RADIOGRAPHY OF THE KNEE, PATELLA, and FEMUR
KNEE AP Projection

• Patient Position:

• Part Position:
  – Leg in____________________
  – Center _______________________
  – Femoral condyles____________
- Asthenic patient - ______ if ASIS to tabletop is < 19 cm

- Sthenic patient - ______ if ASIS to tabletop is 19 – 24 cm

- Hypersthenic patient - ______ if ASIS to tabletop is > 24 cm

- Note: CR is ________________________________
• Structures Shown:
• Criteria of Evaluation:
  – The femoral condyles should be ____________

  – The intercondylar eminences should be centered within the ________________.

  – The head of the fibula should ________________ ________________.

  – The patella should be seen in the ________________.

  – The knee joint ____________
     ________________________

  – Intercondyloid fossa should be________________________
     __________________________________________
• AP knee – Error – __________ rotated – causes lateral condyle to appear __________ , intercondyloid fossa will be __________, and there will be __________. Correction - _______________ rotate leg.

Good image
• AP knee Error: Knee is________________________ – this will cause the medial condyle to appear ______, the intercondyloid fossa will be ______________, and there will be ________________________________ . Correction: ___________ rotate leg.
• AP knee – Error – ________________ – causes ________________to be opened too much and the femur is _______________. To correct: ________________.

Good image

Correction -
Fully extend knee if patient is able
KNEE
AP Oblique Projection
Medial (Internal) Rotation

• Patient Position:

• Part Position:
  – Leg rotated ________________
  – Center ______________________
    ______________________
• Central Ray:
  – Asthenic patient - ________________ if ASIS to tabletop is < 19 cm
  – Sthenic patient – ________________ if ASIS to tabletop is 19 – 24 cm
  – Hypersthenic patient – ________________ if ASIS to tabletop is > 24 cm
• Structures Shown:

• Criteria of Evaluation
  – The head of the fibula should be seen __________
    __________________________
  – The lateral condyle should __________
  – The patella __________
    __________
- Internal (medial) oblique knee- Error – _______ rotation – causes the head of the fibula to be __________________ from the tibia. Correction - Oblique leg __________________________ . (needs ______ rotation)
AP Oblique Projection
Lateral (External) Rotation

- Structures shown;
• External (lateral) oblique knee – Error – ______________ will cause the fibula to not be ______________________________

Correction - Oblique leg __________. Needs more __________ rotation.
KNEE
Lateral Projection

• Patient Position:

• Part Position:
  – Knee flexed ____________
  – Patella ____________ to IR
  – Femoral condyles__________________
• Central Ray:
  – ________________ through knee joint (due to __________ femoral condyle, plus it is at a lower level than the ________ femoral condyle)
  – Center ________________________________ epicondyle
Note: If patient unable to turn into lateral position, ______________ may be obtained.
• Structures Shown:
• Criteria for Evaluation
  – The distal articulating surfaces of the medial and lateral femoral condyles should be___________, and the knee joint space should __________.
  
  – Determine if CR needs to be angled based on___________ _______. Wide pelvis angle _____ degrees __________. Narrow pelvis use ______ angle.
• Criteria for Evaluation
  – The patella should be situated ________________.
  – The patellofemoral joint should ____________.
  – The tibia should be ____________ over the fibular head.
  – Patella seen ____________
• Lateral Knee Error – Knee is flexed ______ ______ – the patellofemoral joint________ ________________ . Correction – flex knee __________

Good image
• Lateral Knee – Knee is_________________ – the patellofemoral joint_________________. Correction – flex knee__________.

Good image
• Lateral knee – Error - the patella was situated too ______________ (______-rotated knee). The head of the fibula is __________________________ _____ than normal. Correction – roll the patella ______ (____________) to the IR.
Lateral knee – Error - the patella was situated too ____________ (_____-rotated knee). There is ________________________________.
Correction - roll the patella _______________ (____________) from the IR and/or ____________ _______________.
• Lateral knee – Error__________________________
_________. Note that medial femoral condyle_______________________________. To correct_______________________________.

