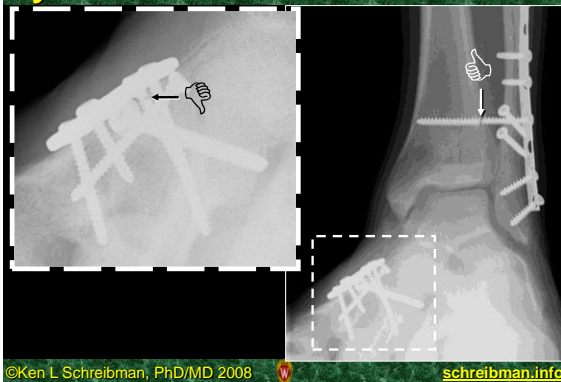
Weber: Syndesmosis Intact?



Syndesmotom Screw: OK to loosen



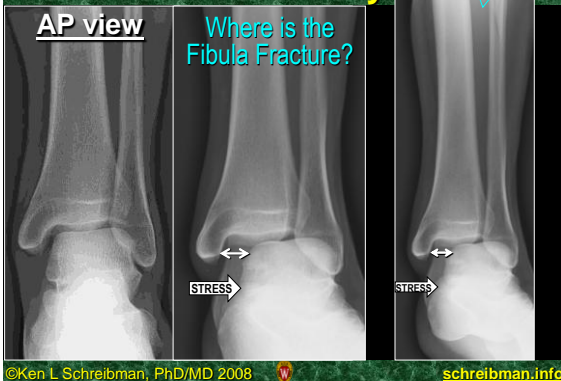
Syndesmotom Screw: OK to break



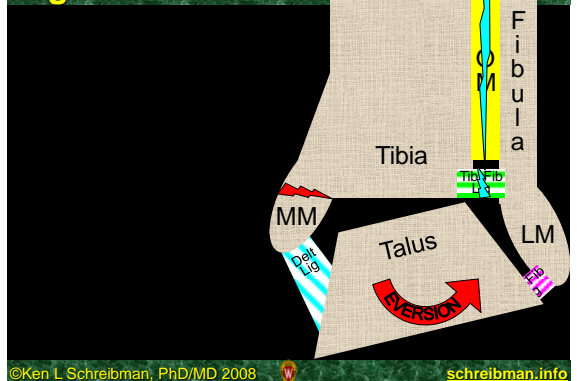
Syndesmotom Screw: Removed



Weber C: Can be tricky



High Weber C = Maisonneuve



Ankle Imaging: Twisting Injuries

Maisonneuve: Can be tricky

Weber A?
No, Weber A has Avulsion Fracture of LM

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Maisonneuve: Can be tricky

Weber B?
No, Weber B has Compression Fx of LM

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Maisonneuve: Can be tricky

Weber C?
No, Weber C has a low Fibula shaft Fx

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Maisonneuve: Can be tricky

Maisonneuve?
Need to look higher!

Is this significant?
Stress views:

Requires Syndes. Screw

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In Summary:

Weber A
↔ Avulsion Fx: LM
↖ Compression Fx: MM

Weber B
↔ Avulsion Fx: MM
↗ Compression Fx: LM (below Syndesmosis)

Weber C
↔ Avulsion Fx: MM
↗ Compression Fx: Fibula (above Syndesmosis)

Maisonneuve
↔ Avulsion Fx: MM
↗ Compression Fx: Fibula (way above Syndesmosis)

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In Summary:

Clues:

Weber A
↔ Avulsion Fx: LM
↖ Compression Fx: MM

Weber B
↔ Avulsion Fx: MM
↗ Compression Fx: LM (below Syndesmosis)

Weber C
↔ Avulsion Fx: MM
↗ Compression Fx: Fibula (above Syndesmosis)

Maisonneuve
↔ Avulsion Fx: MM
↗ Compression Fx: Fibula (way above Syndesmosis)

- Soft Tissue Swelling
 - ✓ Look more closely
 - ✓ Tiny Avulsion Fx
- Need Multiple Views
 - ✓ AP & Mortise
- On Lateral View
 - ✓ Look thru Tibia for the Fibula Fx
- MM avulsion Fx:
 - ✓ Weber B or C?
 - ✓ Maisonneuve!

