Reading Hospital School of Health Sciences
Medical Imaging Program
MI 133: Clinical Seminar II

ANKLE

Routine: AP, AP Mortise, & Lateral

Projection: **AP**

Patient Prep: Remove shoes, socks, nylons and jewelry. May need to raise pant leg.

Technique: **70 kVp @ 1.8 mAs (Tabletop)**

SID: 40" SID

Collimation: To anatomy of interest

Patient Position: Patient is supine with the leg extended. Adjust the ankle joint in anatomic position (Plantar surface of foot should be perpendicular to image receptor - foot pointing straight up) to obtain true AP projection. Dorsiflex the foot/ankle and use a sponge and sandbag.

Central Ray: To the ankle joint midway between the malleoli.

Marker Placement: Place appropriate right or left marker on the image.

Shielding: Gonadal shielding required

Breathing Instructions: N/A

Purpose/Structures: The distal ends of the tibia and fibula and proximal portion of the talus are demonstrated in a true AP position.

Evaluation Criteria:

- Evidence of proper collimation and the presence of a side marker placed clear of the anatomy of interest
- Ankle joint centered to exposure area
- Medial and lateral malleoli
- Talus
- No rotation of the ankle:
    - Normal overlapping of the tibiofibular articulation with the anterior tubercle slightly superimposed over the fibula
    - Talus slightly overlapping the distal fibula
    - No overlapping of the medial talomalleolar articulation
- Tibiotalar joint space
- Bony trabecular detail and surrounding soft tissues

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ANKLE

Routine:	AP, AP Mortise, & Lateral
Projection:	**AP Mortise (AP Oblique with medial rotation)**
Patient Prep:	Remove shoes, socks, nylons and jewelry. May need to raise pant leg.
Technique:	**70 kVp @ 1.8 mAs (Tabletop)**
SID:	40" SID
Collimation:	To anatomy of interest
Patient Position:	Patient is supine with the leg extended. Internally rotate the **leg** 15-20^{o} to place the intermalleolar line parallel to the image receptor. When you internally rotate the leg, the entire leg must be turned not just the foot. Plantar surface of the foot is perpendicular to the image receptor (at a right angle to the leg). Dorsiflex the foot and use a sponge and sandbag.
Central Ray:	To the ankle joint midway between malleoli.
Marker Placement:	Place appropriate right or left marker on the image.
Shielding:	Gonadal shielding required
Breathing Instructions:	N/A
Purpose/Structures:	The distal ends of the tibia and fibula and proximal portion of the talus are demonstrated. Entire mortise joint should be shown in profile. The three sides of the mortise joint should be visualized.

Evaluation Criteria:

- Evidence of proper collimation and presence of a side marker place clear of the anatomy of interest
- Entire ankle mortise joint centered to exposure area
- Distal tibia, fibula and talus
- Proper 15- to 20-degree rotation of ankle:
    - Talofibular articulation open
    - Tibiotalar articulation open
    - No overlap of the anterior tubercle of the tibia and the superolateral portion of the talus with fibula
- Bony trabecular detail and surrounding soft tissues

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ANKLE

Routine:	AP, AP Mortise, & Lateral
Projection:	**Lateral (Mediolateral)**
Patient Prep:	Remove shoes, socks, nylons and jewelry. May need to raise pant leg.
Technique:	**70 kVp @ 1.25 mAs (Tabletop)**
SID:	40" SID
Collimation:	To anatomy of interest
Patient Position:	Have the patient turn toward affected side until the leg is lateral. Dorsiflex the foot and use a sponge and sandbag. Dorsiflexion is required to prevent lateral rotation of the ankle. The malleoli should be perpendicular to the image receptor.
Central Ray:	Perpendicular to ankle joint entering at the medial malleolus
Marker Placement:	Place appropriate right or left marker on the image.
Shielding:	Gonadal shielding required
Breathing Instructions:	N/A
Purpose/Structures:	A true lateral image of the lower 1/3 of the tibia and fibula, of the ankle joint and the tarsals is demonstrated.

