Reading Hospital School of Health Sciences

Medical Imaging Program

Clinical Case Study-Ankle & Tib/Fib

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Each student will be assigned clinical a seminar case study for each procedure taught within the semester. Case study review will allow demonstration of knowledge, practice of image critique skills, anatomical structure identification and pathology identification. Submit answers to the below questions for each projection within the case study in a Word.doc (*Each* projection assigned must have the below answers completed: Ankle Procedure, Tib/Fib Procedure). Within the attached PPT, identify the required anatomy by sliding the corresponding arrow/letter to the anatomy requested. Completed answers to the questions below and anatomical structure labeling within the PowerPoint must be uploaded into the Edvance 360 dropbox under that designated body section. *Please be sure to **fully** answer each line item identified within the assignment below.*

Answer #1-#10 for each assigned projection

1. Is orientation of the image correct?
    a. If orientation is incorrect, explain why.
    b. State how to modify the orientation. (flip, rotate, etc)
2. Is all necessary anatomy included?
    a. Explain the anatomy required by evaluation criteria. And if it is all included in the image
    b. Drag the arrows with letters on the Case Study slides to identify anatomical structures within each slide.
3. Is the body part centered appropriately?
    a. Where should the central ray enter for this projection?
    b. If centering is incorrect, explain how you would move the central ray to achieve proper centering. (inferiorly, laterally, etc.)
4. Is the body part positioned accurately?
    a. If the body part is not positioned accurately:
        i. Explain what anatomy demonstrates inaccurate positioning (over or under-rotation etc).
        ii. State the modification of positioning necessary to meet evaluation criteria.
5. Is the collimation and IR orientation as required?
    a. State the proper collimation size to be used.
    b. State how the IR should be oriented to the patient.
6. Is the proper marker(s)/annotation(s) utilized on the image?
    a. State if the marker was placed in the proper location.
    b. State if any additional marker(s)/annotation(s) are required.
7. Is the exposure within the appropriate EI range?
    a. Identify the correct technique.
    b. If not within the appropriate EI range, explain specifically how to adjust the technical factors to bring the EI into range.
8. Are there any artifacts present on the image?
    a. If an artifact is present, list which artifact(s) would make the image not acceptable and an additional exposure to the patient necessary.
9. Overall, is this image ACCEPTABLE or NOT ACCEPTABLE?
    a. State the reasons this image will require the patient to have a second exposure.
10. Select **ONE** of the following pathologies that are identified below to research and answer the following questions. Then insert an image which best demonstrates the selected pathology into the Case Study PowerPoint.

- Osteogenesis Imperfecta
- Trimalleolar Fracture
- Gian Cell Tumors (Osteoclastomas)
- Osteomalacia (Rickets)
- Bimalleolar Fracture (Pott's)

a. Define the pathology.
b. Identify if the pathology is subtractive, additive or neither.
    i. Explain if the technique would need be modified.
c. Identify symptoms that a patient would have with this pathology.
d. Identify the type of imaging that is obtained for best visualization of this pathology.
    i. State if there are any other additional non-radiographic studies associated with diagnosis of this pathology

AP Ankle

1. Is orientation of the image correct?
    a. **Yes, the orientation of the image is correct.**
2. Is all necessary anatomy included?
    a. **Yes, all anatomy of interest is included, which contains the distal ends of the tibia and fibula, and the proximal portion of the talus are demonstrated, along with the ankle joint centered to the exposure area.**
3. Is the body part centered appropriately?
    a. **Yes, the ankle is centered appropriately, the central ray is centered to the ankle joint midway between the malleoli.**
4. Is the body part positioned accurately?
    a. **Yes, the ankle is positioned accurately, no rotation of the ankle, open tibiotalar joint space visible.**
5. Is the collimation and IR orientation as required?
    a. **Yes, the collimation size is as required, which is to the anatomy of interest.**
    b. **Yes, the IR orientation is as required, it's portrait.**
6. Is the proper marker(s)/annotation(s) utilized on the image?
    a. **Yes, the proper marker is on the image which is a Right lead marker placed clear of anatomy of interest, no additional markers or annotations needed. I would just make sure the marker is visible in the light field when collimating.**
7. Is the exposure within the appropriate EI range?
    a. **70 kVp @ 1.8 mAs (Tabletop)**
    b. **Yes, the EI is at 500 which falls within the ideal range.**
8. Are there any artifacts present on the image?
    a. **No, there are no artifacts present in this image.**
9. Overall, is this image ACCEPTABLE or NOT ACCEPTABLE?
    a. **Overall, this image would be considered ACCEPTABLE, I would just be careful with the positioning of the lead marker and try to make sure that the lead marker is more visible in the image.**