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Ankle Imaging: Twisting Injuries

Ankle: Twisting Injuries

Anatomy

- Ankle Mortise

↻ Inversion ↻ Eversion

- Weber A, B, C

Adolescent

- Juvenile Tillaux
- Triplane



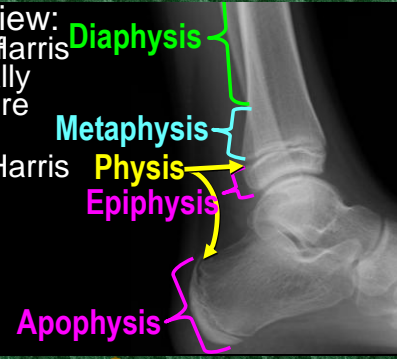
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Juvenile Tillaux Fx = Salter-Harris III

Quick Review:

- Salter-Harris Skeletally Immature Bone
- Salter-Harris



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Juvenile Tillaux Fx = Salter-Harris III

Quick Review:

- Salter-Harris = Physis Fx

- I. Physis Only
- II. Metaphysis
- III. Epiphysis
- IV. Epiphysis & Metaphysis
- V. Crush

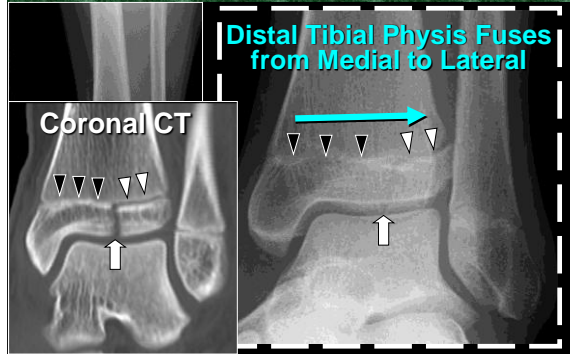


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Juvenile Tillaux Fx = Salter-Harris III

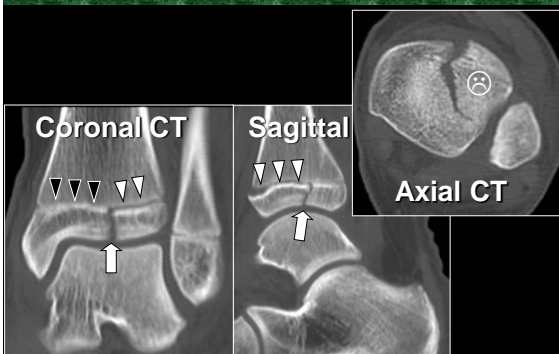
Distal Tibial Physis Fuses from Medial to Lateral



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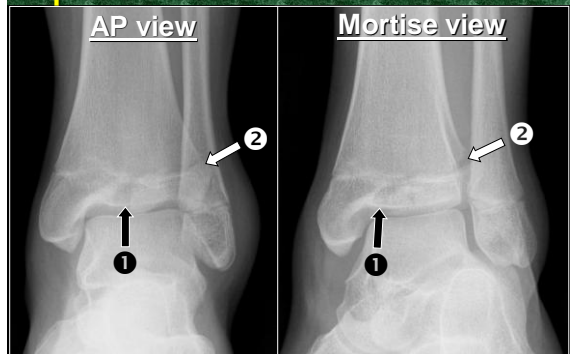
Juvenile Tillaux Fx = Salter-Harris III



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Triplane Fracture = Salter-Harris IV