Evaluation Criteria:

- Evidence of proper collimation and presence of a side marker place clear of the anatomy of interest
- Ankle joint centered to exposure area
- Distal tibia and fibula, talus, calcaneus, and adjacent tarsals
- Ankle in true lateral position:
    - Tibiotalar joint as well visualized, with the medial and lateral talar domes superimposed
    - Fibula over the posterior half of the tibia
- Fifth metatarsal base and tuberosity should be seen to check for Jones fracture
- Soft tissue and bony trabecular detail
- Bony trabecular detail and surrounding soft tissues

Additional Note:

- Base of the 5th metatarsal ***must*** be included on the lateral view. If the radiologist detects a deformity of the 5th metatarsal on the lateral, additional views may be requested.

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ANKLE – SPECIAL VIEW

*14th edition Merrill's Volume I, page 329

Projection: **Medial Oblique**

Patient Prep: Remove shoes, socks, nylons and jewelry. May need to raise pant leg.

SID: 40" SID

Collimation: To anatomy of interest

Patient Position: Place patient in the supine position. Dorsiflex the foot enough to place ankle at nearly right-angle flexion. The ankle may be immobilized with sandbags placed against the sole of the foot. Rotate patient's entire leg and foot internally 45-degree.

Central Ray: Perpendicular to ankle joint entering midway between the malleoli

Marker Placement: Place appropriate right or left marker on the image.

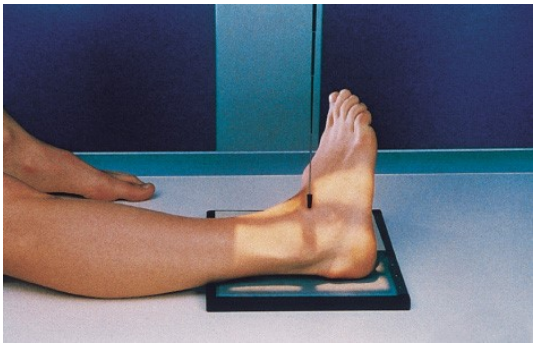
Shielding: Gonadal shielding required

Breathing Instructions: N/A

Purpose/Structures: The distal ends of the tibia and fibula, parts of which are often superimposed over the talus. The tibiofibular articulation also should be shown.

Evaluation Criteria:

- Evidence of proper collimation and the presence of a side marker placed clear of anatomy of interest
- Ankle joint centered to exposure area
- Distal tibia, fibula, and talus
- Proper 45-degree rotation of ankle
  - Tibiofibular articulation open
  - Distal tibia and fibula overlap some of the talus
- Bony trabecular detail and surrounding soft tissues



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ANKLE – SPECIAL VIEW

*14th edition Merrill's Volume I, page 333

Projection: **AP Stress Method**

Patient Prep: Remove shoes, socks, nylons and jewelry. May need to raise pant leg.

SID: 40" SID

Collimation: To anatomy of interest

Patient Position: Place patient in the supine position. Dorsiflex the foot enough to place ankle at nearly right-angle flexion. Apply stress to the joint (physician in room or by using ace bandage)

Central Ray: Perpendicular to ankle joint entering midway between the malleoli

Marker Placement: Place appropriate right or left marker on the image.

Shielding: Gonadal shielding required

Breathing Instructions: N/A

Purpose/Structures: Obtained after an inversion or eversion injury to verify the presence of a ligamentous tear. Rupture of the ligament is shown by widening of the joint space on the side of the injury when, without moving or rotating the lower leg from the supine position, the foot is forcibly turned toward the opposite**.**

Evaluation Criteria:

- Evidence of proper collimation and the presence of a side marker placed clear of anatomy of interest
- Evaluate for widening of the joint space on the side of the injury
- Bony trabecular detail and surrounding soft tissues

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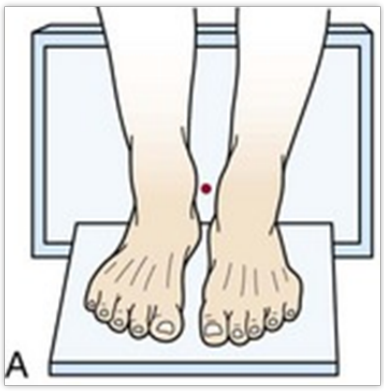
ANKLE – SPECIAL VIEW

*14th edition Merrill's Volume I, page 334-335

Projection:	**AP Weight Bearing**
Patient Prep:	Remove shoes, socks, nylons and jewelry. May need to raise pant leg.
SID:	40" SID
Collimation:	To anatomy of interest
Patient Position:	Place the patient in the upright position, preferably on a low platform that has a IR groove or can use blocks to elevate the feet to the level of the x-ray. Never stand patient on radiographic table. Place cassette in groove of platform. Have patient's heels pushed back against the IR and toes point straight ahead.
Central Ray:	Perpendicular to the center of the IR
Marker Placement:	Place appropriate right and left marker on the image.
Shielding:	Gonadal shielding required
Breathing Instructions:	N/A
Purpose/Structures:	AP projection of both ankle joint and the relationship of the distal tibia and fibula with weight-bearing. It also shows side-to-side comparison of the joint.

