Chapter 19

Image Evaluation

LEARNING OBJECTIVES

- Describe optimum conditions for viewing and evaluating radiographs
- Describe correct orientation to display radiographs on a monitor
- Demonstrate a systematic review of a radiograph for diagnostic, technical, and aesthetic quality

Learning Objectives (Cont' d)

- Recognize artifacts and technical errors on radiographs and state their causes
- Suggest appropriate changes in technique or procedure when image quality is less than optimal
- List appropriate criteria for determining whether a radiograph should be repeated

VIEWING RADIOGRAPHS

- Viewing Monitor
  - Use highest resolution monitor available
  - Keep ambient light low
- Image Orientation
  - For most images, place superior part of anatomy at the top
  - For fingers, hand, wrist, forearm, and foot, place the distal aspect uppermost
  - Orient images of the axial skeleton so that the patient's left side is toward the viewer's right side
  - Orient images of the limbs taken table-top (non-grid) in the same position they were taken

SYSTEMATIC IMAGE REVIEW

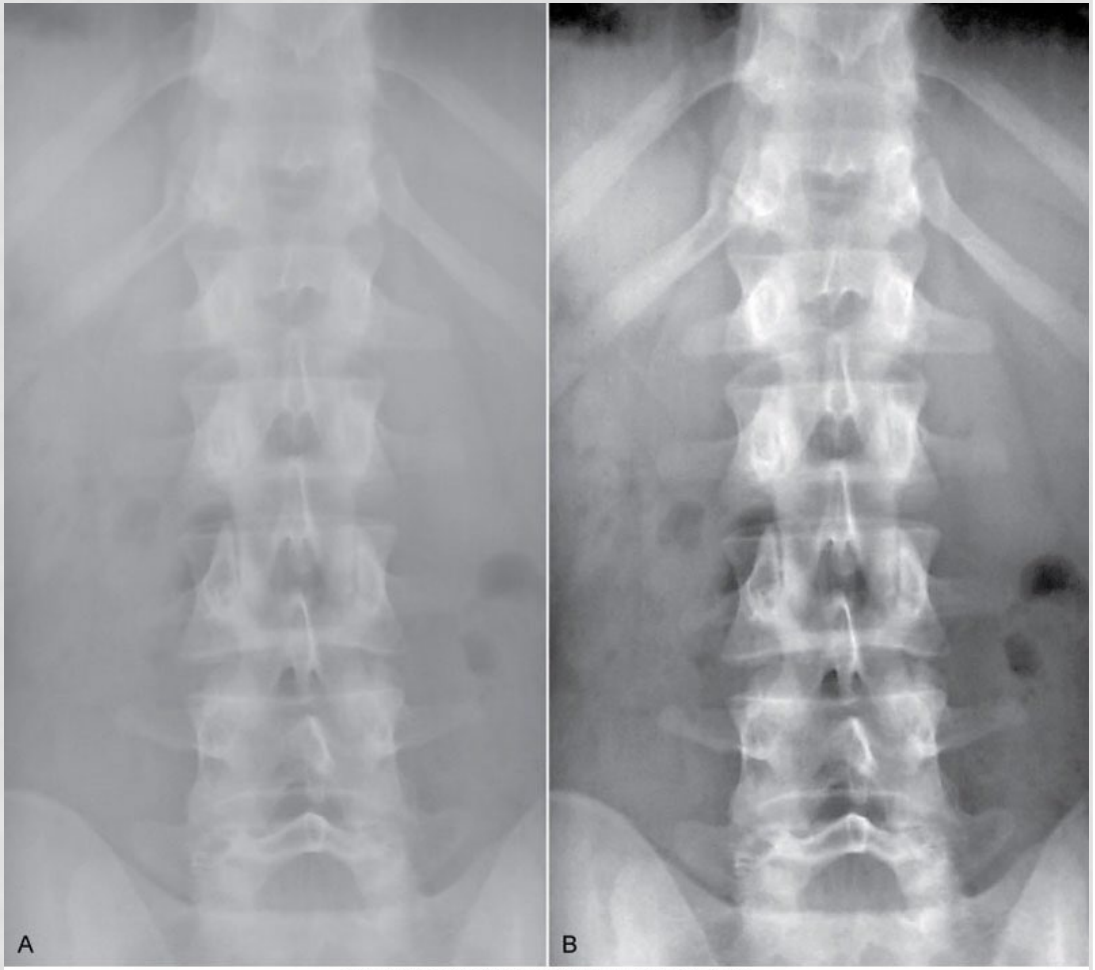
- Evaluate for:
  - Identification
    - Matches examination request
    - Correct patient information
  - Anatomy
    - All anatomy of interest is included and properly positioned
  - Marking
    - Anatomic side (right/left) and positional (flexion/erect) markers are visible

TROUBLESHOOTING

- Incorrect patient and anatomic side markers
  - Cover with label containing correct information
  - If digital, add annotation for correct side marker
- Entire area of interest not imaged
  - Be sure outer margins of anatomy are within the radiation field

SYSTEMATIC IMAGE REVIEW

- If film is used, evaluate exposure for density that is excessive or insufficient
- If digital is used, evaluate for excessive or insufficient exposure by checking exposure indicator number