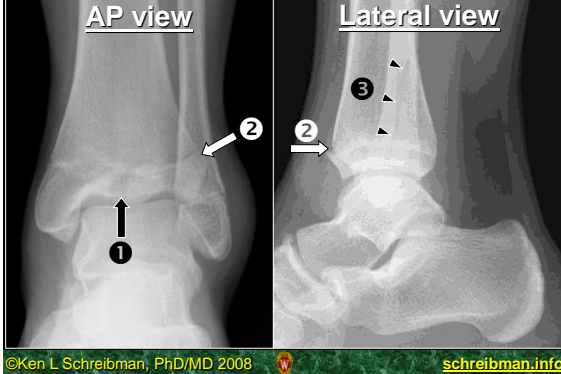


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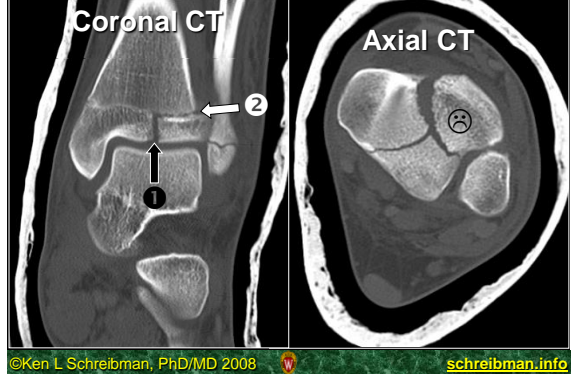
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Ankle Imaging: Twisting Injuries

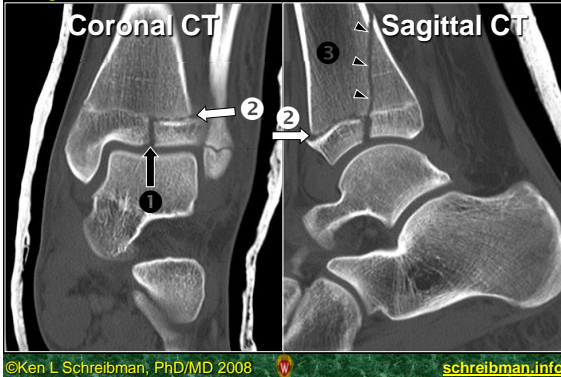
Triplane Fracture = Salter-Harris IV



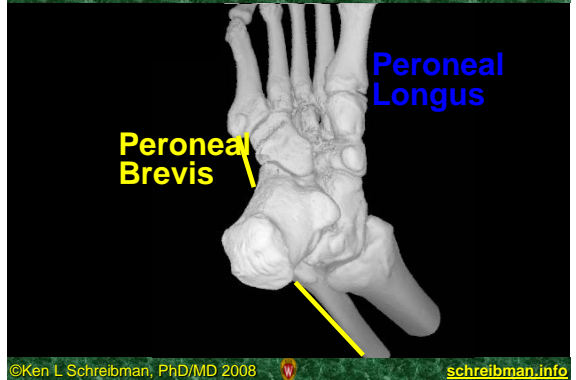
Triplane Fracture = Salter-Harris IV



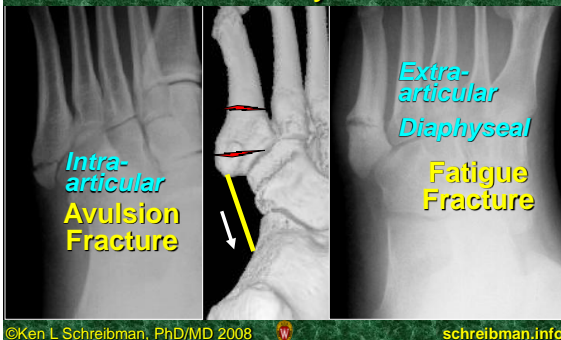
Triplane Fracture = Salter-Harris IV



Base 5th Metatarsal



Base 5th Metatarsal: 2 Different Fxs Both Transversely ↔ Oriented




Base 5th Metatarsal: Normal Apophysis Longitudinally ↑ Oriented



Ankle Imaging: Twisting Injuries

Tarsal Coalition: 2 Locations

Why does this 13 year old have foot pain?

