DIGITAL RADIOGRAPHY ARTIFACTS

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Some information and figures in this presentation are collection from presentations who's name are listed below.

- Artifacts in Digital Radiography (DDR & CR) By Leung Chuen Yung - RAD II, QEH
- http://www.wikiradiography.net/page/Artefacts

Please Note:
The first two references it is very important and useful for thus who are works as Medical Physicists related to Medical Imaging fields.
Contents

Causes and Sources of Artifacts in Digital Medical Radiography
Artifacts

• Any undesirable objects OR structures recorded on the radiography image cause degraded image quality.

• Produced from:
  - Patients such as motion, poor preparations
  - Technologists such as less knowledge, less training
  - Machines, there are various artifacts from CR and DR radiography machines.
Noisy Detector Power Supply Artifacts
Noisy Detector Power Supply Artifacts

Appearance:
Vertical lines, which are symmetrical around the center of the image.

Cause:
Caused by a noisy detector power supply

Solution:
Replace power supply
Loose Cone Artifacts
Loose Cone Artifacts

Appearance:

White edges.

Cause:

Cone has fallen out of the x-ray tube port and is blocking the collimator from opening.

Solution:

Remove the collimator and re-attach the cone to the tube port.
Bar code Artifacts
Bar code Artifacts

Appearance:
Barcode appear on screen

Cause:
Cause by a failure in a data module or the detector

Solution:
Perform bad pixel calibration, if calibration fail then replace detector
Double Exposure Artifacts

Warning: Not for diagnostic use
Double Exposure Artifacts

Appearance:
Duplication of images

Causes:
Two subsequent exposure on same imaging plate

Solution:
Proper knowledge of using of X-ray equipment
Poor Collimation Artifacts
Poor Collimation Artifacts

Appearance:
Unsharp images

Causes:
Improper collimation

Solution:
Proper collimation in accordance with cassette size and body part
Effect of FOV
Scatter and Collimation
Exposure Through Back of Cassette
Exposure Through Back of Cassette

Appearance:
Various patterns of image according to cassette design

Causes:
Poor basic knowledge of construction of cassettes

Solution:
Proper education of radiographers in handling of cassettes
Improper Exposure KV
Artifacts
Improper Exposure KV Artifacts

Appearance:
Darkening or whitening of image

Causes:
Improper exposure setting

Solution:
Proper exposure factors to be used based on body part and patient size
Moire Pattern Artifacts
Moire Pattern Artifacts

Appearance:
Different types of moire pattern

Causes:
Improper Grid usage with low grid frequencies

Solution:
Usage of grids with 60 lines/cm or more; grid lines should run perpendicular to plate reader’s laser scan lines
Grid (Bucky)

• Gustav Bucky who discover and event the Bucky.

• Notice the effect of Compton scattering and how the image degrades.

• Designed a lead grid to absorb the scattered radiation.

• The problem appears the lead grid on screen film.

• Hollis Potter he solve this problem by events the movable grid, its using till today.
Grid (Bucky)

A focused grid placed between patient and film with its strips focused towards the X-ray tube focus.
The two images shown above were obtained using no scatter removal grid and using the identical radiographic techniques 65 kV and 3 mAs. The *only* difference between these two images is that the one on the left had blocks of Plexiglas added adjacent to the knee phantom; this additional material produces a large amount of Compton scatter, which markedly degrades the image contrast seen in the knee region.
Scatter Removal Grids

KV = 75 kV
mAS = 3
No Scatter Removal Grid

KV = 75 kV
mAS = 25
Scatter Removal Grid
Scratches Artifacts

This artifact will may cause wrong diagnosis (stone)
Scratches Artifacts

Appearance:
Kink marks on the image

Causes:
Mishandling of imaging plate during cleaning process

Solution:
Cassettes and image plates should be handled with care
Light Bulb Artifacts
Light Bulb Artifacts

Appearance:
Darkening of lower and outer portions of an image

Causes:
High exposure, back scattered radiation entering imaging plate from patient’s bed due to increased exposure for obese patients or due to uncollimated x ray

Solution:
Reduce back scatter by lowering the KV or proper collimation.
Dust Artifacts
Dust Artifacts

Appearance:
Focal radiopacities

Causes:
Dust particles wedged over imaging plate

Solution:
• Regular cleaning of imaging plates with proper cleaner (EthylAlcohol).
• Paper towels or gauze should not be used because they leave fibers on the plate, the use of lint-free cloth is advisable.
Disparity Artifact

CR
Disparity Artifact

Appearance:
Defective scanning resulting in alteration in image contrast, lower half of it was exposed to laser beam for longer time, which resulted in brighter image output

Causes:
Malfunctioning of rollers in CR reader

Solution:
• Periodic cleaning of roller in CR reader by the supplier
• Optimal image
Ruler Damage Artifacts

This artifact will may cause wrong diagnosis (granulomas in lung)
Damage of imaging plate due to rollers

Appearance:

Chest radiograph shows radiopacities (arrows) along right lateral chest wall, focal linear radiopacities

Causes:

Mechanical damaging of Imaging Plate during transport through rollers

Solution:

Replace that part of roller
Deodorant Artifacts
Hair Bun
Clothes Ribbing
Lighter in the pocket
Umbilical Ring
Plaster
Finger Marks
Air in the Ventriles

Air head

Is this ARTIFACT??