Ideal Exposure: Integrating Imaging Interpretation into a PA Program Curriculum

“This is bad, right? I need to call the neurosurgeon, right? Can’t find anyone!!!”

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Objectives
At the conclusion of this session participants will:

1. Understand how a radiologist has integrated radiology education and imaging interpretation throughout a PA program.
2. Understand and be able to implement teaching methods that will help PA programs provide basic imaging interpretation.
3. Be aware of frequently overlooked, but very important, aspects of effective imaging interpretation education and how to implement these into a PA program curriculum.
PA student and Radiology

- Utilization of imaging resources
  - When to order what
- Interpretation of images
  - Preliminary interpretations
  - Final interpretations?
- Ability to clearly articulate findings to collaborating clinicians
Why spend time on imaging interpretation?

- Improves patient care
  - Utilization of imaging, especially advanced imaging techniques like CT and MRI, have more than tripled since 1995
- X-ray interpretation on PANCE
- Compliments and reinforces anatomy, physical exam, pathophysiology, and clinical medicine
- X-Ray Interpretation: how well are you prepared in this skill?
  - Marietta College PA Program evaluation question
Overview

• The basics
• Normal radiographic anatomy
  – In conjunction with 9 week cadaver anatomy course
• Identify abnormal (and figure out what it is)
  – Lectures in Clinical Medicine course
  – “Unknowns”
  – Individual or small group review at workstation with radiologist
  – Life long learning
    • Look at studies ordered
The Basics

- 5 x-ray densities
- Basics of each imaging modality with emphasis on plain film and CT scans, but also significant unique features of other imaging modalities
  - No radiation in ultrasound, physiologic imaging with nuclear medicine, etc.
  - Enteric and IV contrast
- Presented in conjunction with cadaveric anatomy
“Normal”

• “Within normal limits”
• Extensive normal plain film and CT scan exposure during summer cadaver anatomy – Spine, knee, shoulder, ankle and brain MRI as well
• Lecture with constant classroom interaction
• Small group reviews with instructor – Numerous plain films examples available on view box – CT scans on computer monitors
• All resources available 24/7 for individual review
• “Practice test’
WHAT VIEW IS THIS?

PA CHEST X RAY

R. paratracheal stripe
Azygos
Trachea
Aortic arch/knob
AP window
Carina
Main pulmonary a./t.
L. hilum
R. hilum
L. hilum
L. diaphragm
R. diaphragm
R. paratracheal stripe
Azygos
Trachea
Aortic arch/knob
AP window
Carina
Main pulmonary a./t.
L. hilum
R. hilum
L. hilum
L. diaphragm
R. diaphragm
R and L costophrenic angles
Assessment of “Normal”

- 15% of Anatomy grade is radiology
  - 10% practical exam
  - 5% written exam
“Abnormal”

• Must know normal
  – Review of pertinent normal radiographic anatomy at beginning of Clinical Medicine radiology lectures
  – Radiologic anatomy questions posed to the class during other lectures
Identify abnormal

• Clinical Medicine radiology lectures
  – Follows our systems approach
    • Review anatomy, physiology, pathophysiology while reviewing images
  – Moderate student interaction
  – Emphasize typical features of common abnormalities
  – My approach to each modality
Intracranial hemorrhage imaging

- **CT** best (hematoma increased attenuation – whiter than brain)
- **Location** (parenchymal, subarachnoid, subdural, epidural, or intraventricular)
- Clinically pt. have headaches (HA)
  - **Red flags** – worst headache of life, different character of HA, associated with abnormal physical exam
- If suspect **stroke** clinically, CT to R/O bleed in the stroke prior to anticoagulation
Intracranial hemorrhage imaging

- If bleed, look for mass effect, herniation
- **Hypertensive headaches** – basal ganglia hemorrhage
  - If bleeding is in the brain parenchyma, but not in the basal ganglia, evaluate for underlying mass or AVM – brain MRI with gadolinium (may need to wait a month or two)
- **Nontraumatic subarachnoid hemorrhage** (SAH) = ruptured berry aneurysm until proven otherwise
  - Sulci
Intracranial hemorrhage imaging

• **Subdural hematomas** due to tearing of bridging veins – seen in elderly with atrophic brains
  – Crescentic and cross sutures

• **Epidural hematomas** seen after trauma – tear of middle meningeal a. with bony FX
  – Lenticular and stop at sutures

Examples of each.
L BASAL GANGLIA HEMORRHAGE
Identify abnormal “Unknowns”

- Few days after Clinical Medicine lecture
- 30-40 cases
  - Plain film and CT
- Laser pointer gets passed around amongst the students
  - “Present” the case formally
- Emphasized in chest, bone, neuro
  - Some abdominal, renal cases
- Also done as a break in other lectures
Assessment of “abnormal”

- 7-12% of Clinical Medicine grade  
  - Each system exam has 3-8 (out of 50-60) radiology questions  
  - 2 or 3 will be interpreting radiographic images
- Second year end of rotation exams
- Objective structured clinical examination (OSCE) station
- Comprehensive exam
Next step: Putting it all together

• Sit at workstation with radiologist during didactic phase and on rotations
  – Important to be able to identify the few abnormal cases interspersed amongst many normal cases
  • Often easier to interpret abnormal cases than normal ones
  • Good to hear what the radiologist is thinking
  • Emphasizes importance of good history and rapport with radiologist
  • Use of scroll function at the workstation

• Initial preliminary interpretations
Lifelong learning

• Always look at images ordered
  – Helpful to the patient
  – Helpful to the clinician

Text from one of our graduates who has been working for 5 months:
“This is bad, right? I need to call the neurosurgeon, right? Can’t find anyone!!!”
Sources of radiology instructors and cases

- Friendly neighborhood radiologist
- Radiology teaching program - residents
- To recruit radiologists/residents need to show benefits:
  - Enjoyment of teaching, sharing good cases
  - Training future clinicians
  - Academic prestige
  - College benefits, title
  - Monetary compensation
- Various on-line materials
Textbooks


References