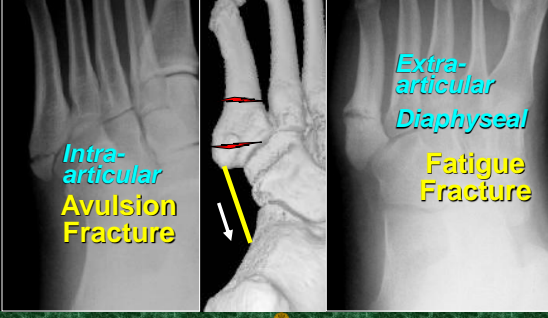


1) Calcaneus-Navicular
2) Talus-Calcaneus
» Middle Facet of Sub-Talar Joint

There is NO normal articulation between the Calcaneus and the Navicular

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Base 5th Metatarsal: 2 Different Fxs Both Transversely ↔ Oriented



Intra-articular Avulsion Fracture

Extra-articular Diaphyseal Fatigue Fracture

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Base 5th Metatarsal: 2 Different Fxs Both present as lateral ANKLE pain

Technologists MUST ALWAYS show proximal 5th MT on one view of the ankle!

Case:

- 51 yo female
- Twisted ankle, lat. pain
- Called her doctor
- He didn't examine her, just told her to "Get X-rays"



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Base 5th Metatarsal: 2 Different Fxs Both present as lateral ANKLE pain

Technologists MUST ALWAYS show proximal 5th MT on one view of the ankle!

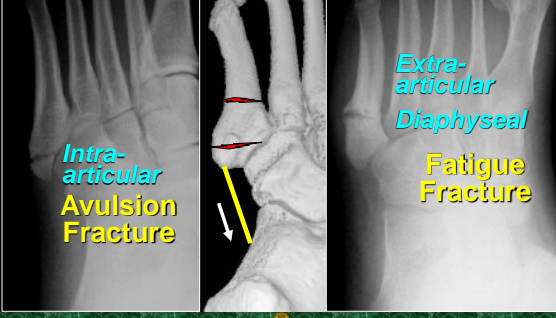
Case:

- 21 yo male
- Inversion injury
- Tender at LM



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Base 5th Metatarsal: 2 Different Fxs Both Transversely ↔ Oriented



Intra-articular Avulsion Fracture

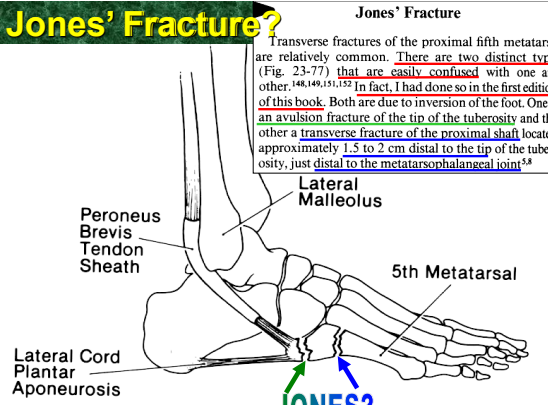
Extra-articular Diaphyseal Fatigue Fracture

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Jones' Fracture?

Jones' Fracture

Transverse fractures of the proximal fifth metatarsal are relatively common. There are two distinct types (Fig. 23-77) that are easily confused with one another.^{148,149,151,152} In fact, I had done so in the first edition of this book. Both are due to inversion of the foot. One is an avulsion fracture of the tip of the tuberosity and the other a transverse fracture of the proximal shaft located approximately 1.5 to 2 cm distal to the tip of the tuberosity, just distal to the metatarsophalangeal joint.⁵⁸



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Ankle Imaging: Twisting Injuries

AnnSurg
1902

FRACTURE OF THE BASE OF THE FIFTH METATARSAL BONE BY INDIRECT VIOLENCE

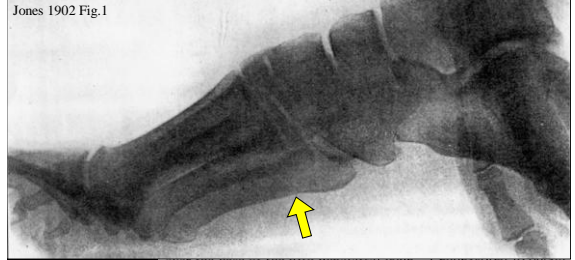
By ROBERT JONES, F.R.C.S.,

OF LIVERPOOL,

SURGEON TO THE ROYAL SOUTHERN HOSPITAL, LIVERPOOL.

