MRAD 204:

Radiographic Technique 1

Outcome 6-10:

Image Critique – Femur and Knee

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Affiliated Readings

Bontrager

✓Pgs: 246→250

✓Pgs: 278→280

Emphasis on the “pink box” Evaluation Criteria

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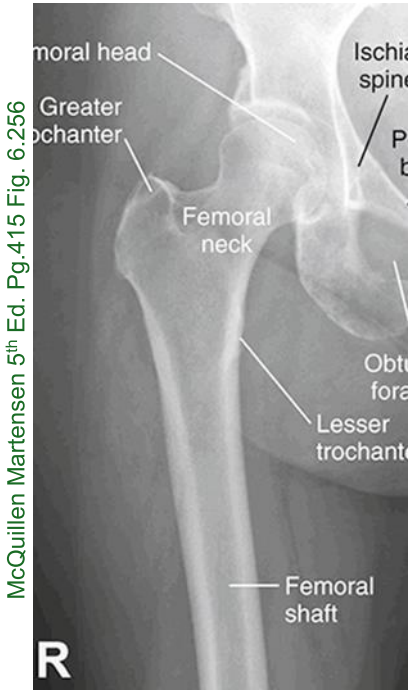
Overview

- Image Critique – Femur
- Image Critique – Knee
- Tips & Tricks

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Image Critique – Femur





McQuillen Martensen 5th Ed. Pg.415 Fig. 6.256

Anatomy





McQuillen Martensen 5th Ed. Pg.423 Fig. 6.270

Ideally, routine Femur radiographs should display:

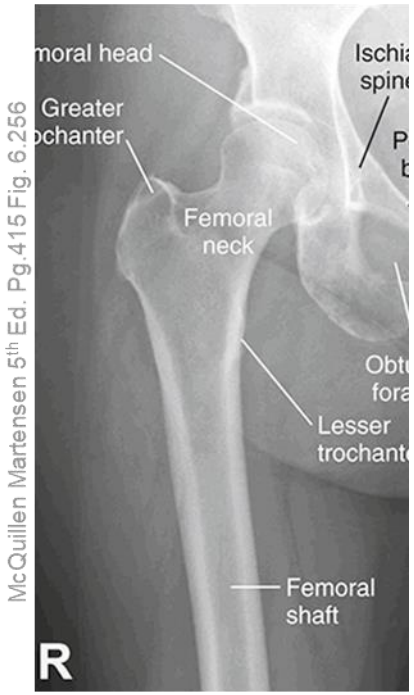
- ✓Entire Femur
- ✓Entire Hip & Knee joint
- ✓ At least 1-inch of proximal tib/fib

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Image Critique – Femur

SAIT Image Critique Handbook





McQuillen Martensen 5th Ed. Pg.415 Fig. 6.256

Exposure & Technique

Routine AP Pelvic radiographs should display:

- ✓ kVp range of 75→85
- ✓ Optimal density and contrast:
  - ✓ no motion (i.e. blur)
  - ✓ soft tissue margins visible
  - ✓ clear bony trabecular markings

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Image Critique – Femur

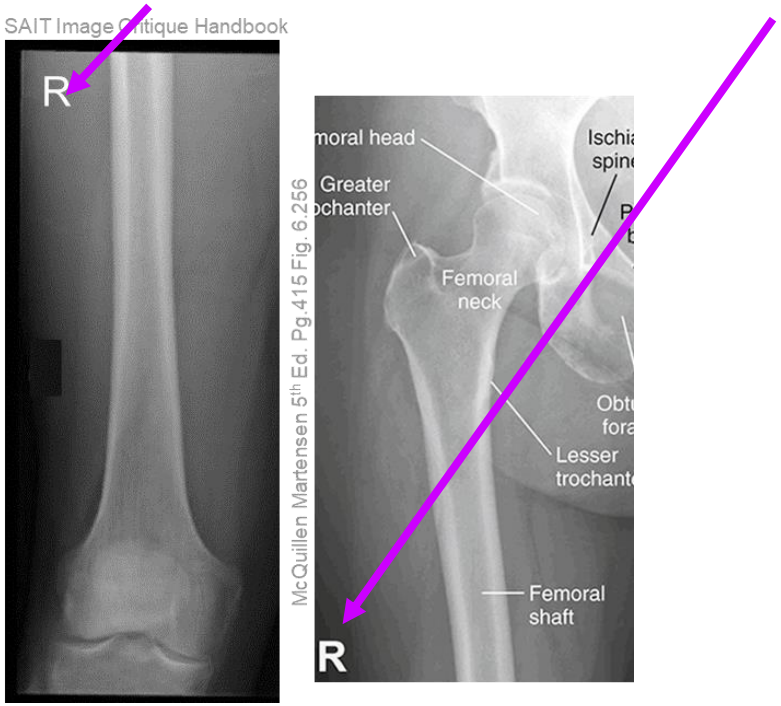
Marker Placement &/or artifacts

Marker placement: in the same anatomical location on both images in each projection, *not* obscuring bony anatomy

✓ No removable artifacts are visible

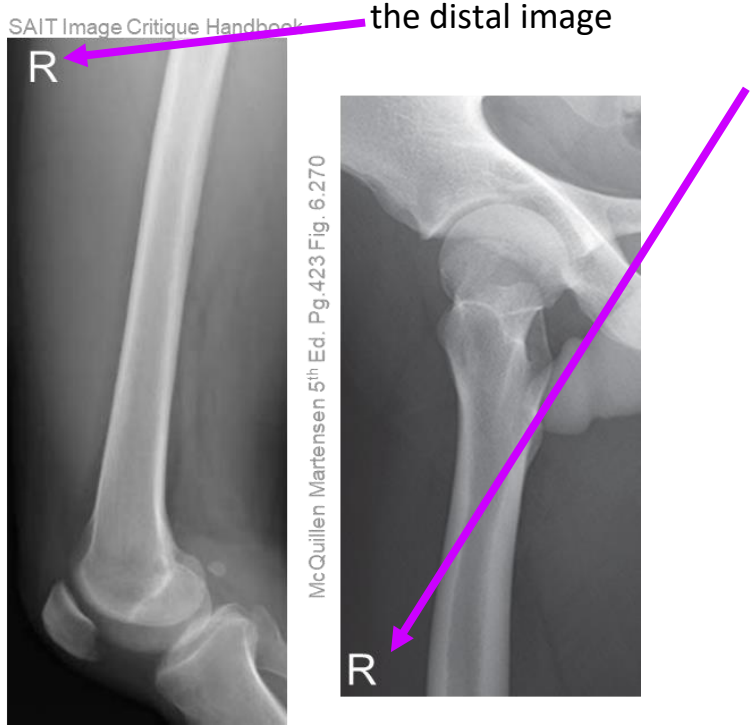
If unmoved between the two images of the AP projection:

Marker will display in the: superior lateral edge of the proximal image & inferior lateral edge of the distal image



If unmoved between the two images of the Lateral projection:

Marker will display in the: superior anterior edge of the proximal image & inferior anterior edge of the distal image

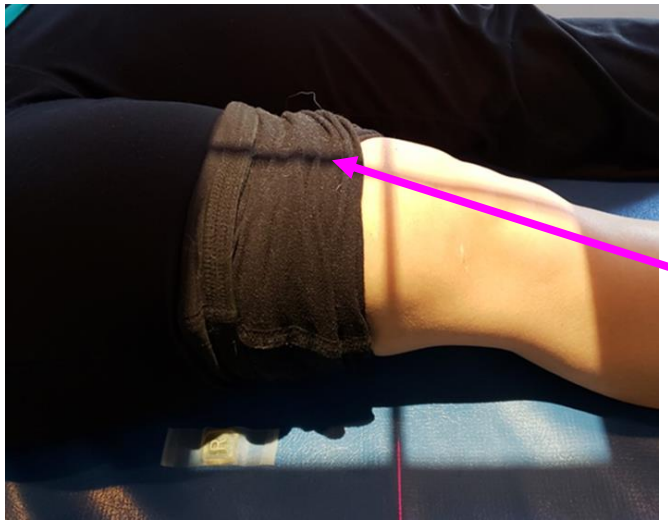


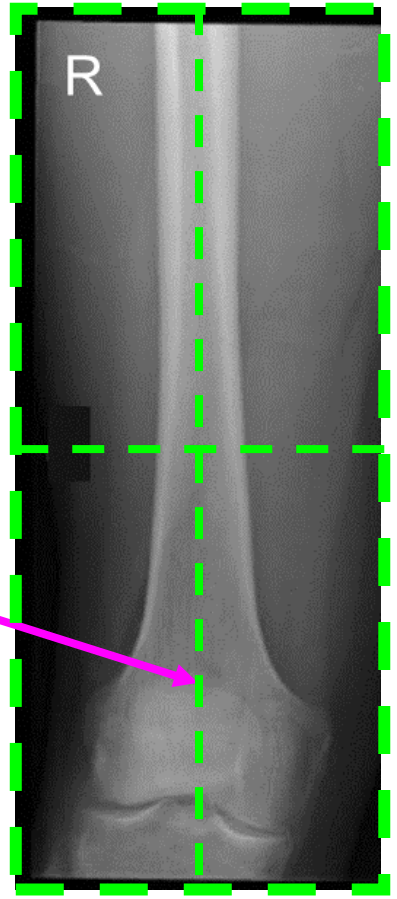
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Image Critique – AP Distal Femur

CR & Collimation

✓Four sided collimation with *<u>lengthwise crosshair</u>* centered over the femoral body





Notes:

- Soft-tissues not required in their entirety; only bony anatomy is of interest

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Image Critique – AP Distal Femur

Position

- Femoral & tibial condyles symmetric in size and shape
- Patella slightly closer to medial side of femur
- Medial half of fibular head superimposed by tibia
- Femur parallel to collimated light-field
- **Knee joint not fully opened due to beam divergence*

@ 75 kVp



Bontrager pg. 278 Fig. 7.37

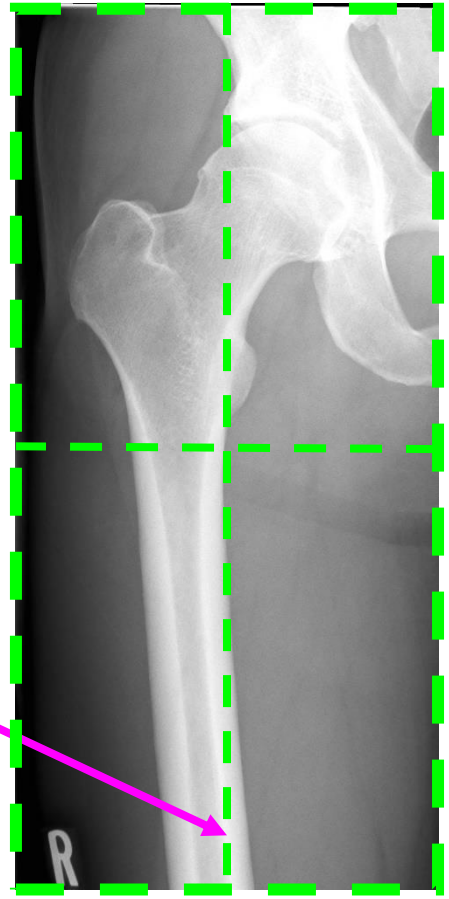
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Image Critique – AP Proximal Femur

CR & Collimation

✓Four sided collimation with *lengthwise crosshair* centered around the femoral body





Notes:

- symphysis pubis **not** required
- CR centering (proximal/distal) is dependent on the field size used
- *When only 1/3rd of the proximal femur is included, the CR should be near the femoral neck*

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Image Critique – AP Proximal Femur

Position

- Femoral head seen through the acetabulum
- Femoral neck in profile
- Greater trochanter in profile
- Lesser trochanters barely seen *(or not seen at all)* on the medial side
- Femur parallel to collimated light-field

