



Patient positioning for CT IQ Optimization



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Disclosures

- No financial disclosures of conflicts of interest.

  2

Outline

- Optimal standard positioning
- Positioning tricks to improve imaging
- Poor positioning compensation

  3

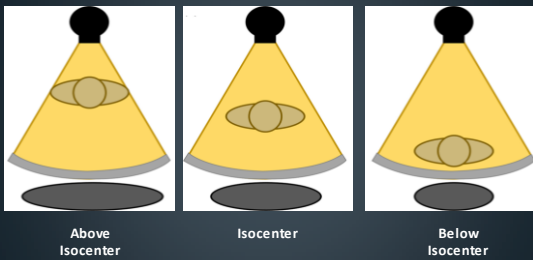
Optimal Standard Positioning

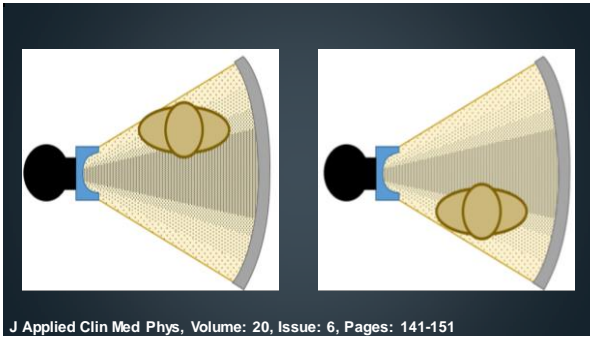
- Position in scanner
- Orientation in scanner
- Limb positioning
- Exogenous materials

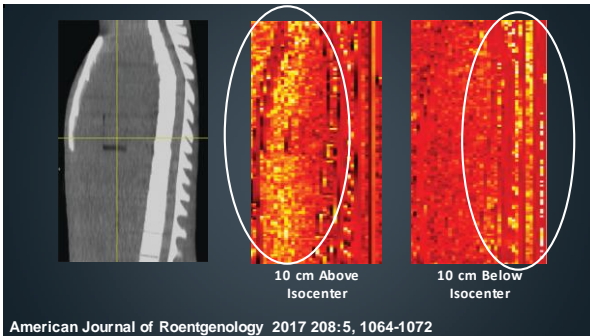
Position in scanner

- Isocenter in scanner!
 - Radiation dose
 - Image signal
 - Relative tissue attenuation












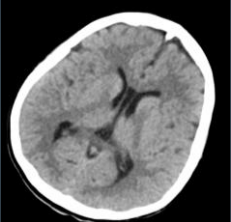
Orientation in scanner

- Supine
- Straight
 - No rotation
 - No bending
- Arms
 - At sides – Head & Neck
 - Above head – Thorax & Upper Ext





9

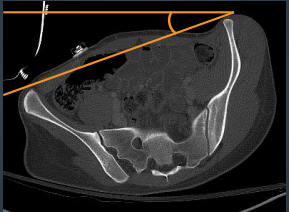
Rotation



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10

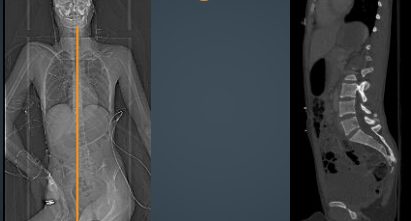
Rotation



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11

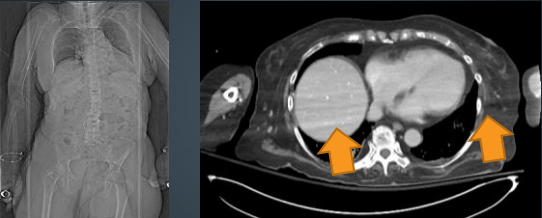
Bending Position



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12

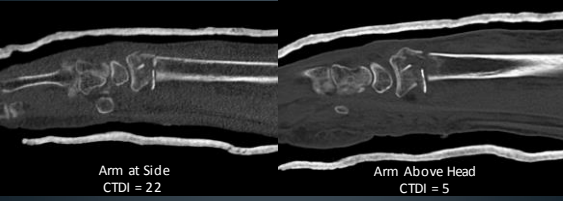
Arms at Side – Thorax



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Arm at Side – Upper Extremity



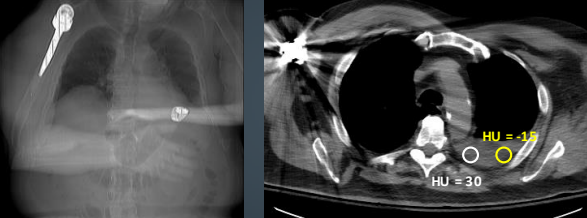
Arm at Side
CTDI = 22

Arm Above Head
CTDI = 5

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14

Hounsfield Unit Alteration



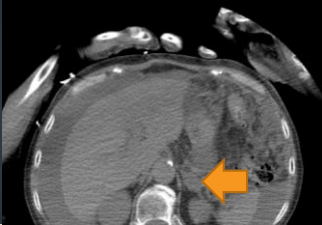
HU = -1

HU = 30

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15

Hounsfield Alteration



Average HU = 30
STD = 20

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Overlying materials

- Clothing
 - Jewelry, watches, keys
- Medical equipment
 - Braces, back board, monitor wires, casting material