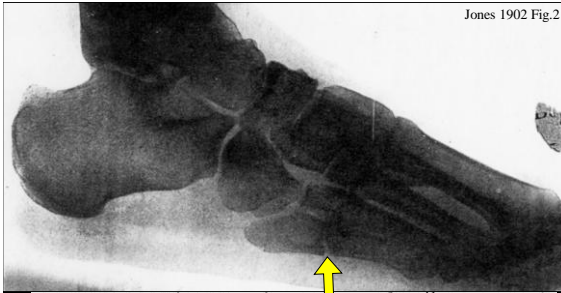
SOME months ago, whilst dancing, I trod on the outer side of my foot, my heel at the moment being off the ground. Something gave way midway down my foot, and I at once suspected a rupture of the peroneus longus tendon. By the help of a friend I managed to walk to my cab, a distance of over 300 or 400 yards. The following morning I carefully examined my foot and discovered that my tendon was intact. There was a slight swelling over the base of the fifth metatarsal bone. I endeavored to obtain crepitus and failed. A finger on the spot gave exquisite pain. Body pressure on the toes, even the slightest, was painful; but when the pressure was deviated to the outer side the pain was still greater. Extension of the ankle and flexion of the toes were immediately felt at the base of the fifth metatarsal.

I hobbled down-stairs to my colleague, Dr. David Morgan, and asked him to X-ray my foot. This was done, and the fifth metatarsal was found fractured about three-fourths of an inch from its base. (Fig. 1.)

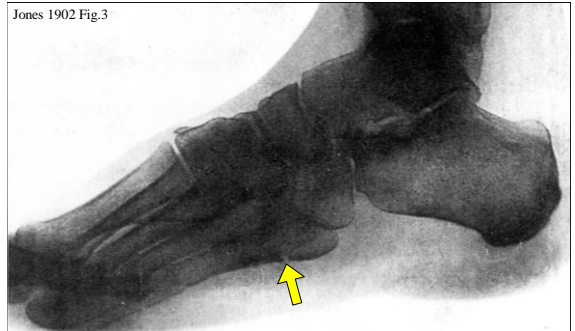


over the base of the fifth metatarsal bone. I endeavored to obtain crepitus and failed. A finger on the spot gave exquisite pain. Body pressure on the toes, even the slightest, was painful; but when the pressure was deviated to the outer side the pain was still greater. Extension of the ankle and flexion of the toes were immediately felt at the base of the fifth metatarsal.

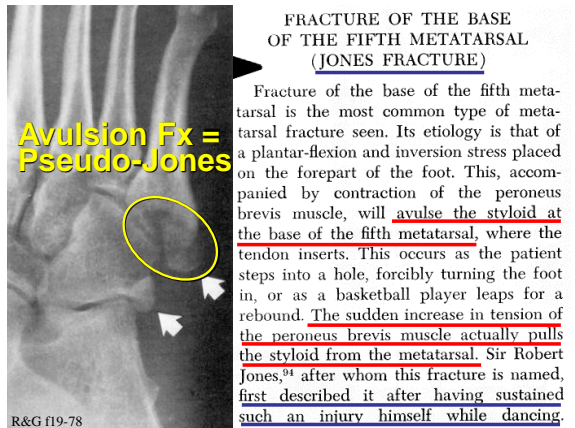
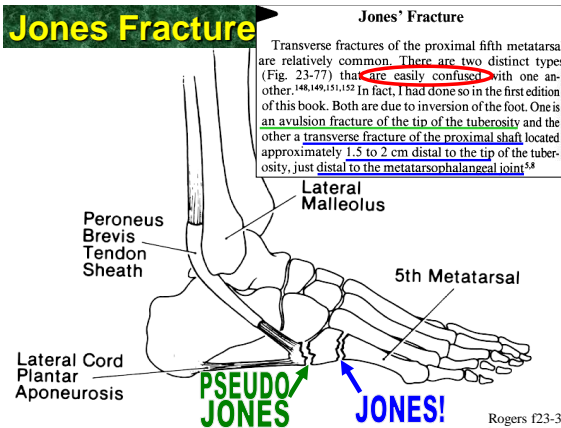
I hobbled down-stairs to my colleague, Dr. David Morgan, and asked him to X-ray my foot. This was done, and the fifth metatarsal was found fractured about three-fourths of an inch from its base. (Fig. 1.)