AP Mortise Ankle

1. Is orientation of the image correct?
    a. **Yes, the orientation of the image is correct.**
2. Is all necessary anatomy included?

    a. **Yes, all anatomy of interest is included, which contains the distal ends of the tibia and fibula, and the proximal portion of the talus are demonstrated, along with the ankle joint centered to the exposure area.**
3. Is the body part centered appropriately?
    a. **Yes, the ankle is centered appropriately, the central ray is centered to the ankle joint midway between malleoli.**
4. Is the body part positioned accurately?
    a. **No, the ankle is not positioned accurately, it is under rotated and showing a lack or dorsiflexion. To fix this we would need to rotate the foot more medially there needs to be a proper 15 to 20-degree rotation of the ankle, could also increase dorsiflexion in order to have the talofibular articulation open.**
5. Is the collimation and IR orientation as required?
    a. **Yes, the collimation size is as required, which is to the anatomy of interest.**
    b. **Yes, the IR orientation is as required, it's portrait.**
6. Is the proper marker(s)/annotation(s) utilized on the image?
    a. **Yes, the proper marker is on the image which is a Right lead marker placed clear of anatomy of interest, no additional markers or annotations needed.**
7. Is the exposure within the appropriate EI range?
    a. **70 kVp @ 1.8 mAs (Tabletop)**
    b. **Yes, the EI is at 590 which falls within the ideal range.**
8. Are there any artifacts present on the image?
    a. **No, there are no artifacts present in this image.**
9. Overall, is this image ACCEPTABLE or NOT ACCEPTABLE?
    a. **Overall, this image would be considered NOT ACCEPTABLE, we would need to repeat this view due to a positioning error with the ankle being under rotated with the talofibular articulation not fully open.**

Lateral Ankle

1. Is orientation of the image correct?
    a. **Yes, the orientation of the image is correct.**
2. Is all necessary anatomy included?
    a. **Yes, all anatomy of interest is included, which contains the distal tibia and fibula, talus, calcaneus, adjacent tarsals, and the base of the 5th metatarsal and tuberosity are visible.**
3. Is the body part centered appropriately?
    a. **Yes, the lateral ankle is centered appropriately, the central ray is perpendicular to the ankle joint entering around the medial malleolus.**
4. Is the body part positioned accurately?
    a. **No, the lateral ankle is not positioned accurately, it's slightly under rotated, talar domes aren't superimposed, and the foot is significantly not dorsiflexed. To fix this we would need to place a positioning sponge under the patients leg to help them hold their foot in a lateral position, and increase dorsiflexion of the foot.**
5. Is the collimation and IR orientation as required?
    a. **Yes, the collimation size is as required, which is to the anatomy of interest.**
    b. **Yes, the IR orientation is as required, it's portrait.**
6. Is the proper marker(s)/annotation(s) utilized on the image?
    a. **Yes, the proper marker is on the image which is a Right lead marker placed clear of anatomy of interest, no additional markers or annotations needed.**
7. Is the exposure within the appropriate EI range?
    a. **70 kVp @ 1.25 mAs (Tabletop)**
    b. **Yes, the EI is at 320 which falls within the acceptable range.**

8. Are there any artifacts present on the image?
    a. **No, there are no artifacts present in this image.**
9. Overall, is this image ACCEPTABLE or NOT ACCEPTABLE?
    a. **Overall, this image would be considered NOT ACCEPTABLE, we would need to repeat this view due to a positioning error for the Lateral Ankle with the talar domes not superimposed and a lack of dorsiflexion.**