@ 75 kVp

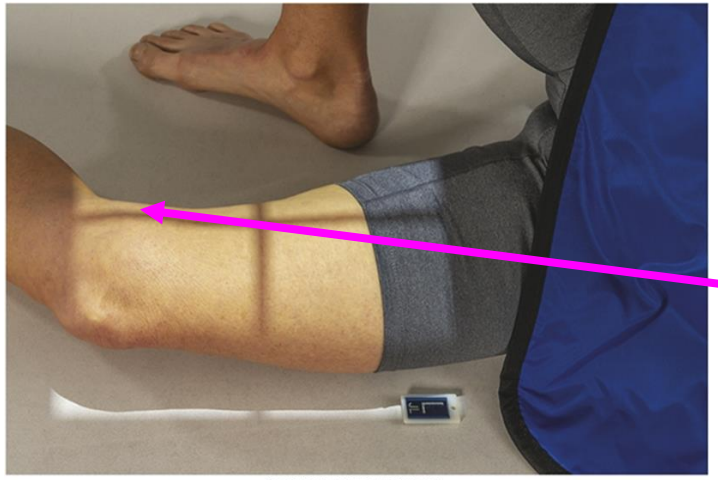


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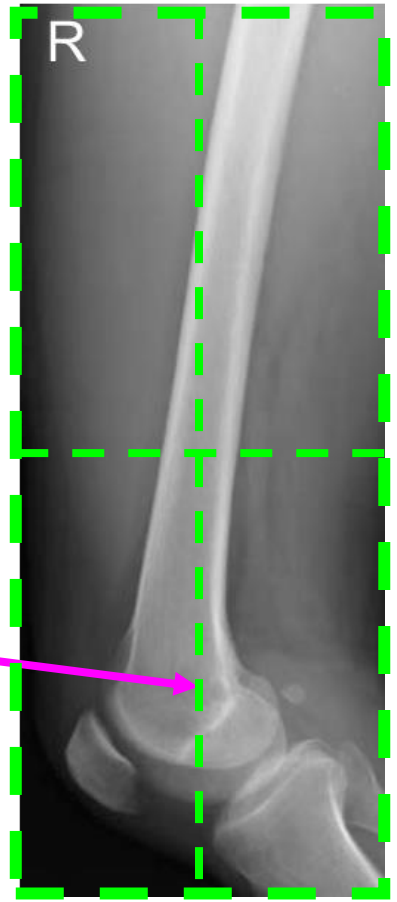
Image Critique – Lateral Distal Femur

CR & Collimation

✓Four sided collimation with *lengthwise crosshair* centered over the medial epicondyle of the femur


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Bontrager pg. 279 Fig. 7.38



Notes:

- Soft-tissues not required in their entirety; only bony anatomy is of interest

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Image Critique – Lateral Distal Femur

Position

@ 75 kVp

- Open patellofemoral joint space
- **Closed knee joint, due to beam divergence*
  - Aka. Inferior margins of femur <u>not</u> superimposed

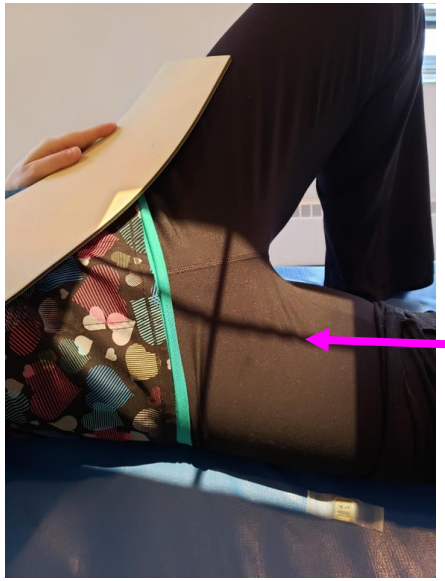


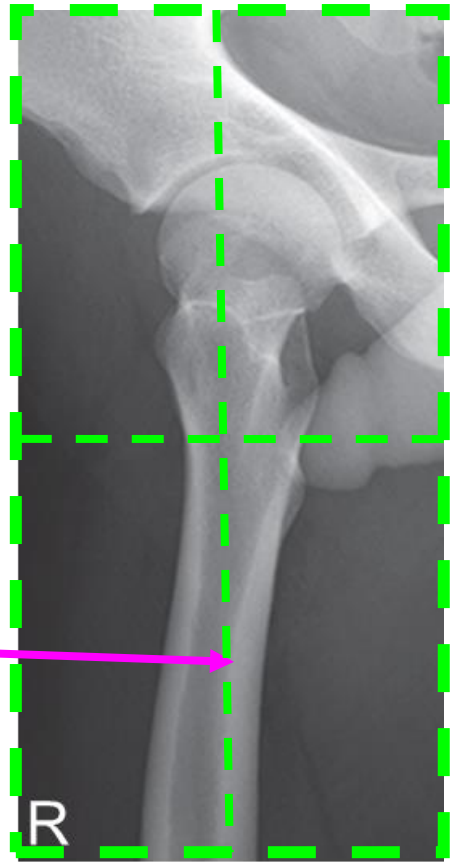
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Image Critique - Lateral Proximal Femur

CR & Collimation

✓Four sided collimation with *lengthwise crosshair* centered around the femoral body





Notes:

- CR centering (proximal/distal) is dependent on the field size used
- *When only 1/3rd of the proximal femur is included, the CR should be near the femoral neck*

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Image Critique - Lateral Proximal Femur

Position

- Head of femur in the acetabulum
- Femoral neck foreshortened and ***superimposed by the greater trochanter***
- Only a small part of lesser trochanter visible on the medial side
- Femur parallel to collimated light-field

@ 75 kVp



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Image Critique – Routine Knee

Anatomy



Bontrager pg. 246 Fig.6.101



SAIT Image Critique Handbook



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Ideally, all routine Knee radiographs should display:

✓1/4 of proximal tib/fib

✓Entire patella

✓Distal femur

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Image Critique – Routine Knee

Exposure & Technique

ALL routine hip radiographs should display:

- ✓Optimal density and contrast:
  - ✓no motion (i.e. blur)
  - ✓soft tissue margins visible
  - ✓clear bony trabecular markings

✓ kVp range of 65→80



Bontrager pg. 246 Fig.6.101



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Image Critique – Routine Knee

Marker Placement &/or artifacts

Marker placement, *not* obscuring soft-tissue:

AP, & Oblique projections: *lateral* edge of light-field

Lateral projection: *anterior*, inferior edge of light field



Bontrager pg. 246 Fig.6.101



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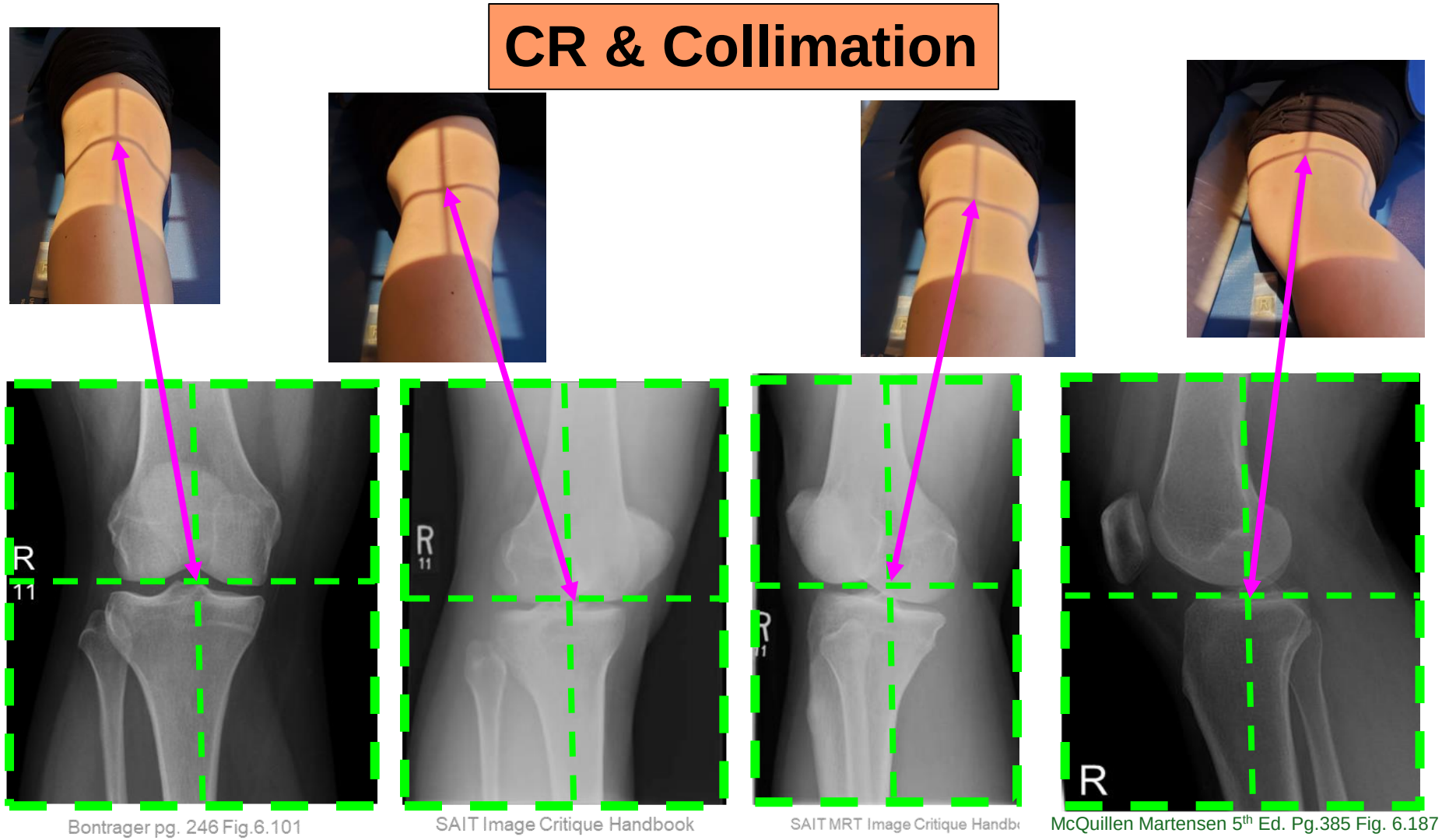
McQuillen Martensen 5th Ed. Pg.385 Fig. 6.187

✓No removable artifacts are visible

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Image Critique – Routine Knee

✓Four sided collimation centered to mid-knee joint



Bontrager pg. 246 Fig.6.101

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McQuillen Martensen 5th Ed. Pg.385 Fig. 6.187

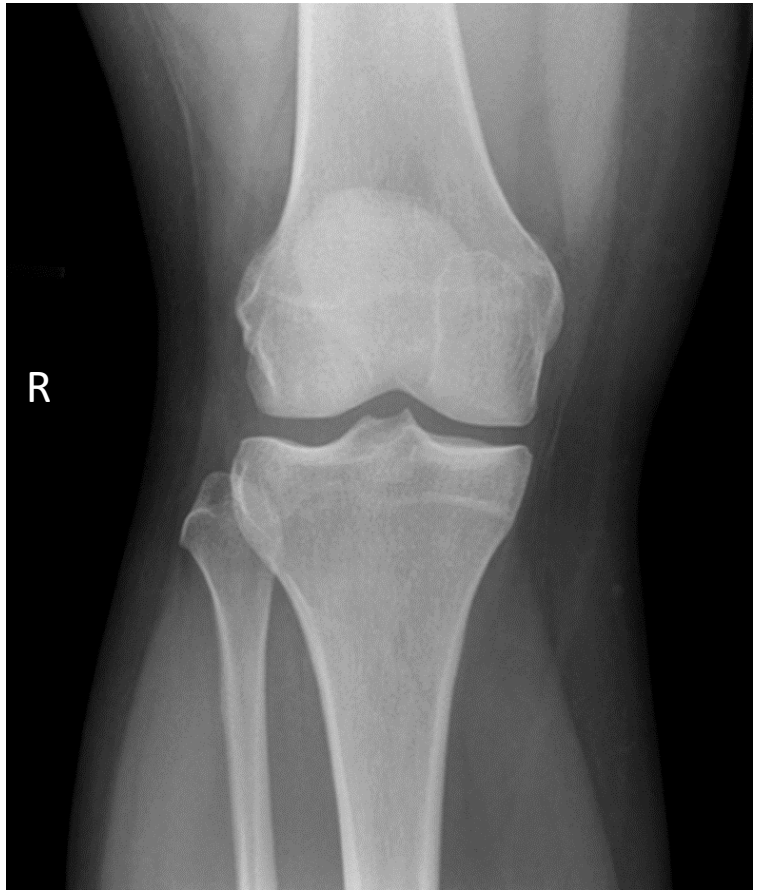
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Image Critique – AP Knee