years with Dr. Floyd, of Birkenhead. He had been away fishing, and stepping from stone to stone he placed the whole of his body weight upon an inverted foot. He felt, as he said, something crack in his ankle, and he limped towards his house. The symptoms were identical with my own, and the radiograph showed a precisely similar picture. (Fig. 2.)



some days after the accident. There was pain over the metatarsal base; no crepitus. By this time I could indulge in a positive diagnosis; and I confirmed its accuracy by an X-ray plate. (Fig. 3.)



Ankle Imaging: Twisting Injuries

Jones vs Avulsion Fractures: So What?

Tuberosity Avulsion (Pseudo-Jones)

- Healing is easily achieved
- Dameron JBJS 57-A: 788 1975**
- ✓ 100 Avulsion Fractures
- ✓ Treated with elastic bandage or partial weight bearing
- ✓ 99% clinically healed @ 3weeks radiographically healed @ 8w

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Jones vs Avulsion Fractures: So What?

Tuberosity Avulsion (Pseudo-Jones)



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Jones vs Avulsion Fractures: So What?

Jones Fracture

- Athletic injury of young adults
- High rate of delayed/non-union
- Torg, Pavlov JBJS 66-A: 209 1984**
- 43 patients, 16-22yo (mean=18yo)
- All sustained fx during athletics
- ✓ 16 Basketball
- ✓ 15 Football
- ✓ 6 Soccer
- ✓ 5 Baseball
- ✓ 0 Dancing

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Jones vs Avulsion Fractures: So What?

Jones Fracture

Torg, Pavlov JBJS 66-A:

- Half ultimately required surgery to achieve union
- The rest achieved union only after prolonged immobilization (7-15 m)
- Poor healing thought to be due to relative hypovascularity of proximal diaphysis 5th MT

(Carp AnnSurg86:308 1927)
Helene Pavlov
Hosp Special Surgery, NY



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Jones Fracture

38 yo male, right lateral ankle pain



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Jones Fracture: Delayed Healing

38 yo male, right lateral ankle pain



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Ankle Imaging: Twisting Injuries

Jones Fracture: Delayed Healing

38 yo male, left lateral foot pain



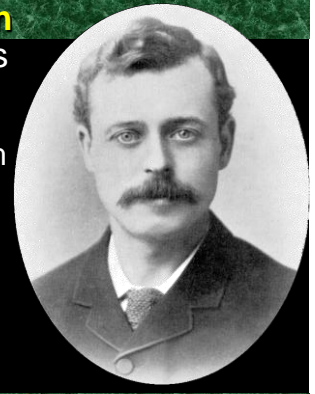
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Jones: The Man

Sir Robert Jones

- Born 1857
N. Wales
United Kingdom
- Died 1933
age 76
- Father of
Orthopedic
Surgery



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Jones: The Young Surgeon

Sir Robert Jones

- 1887, 30yo
- Apprenticed
with uncle,
Hugh Owen
Thomas



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Jones: The Young Surgeon

Sir Robert Jones

- 1887, 30yo
- 1888, Appointed chief
surgeon for the
Manchester Ship Canal
 - ✓ Established a chain of small
hospitals along the length
of the canal construction
 - ✓ This was the first organized
fracture and injury service
in England