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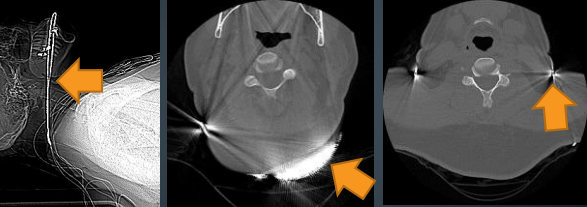
Jewelry - Earrings



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18

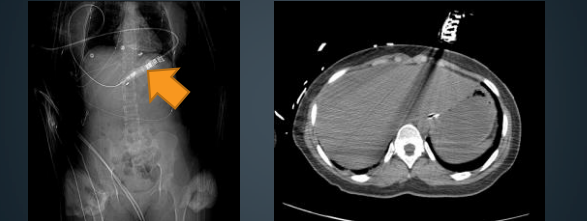
Jewelry - Necklace



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19

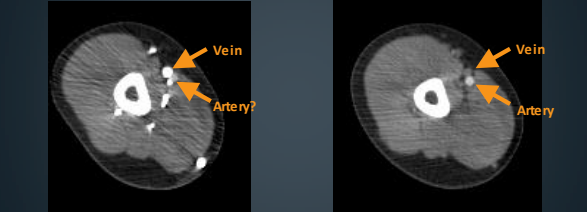
Medical Devices



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20

IV Contrast Contamination



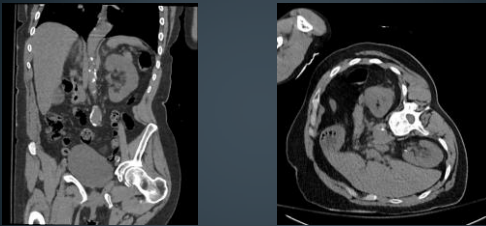
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21

Tricks for Suboptimal Positioning

- Decubitus positioning
- Alternative arm positions
- Lower extremity bending/elevation
- Head tilt/neck traction

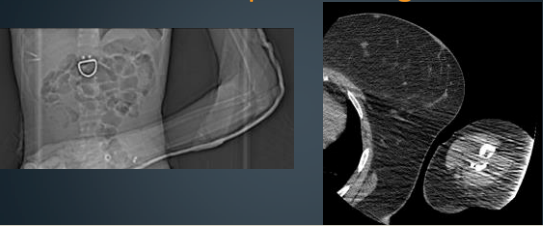
Lateral Decubitus



Arm positioning



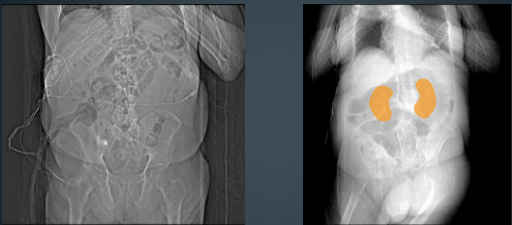
Arm positioning



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25

Bent Arm Position



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Leg positioning



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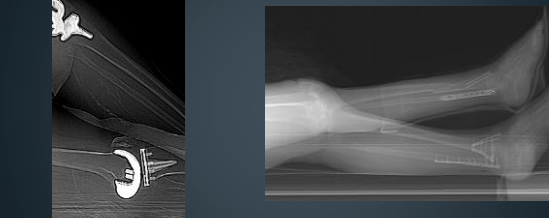
Leg positioning



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28

Leg positioning



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29

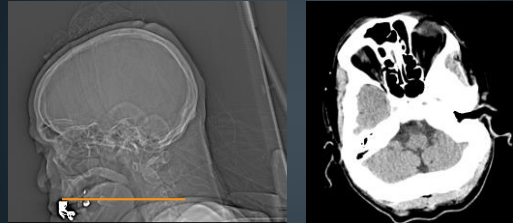
Chin Tilt



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30

Chin Tilt



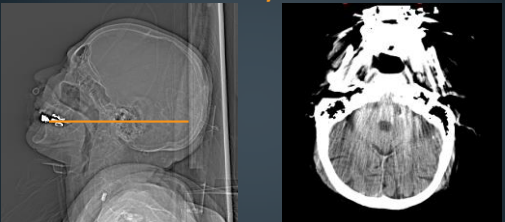
Shoulder shrug



Reducing Shoulder Artifact



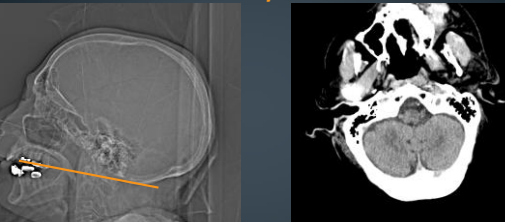
Gantry Tilt



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34

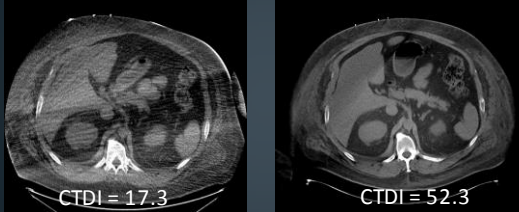
Gantry Tilt



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Increase Radiation Dose



CTDI = 17.3 CTDI = 52.3

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36

Take-home Points

- Position: Isocenter is vital!
- Straight & Extended in scanner
 - Reformats can't fix everything

Take-home Points

- Arms/External materials/LE hardware
 - Out of imaging plane is possible
 - Otherwise elevate and displace
 - Minimize volume on each slice

Take-home Points

- Gantry tilt to move hardware out of FoV
- Don't be afraid to use appropriate radiation dose