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• Lateral knee – ______________, patella ____________ to IR, and________________. Correction: roll the patella ______________ the IR and have____________________________.
Weight-Bearing Knees
AP Projection

• For ______________ studies to show __________
________________________________________________

• Note: CR is _____________________
Weight-Bearing Knees Lateral Projection

- For ____________________
- Note: CR is ________________
PA Axial Bilateral Weight-Bearing Knees Rosenberg Method

For ___________studies to show narrowing of
INTERCONDYLAR FOSSA

“Tunnel Views”
Camp – Coventry Method
Homblad Method
Beclere Method
PA Axial Projection
Camp-Coventry Method

• Patient Position:

• Part Position:
  – Knee _____________
  – ______________ of leg
  – Foot___________________
• Central Ray:
  - _______________to _______
  - _______________through knee joint
PA Axial Projection
Homblad Method

• Patient Position:

• Part Position:
  – Knee _________
  – Knee joint ______________
  – Femoral shafts ______________

• Central Ray:
  – _______________ to _________ through 
    ___________________________ (______knee joint)
Holmblad Method Modifications
Holmblad Method Modifications
AP Axial Projection
Beclere Method

• Patient Position:

• Part Position:
  – Knee flexed ________
  – IR placed __________________
  – No ____________________

• Central Ray:
  – Perpendicular to ______________
  – Angled _______through knee joint
  – Enters________________________
• Structures Shown:

- Medial femoral condyle
- Intercondylar fossa
- Patella
- Lateral femoral condyle
- Articular facet
- Intercondylar eminence
- Fibular head
- Tibia
• Criteria for Evaluation:
  – Open ___________________
    Knee joint space _______
  – Apex of patella ________________
  – ________________________ of femoral condyles
INTERCONDYLAR FOSSA
"Tunnel Views"

Camp Coventry method (intercondylar fossa)

CAMP-COVENTRY METHOD
PA Axial Projection

Femur
Patella
Lateral femoral condyle
Medial femoral condyle
Tibial intercondylar eminences
Tibia

Holmblad method

HOLMBLAD METHOD
PA Axial Projection

BECLEERE METHOD
AP Axial Projection
PATELLA
PA Projection

- Patient Position:
- Part Position:
  - Center IR to ______
  - Rotate heel laterally ________ to make patella
    _________ to IR (or __________________ of anterior knee)
- Central Ray:
  - __________________________ to IR
  - Enters______________________; exits ________________
• Structures Shown:

• NOTE: May be done _____, but detail better when done ______
Stellate Fracture of Patella
PATELLA
Lateral Projection

• Patient Position:

• Part Position:
  – Turn on to __________
  – Knee flexed _______
  – Patella is ______________ to IR
  – Femoral condyles________________
• Central Ray:
  – __________ to IR
  – __________________ joint

• Structures Shown:
Transverse Fracture of Patella
PATELLA
“Sunrise or Skyline Views”
Merchant Method
Hobbs Method
Settegast Method
Hughston Method
Bilateral Tangential Projection
Merchant Method

• ______________________ image
______________projection) of both
_____________________; shows
_______________ of patellae
Alternative method – Hobbs Modification
Tangential Projections
Settegast Methods

• Patient Position:

• Part Position:
  – __________knee to place patella
  ____________ to IR
  – Base of ________________to IR
Settegast Method Modifications
• Central Ray:
  – ______________ to femoro-patellar joint space
  – Angle depends on________________

• Structures Shown:
Tangential Projection
Hughston Method

• Knee flexed ______________ from IR; CR angled ______________________

• Demonstrates ______________________________

____________________________

[Image of a knee with a tangential projection]

[Image of an X-ray showing the knee with labeled structures: Patella, Femoral condyle, Patellofemoral articulation]
• Tangential Patella error –________ flexion of knee, patella superimposed on_______, joint space is_________. To correct ________ flexion of knee or make the CR ________________________________.
TANGENTIAL PATELLA PROJECTIONS
"Sunrise or Skyline views"

1. Settegast Method(s)
2. Hughston Method
3. Merchant Method

Structures Shown: Tangential projection to show vertical fractures and the patellofemoral joint