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Manchester Ship Canal

Welcome to the Manchester Ship Canal Company web site

www.manchestershipcanal.co.uk



Jones: The Experienced Surgeon

During World War 1,
revolutionized the care
of wounded soldiers

- Established network
of field hospitals
- Rehab hospitals
- Mortality rate for open
fractures was reduced
from 80% to 20%

1925- "To him and his practical
teaching and influence we owe
it that our streets today show
relatively so few war cripples"



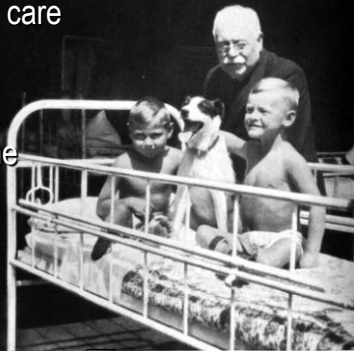
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Ankle Imaging: Twisting Injuries

Jones: The Pediatric Surgeon

- Pioneer in the care of crippling diseases of children
- Established the first long-stay orthopedic hospitals for children



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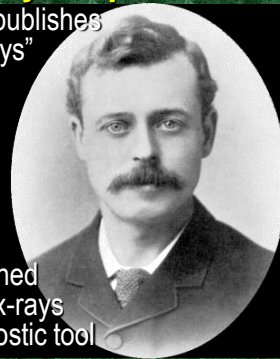
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Jones: Early X-Ray Proponent

Dec 28 1895: Röntgen publishes "On a New Kind of Rays"

Feb 22 1896: Jones publishes in Lancet, "The Discovery of a Bullet Lost in the Wrist by Mean of the Roentgen Ray"

Arguably the first published case history in which x-rays were used as a diagnostic tool



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Jones: Early X-Ray Proponent

"In 1896 we were all dancing in a circle round the tent pole. Robert Jones' ankle seemed to give... he said he had strained such and such a muscle or tendon, exclaiming:

'Most interesting, most painful. I had no idea it could be so painful. Most interesting!'

"At that time he (Jones) had what might almost be described as a new toy – an X-ray apparatus, the first in England.

"He wondered whether it would not be possible for the X-ray to show the torn or swollen muscle, and on experimenting the plate showed to his amazement that a small bone was fractured.

"This disability gave him immense satisfaction. To one patient who came to him with mysterious symptoms he said, after a brief examination,

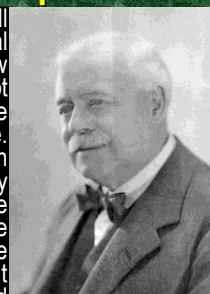
'Madam, you could have paid me no greater compliment – this is a genuine Jones fracture.'"

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Jones: Early X-Ray Proponent

"Radiography here, as in all branches of medicine, is an essential aid to diagnosis. No matter how experienced we may be, we cannot afford to dispense with it, even in the apparently simple and obvious case. Not only should we insist upon procuring a film, but it is equally important that we should welcome the radiologist's reading of it. Some surgeons resent this and say, 'Give me the film so that I can read it myself,' but this is an arrogant and stupid attitude, and not the patient's advantage."



Jones: Manipulation as a therapeutic measure, Proc RoySocMed 24:1405, 1931-2

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Jones: Inspiration to Others

Memorial Tablet:

"Great surgeon:
greater man"

Obituary:

"As a teacher he was pre-eminent, not in the role of didactic pedagogue, but in the role of leader able to enthuse men, and through them he advanced the art and science of his specialty"



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Ankle Imaging: Twisting Injuries

Anatomy

- Ankle Mortise
- ↺ Inversion ↻ Eversion
- Weber A, B, C

Adolescent

- Juvenile Tillaux
- Triplane

Base 5th Metatarsal

- Jones, Avulsion



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