New Developments In Radiation Safety

Proper C-Arm Angulation, Dynamic Computer Assisted Collimation, Radiation Reducing Cap (No Brainer) And Avoiding Mag Views

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Conflict of Interest

• Consultant / Independent Contractor
  - Arsenal Medical
  - Boston Scientific
  - Endologix
  - Medtronic Industries

• Grant/Research Support
  - Ikomed Medical

• Stock Shareholder
  - Analytics 4 Life
  - Calgary Scientific
  - Harmonic Medical
  - Ikomed Medical
  - NDC
  - Zymeworks

Traditional Dose Exposure Guidelines

• All premised on assumption everyone of a specific age is equally sensitive to radiation injury

What Do You Need To Know About Radiation?

• You have varying levels of repair genes
  – There is no test (as yet) for the repair gene

• Brain and eyes are MUCH more radiosensitive than previously thought

• Your radiation physicist probably does not know this

Examination of Interventionalists’ Lens

B. Worgul

• 59 attendees Veith conference
• Age 29 – 62
• 45 % had radiation damage
Higher Incidence Cataracts

- astronauts¹
- interventional cardiologists²,³
- nursing and technical staff in fluoro.⁴,⁵

⁵. Radiat Res 2010; 174; 490-496.

Radiation Induced Cataracts

Objective: This manuscript discusses radiation cataracts and makes some basic suggestions for preventing radiography.

Conclusion: Increases in the incidence of radiation-induced cataracts were suggested by the American Radiological Health Organization. It has been established that radiation can cause retinal damage and the International Commission on Radiological Protection has suggested lower exposure limits.

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Why Have You Not Heard This Before?

- Case number and complexity, and style of practice have changed
- Effects of radiation delayed by years to decades
- Basil Worgul – deceased

Dynamic Coning With Automated Tracking

Images from Siemens AAA prototype – Dr. LumenDr. Bernuth. Methodist DeBakey Heart and Vascular Center

15 frames/sec

1 frame/sec

IKOMED Technologies Inc

12
Scatter Radiation

- Main source of exposure to operator and staff

Reducing Scatter Radiation - T·I·D·S

- Time
- Intensity
- Distance
- Shielding

Minimizing radiation exposure to the vascular surgeon


Reducing Scatter Radiation - T·I·D·S

- Time: Limit fluoroscopy time
  - only to observe objects in motion
  - use last-image-hold or stored fluoroscopy loops

- Intensity
- Distance
- Shielding

Reducing Scatter Radiation - T·I·D·S

- Time

- Intensity – Use:
  - lowest fluoroscopic dose yielding adequate image
  - lowest digital acquisition rate providing necessary information

- Distance
- Shielding

Position Monitor So Magnification Not Necessary

Reducing Scatter Radiation - T·I·D·S

- Time
- Intensity
- Distance: Stay as far away from primary beam and x-ray tube as possible
- Shielding
Reducing Scatter Radiation - T·I·D·S

- Time
- Intensity
- Distance
- Shielding: Wear appropriate personal protective equipment

Back Care In The Interventional Suite

- Use as much passive protection as possible

Use as much passive protection as possible

Effect of Oblique Projection on Dose to the Operator

New Recommendations ICRP
International Commission on Radiological Protection

- Recommendations – not regulations
- Threshold for cataracts now 500 mGy
  - 4 x lower than previous
- Annual dose limit should average 20 mSv / yr
  - no year >50 mSv
  - Current limits set by the NRC 7.5 x higher

SQUID-Capture Procedure
5.9% of suggested yearly dose!

Take Home Messages

• Knowledge base about radiation effects in evolution
• There are NO safe doses of radiation
• Use radiation like contrast
  – As much as you need but no more