- Open femorotibial joint space
- Tibial plateaus seen with only minimal surface area
- Intercondylar eminence centered at mid-femur (“side-side”)
- Symmetric femoral and tibial condyles
- ~ ½ fibular head superimposed by tibia

Position

@ 65 kVp



Bontrager pg. 246 Fig. 6.101

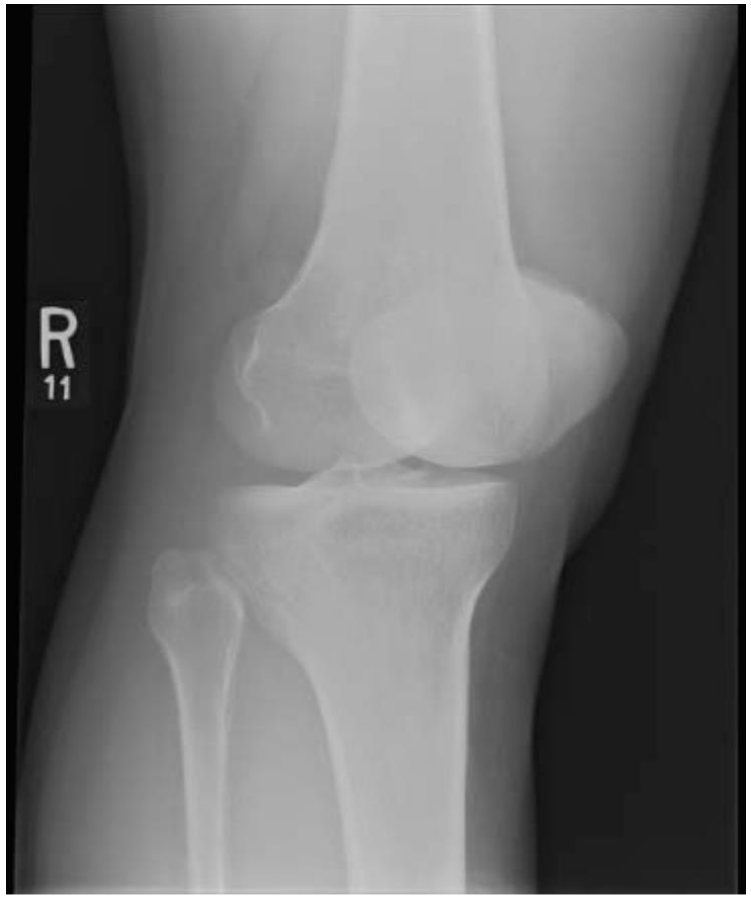
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Image Critique: AP Internal Oblique Knee

Position

- ~½ patella superimposing medial condyle of femur, and ~½ free of superimposition
- Open proximal tibiofibular joint
  - *Aka. head and neck of fibula free of superimposition*
- Lateral condyle of femur & tibia in profile

@ 65 kVp



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Image Critique: AP External Oblique Knee

Position

- ~½ patella superimposing lateral condyle of femur, and ~½ free of superimposition
- Proximal fibula superimposing lateral half of tibia
  - *Fibular head aligned with "anterior edge" of tibia*
- Medial condyle of femur & tibia in profile

@ 65 kVp



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Image Critique – Lateral Knee



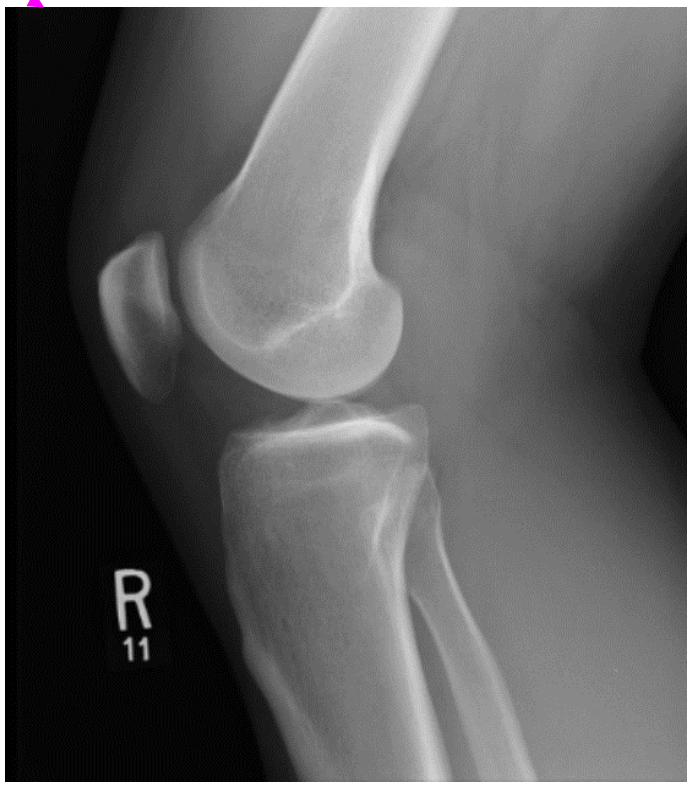
McQuillen Martensen 5th Ed. pg. 385 Fig. 6.187