AP Tib/Fib

1. Is orientation of the image correct?
    a. **Yes, the orientation of the image is correct.**
2. Is all necessary anatomy included?
    a. **Yes, all anatomy of interest is included, which contains the ankle and knee joints on one or more images, the entire leg without rotation, the proximal and distal articulations of the tibia and fibula**
3. Is the body part centered appropriately?
    b. **Yes, the Tib/Fib is centered appropriately, the central ray is perpendicular to the IR, center to the mid-shaft.**
4. Is the body part positioned accurately?
    a. **Yes, the Tib/Fib is positioned accurately. There is proximal articulation of the tibia and fibula moderately overlapped, with the fibular midshaft free of tibial superimposition.**
5. Is the collimation and IR orientation as required?
    a. **Yes, the collimation size is as required, which is 7x17 Lengthwise for the first image, 2-3 cm beyond the joint space should be imaged, looks like they included a little more than needed but no need to repeat for that.**
    b. **Yes, the IR orientation is as required, it's portrait.**
6. Is the proper marker(s)/annotation(s) utilized on the image?
    a. **Yes, the proper marker is on the image which is a Left lead marker placed clear of anatomy of interest, no additional markers or annotations needed, the marker should not be moved between images to ensure overlap.**
7. Is the exposure within the appropriate EI range?
    a. **Identify the correct technique.**
        - **81 kVp center cell selected; non AEC 2.0 mAs (Bucky)**
        - **70 kVp @2.5 mAs (Tabletop)**
    b. **Yes, the EI is at 400 which falls within the ideal range.**
8. Are there any artifacts present on the image?
    b. **No, there are no artifacts present in this image.**
9. Overall, is this image ACCEPTABLE or NOT ACCEPTABLE?
    a. **Overall, this image would be considered ACCECTABLE, we would not need to repeat for this first image of the AP Tib/Fib.**

AP Tib/Fib 2nd image

1. Is orientation of the image correct?
    a. **Yes, the orientation of the image is correct.**
2. Is all necessary anatomy included?
    a. **Yes, all anatomy of interest is included, which contains the distal tibia and distal fibula along with the ankle joint space visible.**
3. Is the body part centered appropriately?
    a. **Yes, the Tib/Fib is centered appropriately, centering doesn't need to be at the joint for the second image should be centered to the center of the IR. We need to be sure that both malleoli are in the light field without excessive light beyond them.**

4. Is the body part positioned accurately?
    a. **Yes, the Tib/Fib is positioned accurately, the ankle is flexed, the foot is in a vertical position (dorsiflexion). There is distal articulation of the tibia and fibula moderately overlapped.**
5. Is the collimation and IR orientation as required?
    a. **Yes, the collimation size is as required, which is to be no smaller than 6x6 collimation and no larger than a 10x12 collimation.**
    b. **Yes, the IR orientation is as required, it's portrait.**
6. Is the proper marker(s)/annotation(s) utilized on the image?
    a. **Yes, the proper marker is on the image which is a Left lead marker placed clear of anatomy of interest, no additional markers or annotations needed, the marker should not be moved between images to ensure overlap.**
7. Is the exposure within the appropriate EI range?
    a. **Identify the correct technique.**
        - **81 kVp center cell selected; non AEC 2.0 mAs (Bucky)**
        - **70 kVp @2.5 mAs (Tabletop)**
    b. **Yes, the EI is at 550 which falls within the ideal range.**
8. Are there any artifacts present on the image?
    a. **No, there are no artifacts present in this image.**
9. Overall, is this image ACCEPTABLE or NOT ACCEPTABLE?
    a. **Overall, this image would be considered ACCEPTABLE, there would be no need to repeat for the second image of the AP Tib/Fib.**