Evaluation Criteria:

- Evidence of proper collimation and the presence of a side marker placed clear of anatomy of interest
- Both ankles centered on the image
- Medial mortise open
- Distal tibia and talus partially superimpose distal fibula
- Lateral mortise closed
- Bony trabecular detail and surrounding soft tissues



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ANKLE – SPECIAL VIEW

Projection:	**Lateral Weight Bearing (Lateromedial)**
Patient Prep:	Remove shoes, socks, nylons and jewelry. May need to raise pant leg.
SID:	40" SID
Collimation:	To anatomy of interest
Patient Position:	Place the patient in the upright position, preferably on a low platform that has a IR groove or can use blocks to elevate the feet to the level of the x-ray. Never stand patient on radiographic table. Place cassette in groove of platform. Have patient's medial side against the IR and toes point straight ahead. Ensure no rotation by palpating the malleoli
Central Ray:	Perpendicular through the ankle joint entering ½ inch superior to the lateral malleolus
Marker Placement:	Place appropriate right or left marker on the image.
Shielding:	Gonadal shielding required
Breathing Instructions:	N/A
Purpose/Structures:	Performed to identify ankle joint space narrowing with weight-bearing

Evaluation Criteria:

- Evidence of proper collimation and the presence of a side marker placed clear of anatomy of interest
- Ankle centered to the exposure area
- Ankle in true lateral position:
  - Tibiotalar joint well visualized with the medial and lateral talar domes superimposed
  - Fibula over the posterior half of the tibia
- Bony trabecular detail and surrounding soft tissues

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TIBIA FIBULA

Routine: AP & Lateral

Projection: **AP (2 exposures if needed to ensure overlap)**

Patient Prep: Remove shoes, socks, nylons and jewelry. May need to remove pants.

Technique: **81 kVp ○●○; non AEC 2.0 mAs (Bucky)**
70 kVp @ 2.5 mAs (Tabletop)

SID: 40" SID

Collimation: 7 x 17 Lengthwise
- 2-3 cm beyond the joint space should be imaged, full patella is not necessary
- If required: 2nd image collimated to ensure overlap
  - no smaller than 6x6 collimation, in most circumstances collimation should not exceed 10x12 Portrait

Patient Position: ****If 2 images are needed, it is recommended to start proximally and take the second image distally***
Patient supine. Adjust the leg so that the femoral condyles are parallel with the IR and the foot is vertical. Flex the ankle until the foot is in the vertical position (dorsiflexion) Image receptor parallel to the long axis of the leg and centered to the mid-shaft. Place a sandbag at the foot to keep dorsiflexion. Central ray to the center of the image receptor.

Central Ray: Perpendicular to image receptor. Center to mid-shaft; light field should include entire malleoli distally and entire tibia/fibula proximally.

Marker Placement: Appropriate right and left marker should be placed on the image and not moved between images to ensure overlap.

Shielding: Gonadal shielding required

Breathing Instructions: N/A

Purpose/Structures: Tibia, fibula and adjacent joints

Evaluation Criteria:

- Evidence of proper collimation and the presence of a side marker placed clear of the anatomy of interest
- Ankle and knee joints on one or more images
- Entire leg without rotation:
    - Proximal and distal articulations of the tibia and fibula moderately overlapped
    - Fibular midshaft free of tibial superimposition
- Bony trabecular detail and surrounding soft tissues

RH Additional Note: If any combination of tibia/fibula and joint (knee and/or ankle) is requested, each must be imaged as a stand-alone study.

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TIBIA FIBULA

Routine: AP & Lateral

Projection: **Lateral** (Mediolateral) -2 exposures if needed to ensure overlap)

Patient Prep: Remove shoes, socks, nylons and jewelry. May need to remove pants.