Note: Femur should be parallel to collimated light-field

Note: This image used to demonstrate all other "ideal" positioning criteria

Position

@ 65 kVp



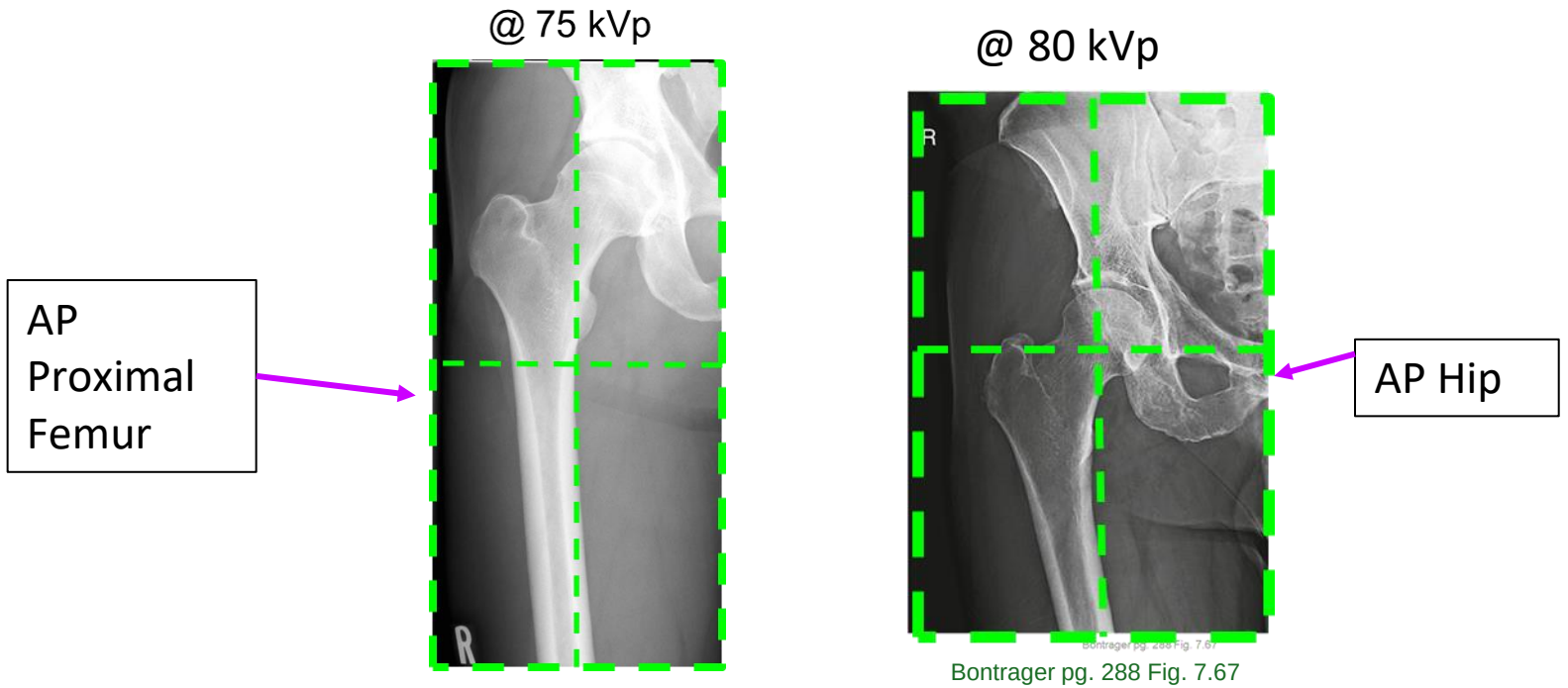
- Patella in profile
- Posterior *and* distal margins of femoral condyles directly superimposed
- Open Patellofemoral joint
- Proximal tibiofibular joint slightly superimposed by posterior half of proximal tibia

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Tips & Tricks – Femur Projections

Proximal AP Femur Image:

- Critique same way you would critique AP Hip, EXCEPT:
  1. "Symph" not required
  2. Femur requires a lower technique
  3. *If proximal femur is site of injury, the CR will not be centered over femoral neck



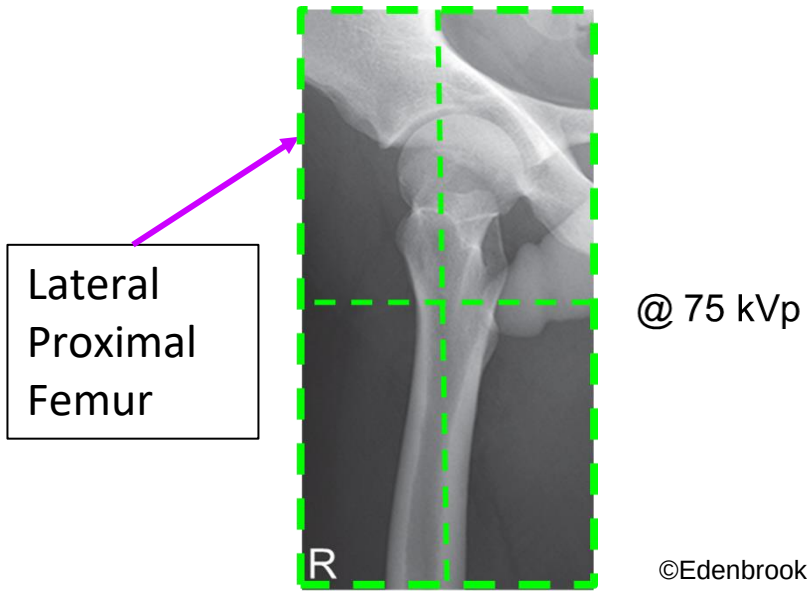
Bontrager pg. 288 Fig. 7.67

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Tips & Tricks – Femur Projections