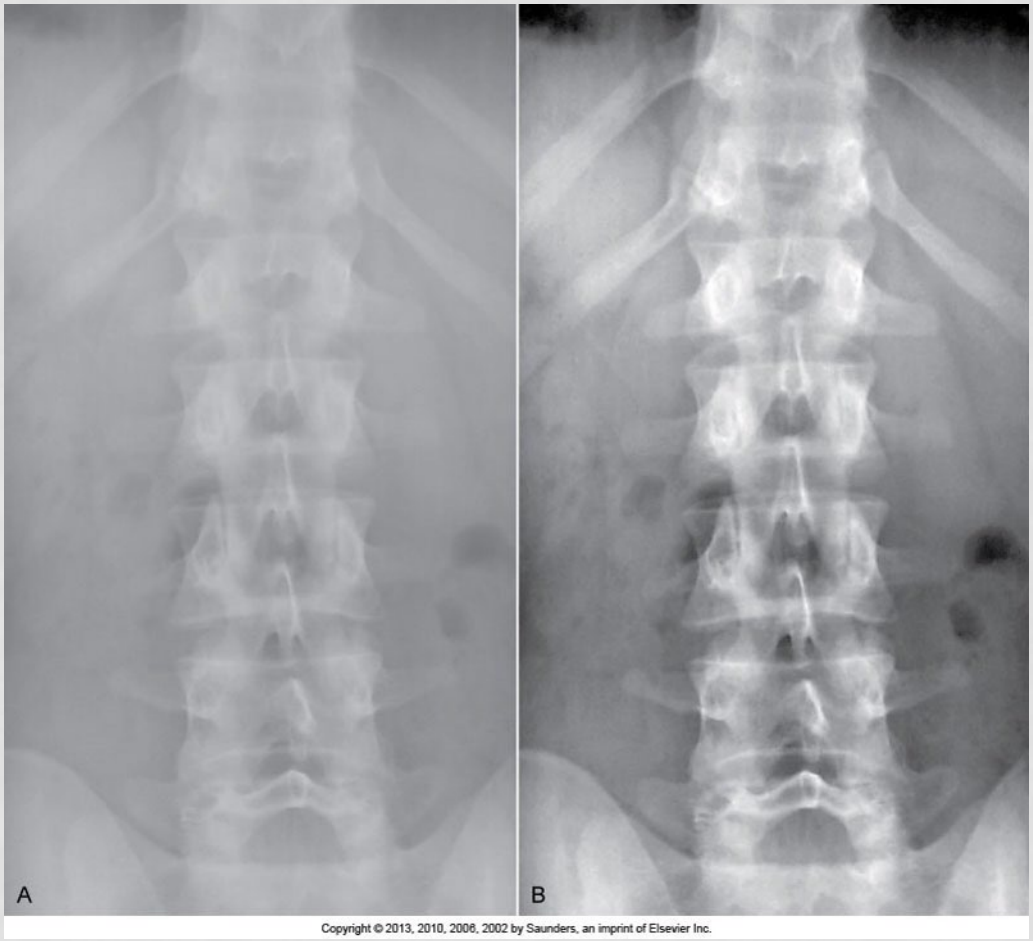


TROUBLESHOOTING

- Excessive and insufficient density
  - Check technique chart for appropriate exposure factors, SID
  - Watch exposure indicator to be sure exposure did not terminate prematurely
  - When repeating a radiograph with excessive or insufficient density caused by exposure factor error, adjust mAs

SYSTEMATIC IMAGE REVIEW

- If film is used, evaluate exposure for contrast that is too high (short scale) or too low (long scale)
- If digital is used, ensure proper kVp is selected for body part imaged



A. 100 kVp and lacks sufficient contrast
B. 80 kVp, improved contrast

TROUBLESHOOTING

- Contrast too high or too low
  - Check technique chart for appropriate exposure factors
  - Collimate to body part and/or IR size
  - When repeating a radiograph with contrast that is too high or too low because of exposure factor error, adjust kVp

SYSTEMATIC IMAGE REVIEW

- Evaluate for poor recorded detail (blurriness and size or shape distortion)

TROUBLESHOOTING

- Poor recorded detail because of blurriness and/or distortion
  - Check technique chart for appropriate IR speed class and SID
  - Use short exposure times to avoid patient motion
  - Place the body as close to the IR as possible to reduce OID

SYSTEMATIC IMAGE REVIEW

- If using film, evaluate for processing or darkroom problems such as:
  - Film handling artifacts
  - Fog
  - Chemical solution strength and temperature

TROUBLESHOOTING FILM IMAGES

- Image is fogged, displays artifacts, or has inappropriate density/contrast as a result of improper processing
  - Handle film by corners
  - Keep cassettes, screens, and loading bench clean
  - Check cassettes and darkroom for light leaks
  - Check safelights
  - Make sure film is stored properly
  - Run quality-control checks on processor chemicals and transport system

SYSTEMATIC IMAGE REVIEW

- Evaluate for:
  - Aesthetics or overall quality of the image
  - Radiation safety
    - Proper collimation and shielding

TROUBLESHOOTING

- Lack of collimation and shielding
  - Limit the radiation field to the body part and/or IR size so that evidence of collimation shows on at least three sides of the image
  - Use gonad shields as appropriate
  - Ensure shields do not obscure desired anatomy

REPEAT RADIOGRAPHS

- Repeat radiographs when they lack sufficient quality to reveal or rule out pathologic condition
- Maintain a repeat log that includes:
  - Type of exam
  - Reason for the repeat
  - Measures taken to prevent the error from recurring
- Strive for a repeat rate of less than 10%

SUMMARY

- Maintain proper image viewing conditions
- Except for distal upper limb and foot, view images with the superior part of the anatomy at the top
- Orient images of the axial skeleton so that the patient’ s left side is toward the viewer’ s right side
- Orient images of the limbs taken table-top (non-grid) in the same position they were taken; they should not be flipped to reflect anatomic position

Summary (Cont' d)

- Evaluate and troubleshoot images for proper identification, marking, anatomy, positioning, density, contrast, recorded detail, processing problems, aesthetics, and radiation safety
- Maintain a repeat log
- Strive for a repeat rate of <10%