Technique: **81 kVp ○●○; non AEC 2.0 mAs (Bucky)**
70 kVp @ 2.5 mAs (Tabletop)

SID: 40" SID

Collimation: 7x17 Lengthwise
- 2-3 cm beyond the joint space should be imaged, full patella is not necessary
- If required: 2nd image collimated to ensure overlap
  - no smaller than 6x6 collimation, in most circumstance collimation should not exceed 10x12 Portrait

Patient Position: ****If 2 images are needed, it is recommended to start proximally and take the second image distally***
Have the patient turn toward the affected side until the knee is in a true lateral. Bring the unaffected leg up and over the affected leg and support with a sponge to keep from forward rotation of the pelvis. Patella will be perpendicular to the image receptor. Place a small angle sponge under the patella to prevent over rotation. Intermalleolar line should be perpendicular to the image receptor.
****Merrill's does not state to bring the unaffected leg over affected leg***

Central Ray: Perpendicular to image receptor. Center to mid-shaft; light field should include entire malleoli distally and entire tibia/fibula proximally.

Marker Placement: Appropriate right and left marker should be placed on the image and not moved between images to ensure overlap.

Shielding: Gonadal shielding required

Breathing Instructions: N/A

Purpose/Structures: Tibia, fibula and adjacent joints

Evaluation Criteria:
- Evidence of proper collimation and the presence of a side marker placed clear of the anatomy of interest

- Ankle and knee joints on one or more images
- Entire leg in true lateral position:
    - Distal fibula superimposed by the posterior half of the tibia
    - Slight overlap of the tibia on the proximal fibular head
    - Moderate separation of the tibial and fibular bodies or shafts (except at their articular ends)
- Possibly reduced superimposition of femoral condyles because of divergence of the beam
- Bony trabecular detail and surrounding soft tissues

RH Additional Note: If any combination of tibia/fibula and joint (knee and/or ankle) is requested, each must be imaged as a stand-alone study.

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TIBIA/FIBULA – SPECIAL VIEW

*14th edition Merrill's Volume I, page 340-341

Projection: **AP Oblique (2 exposures if needed to ensure overlap)**

Patient Prep: Remove shoes, socks, nylons and jewelry. May need to remove pants.

SID: 40" SID

Collimation: To anatomy of interest

Patient Position: Place the patient in the supine position.

Medial Rotation: Rotate the entire leg in 45-degrees medially. This can be done by elevating the affected hip enough to rest the medial side of the foot and ankle against a 45-degree foam wedge and place a support under the greater trochanter.

Lateral Rotation: Rotate the entire leg out 45-degrees laterally. Support with a foam wedge if needed.

Central Ray: Perpendicular to image receptor. Center to mid-shaft; light field should include entire malleoli distally and entire tibia/fibula proximally.

Marker Placement: Appropriate right and left marker should be placed on the image and not moved between images to ensure overlap.

Shielding: Gonadal shielding required

Breathing Instructions: N/A

Purpose/Structures: 45-degree oblique projection of the bones and soft tissues of the leg and one or both of the adjacent joints

Evaluation Criteria:

- Evidence of proper collimation and the presence of a side marker placed clear of the anatomy of interest
- Ankle and knee joints on one or more images
- Bony trabecular detail and surrounding soft tissues

Medial Rotation:

- Proper rotation of leg
    - Proximal and distal tibiofibular articulations
    - Maximum interosseous space between the tibia and fibula

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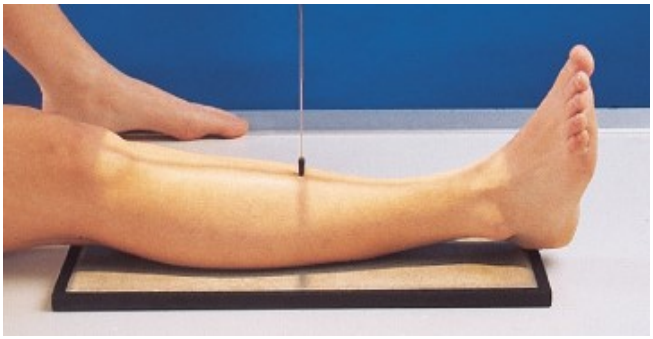
Lateral Rotation:

- Proper rotation of leg
  - Fibula superimposed by lateral portion of tibia

Lateral Rotation



Medial Rotation