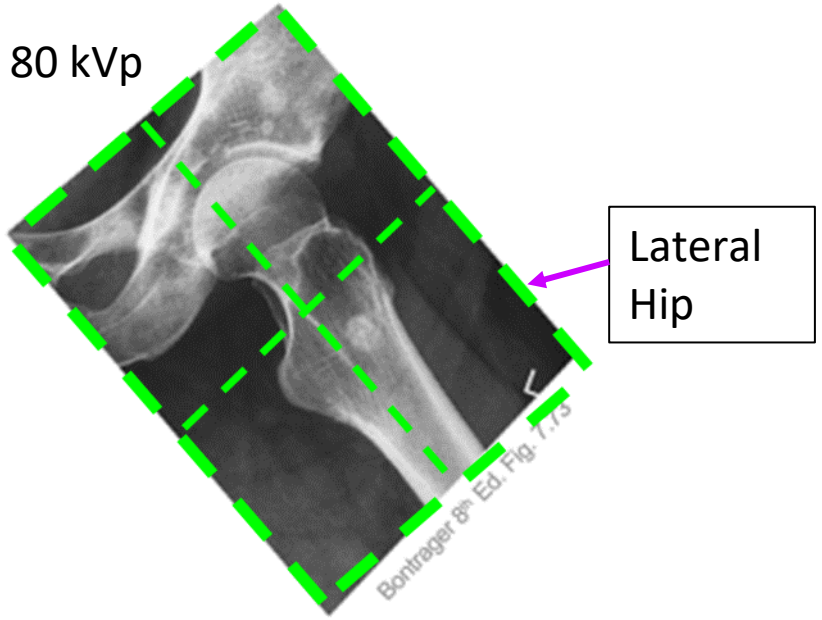
Proximal Lateral Femur Image:

- Critique same way you would critique Lateral Hip, EXCEPT:
  1. Only a small part of the lesser trochanter will be visible medially
  2. Femur requires a lower technique
  3. Femur must be parallel to edge of IR (i.e. no collimator tilt)
  4. *If proximal femur is site of injury, the CR will not be centered over femoral neck



@ 75 kVp

@ 80 kVp



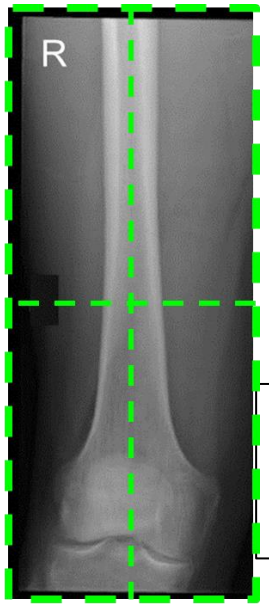
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Tips & Tricks – Femur Projections

Distal Femur Images:

- Critique same way you would critique AP & Lateral Knee projections EXCEPT:
  1. Femur requires a higher technique
  2. Knee joint will be superimposed in femur projections
  3. Lateral distal Femur: Femoral condyles will <u>not</u> be superimposed

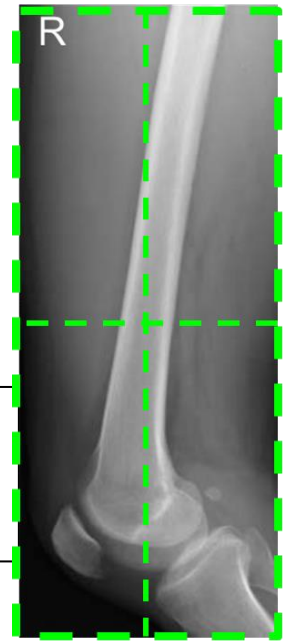
@ 75 kVp



SAIT Image Critique Handbook

AP distal Femur

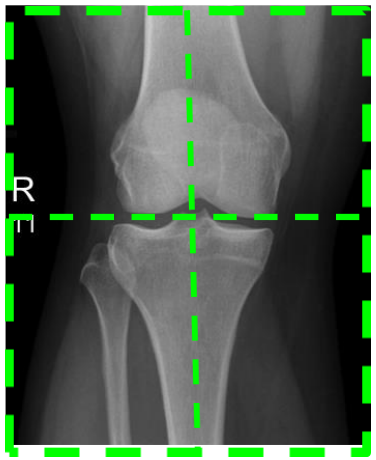
@ 75 kVp



SAIT Image Critique Handbook

Lateral distal Femur

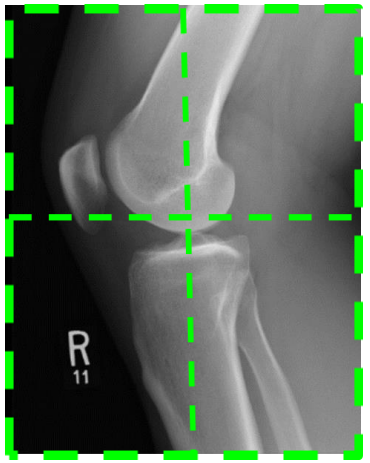
@ 65 kVp



Bontrager pg. 246 Fig.6.101

AP Knee

@ 65 kVp



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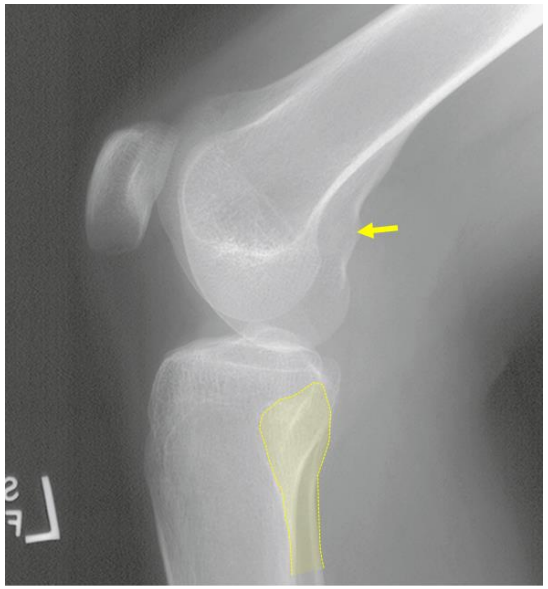
Lateral Knee