Lateral Tib/Fib

1. Is orientation of the image correct?
    a. **Yes, the orientation of the image is correct.**
2. Is all necessary anatomy included?
    a. **Yes, all anatomy of interest is included, which contains the ankle and knee joints on one or more images, the entire leg in a true lateral position.**
3. Is the body part centered appropriately?
    a. **Yes, the Tib/Fib is centered appropriately, the central ray is center to the mid-shaft.**
4. Is the body part positioned accurately?
    a. **Yes, the Tib/Fib is positioned accurately, there is slight overlap of the tibia on the proximal fibular head, and moderate separation of the tibial and fibular bodies.**
5. Is the collimation and IR orientation as required?
    a. **Yes, the collimation size is as required, which is 7x17 Lengthwise for the first image, 2-3 cm beyond the joint space should be imaged, looks like they included a little more than needed as the full patella is not necessary, but no need to repeat for that.**
    b. **Yes, the IR orientation is as required, it's portrait.**
6. Is the proper marker(s)/annotation(s) utilized on the image?
    a. **Yes, the proper marker is on the image which is a Left lead marker placed clear of anatomy of interest, no additional markers or annotations needed, the marker should not be moved between images to ensure overlap.**
7. Is the exposure within the appropriate EI range?
    a. **Identify the correct technique.**
        - **81 kVp center cell selected; non AEC 2.0 mAs (Bucky)**
        - **70 kVp @2.5 mAs (Tabletop)**
    b. **Yes, the EI is at 600 which falls within the ideal range.**
8. Are there any artifacts present on the image?
    a. **No, there are no artifacts present in this image.**

9. Overall, is this image ACCEPTABLE or NOT ACCEPTABLE?
    a. **Overall, this image would be considered ACCECTABLE, we would not need to repeat for this first image of the Lateral Tib/Fib, but we could have collimated a little better didn't need to include the full patella.**

Lateral Tib/Fib 2nd image

1. Is orientation of the image correct?
    a. **Yes, the orientation of the image is correct.**
2. Is all necessary anatomy included?
    a. **Yes, all anatomy of interest is included, which contains the distal tibia and fibula, and the ankle joint visible.**
3. Is the body part centered appropriately?
    a. **Yes, the Tib/Fib is centered appropriately, the light field includes the entire malleoli distally.**
4. Is the body part positioned accurately?
    a. **No, the Tib/Fib is not positioned accurately, they need to align the leg with the IR and dorsiflex the foot.**
5. Is the collimation and IR orientation as required?
    a. **No, the collimation size is over collimated, it should be no smaller than 6x6 collimation and no larger than a 10x12 collimation.**
    b. **Yes, the IR orientation is as required, it's portrait, but it should be aligned to the IR.**
6. Is the proper marker(s)/annotation(s) utilized on the image?
    a. **Yes, the proper marker is on the image which is a Left lead marker placed clear of anatomy of interest, no additional markers or annotations needed, the marker should not be moved between images to ensure overlap.**
7. Is the exposure within the appropriate EI range?
    a. **Identify the correct technique.**
        - **81 kVp center cell selected; non AEC 2.0 mAs (Bucky)**
        - **70 kVp @2.5 mAs (Tabletop)**
    b. **Yes, the EI is at 600 which falls within the ideal range.**
8. Are there any artifacts present on the image?
    a. **No, there are no artifacts present in this image.**
9. Overall, is this image ACCEPTABLE or NOT ACCEPTABLE?
    a. **Overall, this image would be considered NOT ACCEPTABLE, we would need to repeat this view for the Lateral Tib/Fib due to a positioning error, and to better collimate and align the Tib/Fib better with the IR.**
10. Select **ONE** of the following pathologies that are identified below to research and answer the following questions. Then insert an image which best demonstrates the selected pathology into the Case Study PowerPoint.

    Bimalleolar Fracture (Pott's)

    a. Define the pathology.
        - **Fracture of both malleoli with dislocation of the ankle joint.**
    b. Identify if the pathology is subtractive, additive or neither.
        - **Neither unless splinted, casted, ect… then increase technique**
    c. Identify symptoms that a patient would have with this pathology.
        - **Tendon disruption, wound infection, injury to the nerves and vessels in the area, non-union or delayed union of the fracture, ankle joint instability, degenerative arthritis, pain, loss of range of motion, and calcification of the ligaments.**
    d. Identify the type of imaging that is obtained for best visualization of this pathology.

- **The best type of imaging for this pathology is general x-ray, however MRI and CT are other recommended imaging methods used for this pathology.**