Merchant bilateral method
Hughston method

SETTEGAST METHODS
Trauma Radiography of the Patella

• Sequence of Radiographs
  – ______________________ – shows ______________
  – _______________ – shows ________________________
  – Tangential – shows _____________________________*

• *Note: Acute flexion of knee should not be attempted ___________________________
  ___________________________
FEMUR
AP Projection

• Patient Position:

• Part Position:
  – Center ______________________ of IR
  – Rotate leg ______________ for distal femur
    (femoral condyles _____________ to IR); __________
    for proximal femur (femoral neck ______________ to IR)
• Part Position (Cont’d):
  • For distal femur –
    – Bottom of IR is___________________________
  • For proximal femur –
    – Top of IR at the_________________________
• Central Ray:
  – ______________________ to IR at midfemur
• Structures Shown:
• Criteria for Evaluation:
  – Proximal femur
    • Greater trochanter seen __________
    • Femoral neck ___ 
      ________________
    • Lesser trochanter 
      ________________
  – Distal femur
    • No ____________ 
      ________________
AP’s
FEMUR
Lateral Projection

• Patient Position
  – _______________________
  – Femur _________________
  – Affected knee __________
• Part Position: For distal femur –
  – Draw upper leg _________________________
  – Pelvis true __________________________
  – Patella and femoral condyles _________to IR
  – Bottom of IR _________________________
• Part Position: For proximal femur –
  – Upper leg drawn ____________________________
  – Pelvis rotated __________ from lateral to prevent ________________________________
  – Top of IR at ____________________________
• Central Ray:
  – ______________ to IR

• Structures Shown:
• Criteria for Evaluation
  – Proximal femur
    • Lesser trochanter ________________________________
    • Greater trochanter ______________________________
    • Unaffected femur ________________________________
• Criteria for Evaluation
  – Distal femur
    • Anterior surface of femoral condyles ________
    • Patella in ______________
    • Patellofemoral joint__________________
Laterals
Trauma
Lateromedial projection of Femur
Image Stitching
CT-Scanograms-Lower Extremity

- CT Scanograms
  - Take CT “Scout” images of the femur/tibia
  - For lower extremity measurements
    - Place cursors over the respective hip, knee and ankle joints
• **Situation:** A radiograph of a lateral projection of the patella reveals that the femoropatellar joint space is not open. The patella is within the intercondylar sulcus. **Solution:** The most likely cause of this is excessive ________ of the knee.
• **Situation:** A radiograph of an AP knee reveals rotation with almost total superimposition of the fibular head and the proximal tibia. **Solution:** To correct this positioning error on the repeat exposure, the technologist must rotate the knee slightly __________________.
• **Situation:** A radiograph of a PA axial projection for the intercondylar fossa does not demonstrate the fossa well. It is foreshortened. The following positioning factors were used: patient prone, knee flexed 40° to 45°, CR angled to be perpendicular to the femur, 40-inch SID, and no rotation of the lower limb. **Solution:** To correct this positioning error on the repeat exposure, the technologist must direct the CR perpendicular to the _________________ to produce a more diagnostic image.
• **Situation:** A patient comes to the radiology department for a knee study with special interest in the region of the proximal tibiofibular joint and the lateral condyle of the tibia. **Solution:** The positioning routines should include, _____________ oblique of the knee.
• **Situation:** A geriatric patient comes to the radiology department for an intercondylar fossa study of the knee. The patient is unsteady and unsure of himself. **Solution:** If choosing between the Holmblad or the Camp-Coventry methods, the ________________ intercondylar fossa projection might provide the best results without risk of injury to the patient.
• **Situation:** A patient enters the ER with a possible transverse fracture of the patella. Which projection(s) would safely confirm a transverse fracture *without flexing the patient’s knee*?  
**Solution:**  
________________ and ________________
• **Situation:** On a lateral knee radiograph, if there is increased separation of the tibia & fibula, the knee is _______-rotated.  
**Solution:** The patient must be rotated ______________.
• **Situation:** On a lateral knee radiograph, if the head of the fibula is more superimposed on the tibia than normal, the knee is ______-rotated. **Solution:** The patient must be rotated __________.