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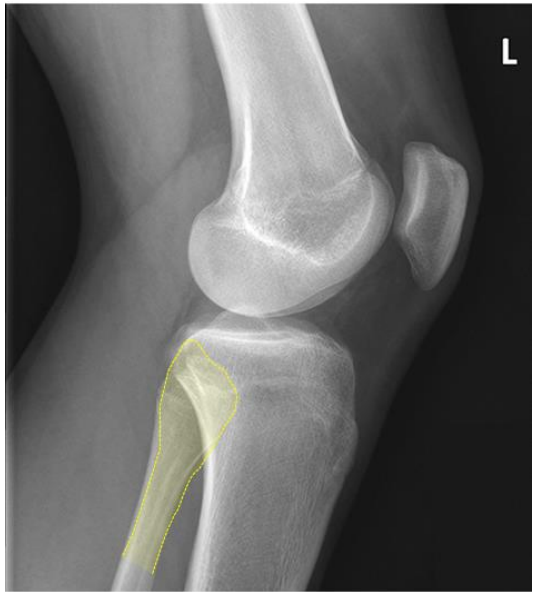
Tips & Tricks: Lateral Knee Projections

Evaluate the Fibula & Adductor tubercle:

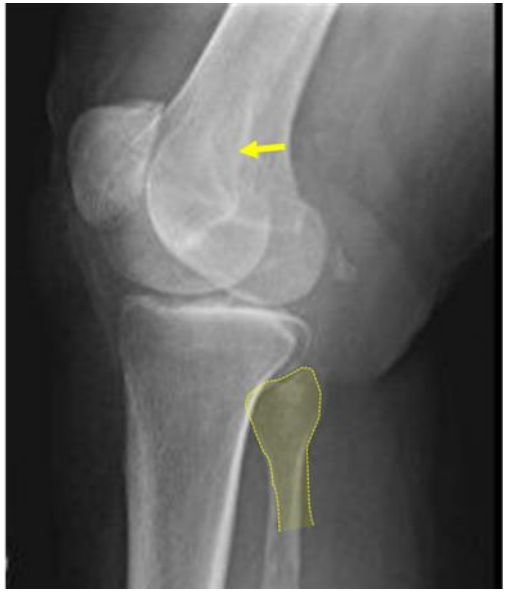
- Adductor tubercle (yellow arrow): is it superimposed (on top of another structure)
- Superimposition of fibula = under-rotation
- Superimposition of fibula = over-rotation



Bontrager 9th Ed. pg. 262 Fig. 6.146



Bontrager 9th Ed. pg. 249 Fig. 6.110



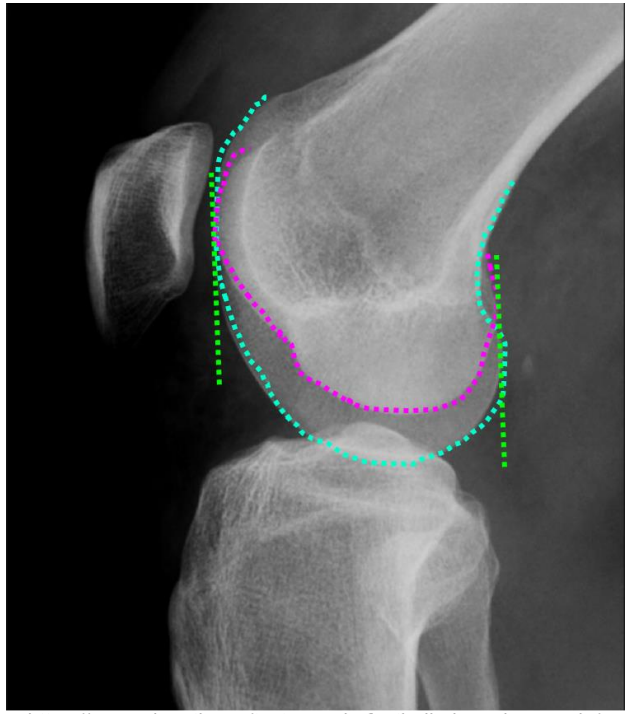
https://i.pinimg.com/736x/3b/d5/83/3bd5833938cc85d55028ec1dbb9fb27e.jpg

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Tips & Tricks: Lateral Knee Projections

If CR centering is accurate, but femoral condyles are:

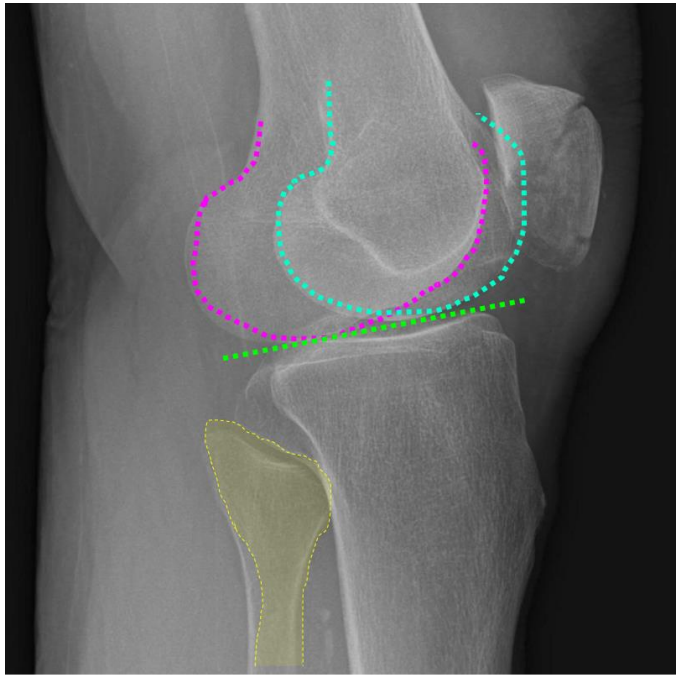
- NOT Superimposed inferiorly
- NOT Superimposed anteriorly



https://www.airrosti.com/test-x-ray-iq-football-player-knee-pain/



Bontrager 9th Ed. pg. 249 Fig. 6.110



https://radiopaedia.org/cases/lateral-knee-positioning

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