RADIOLOGY FOR FUN & PROFIT (OR JUST FUN)

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VANCOUVER RADIOLOGISTS

- Subspecialized group of 11
- Imaging center near Vancouver Mall
- Imaging center in east Vancouver
- Staff Legacy Salmon Creek Hospital

HOW HARD CAN IT BE TO READ AN X-RAY???

After all:

- It's only black and white
- Just 2 or 3 pictures
- You can learn by watching TV shows!
ALTHOUGH TV OFTEN HAS IT BACKWARDS

THE ANSWER:

- It’s very EASY to read an x-ray
- It’s very HARD to read it correctly

COMMON ERRORS

- Over-diagnosing pneumonia
- Missing fractures
- Mistaking normal structures for abnormal, especially in kids
TODAY’S TALK

1. Reading X-rays
2. Ordering the right imaging test
3. “Nightmare on ICD-10 Street” – coming soon to a clinic near you

NORMAL PA CHEST

- Look for:
  - Trachea: Azygos vein
  - Aortic knob: Pulm. Artery/hilum
  - Heart: Hemi-diaphragm
  - Lungs
  - Ribs
  - Liver
  - Spleen

NORMAL CHEST PA

![Image of a chest X-ray with labels for normal structures]
FEMALE CHEST CHALLENGES

- Breast shadows at bases; NOT pneumonia (check lateral view for bases)
- Nipple shadows

LOWER LUNGS MORE OPAQUE DUE TO BREASTS

MASTECTOMY – NOTE DENSITY DIFFERENCES
PROSTHESES (CAN CALCIFY) – NOTE EMPHYSEMA

LOCALIZING ABNORMALITIES

- RIGHT MIDDLE LOBE PNEUMONIA – obscures heart border
- Can be simulated by Pectus Excavatum
PECTUS EXCAVATUM—SIMILAR ON PA VIEW

RLL—HEART BORDER NOT OBSCURED

LEFT UPPER LOBE LINGULA—SIMILAR TO RML
NOTE LINGULA (PINK) CONTACTS HEART BORDER

LEFT LOWER LOBE SUPERIOR SEGMENT = "MIDLUNG"

LLL BASAL OBSCURES DIAPHRAGM (CAN’T EXCLUDE EFFUSION)
WHAT LOOKS LIKE PNEUMONIA--BUT ISN’T??

THYMUS SAIL SIGN

MORE THYMUS
THYMUS GLAND

Grows T-cells in childhood, anti-infection lymphocytes
Shrinks after puberty, replaced by fat:

THYMUS SURROUNDED BY PNEUMOMEDIASTINUUM

SPEAKING OF HOT AIR

- Pneumomediastinum—w/wo subcutaneous emphysema—asthmatics, COPD
- Pneumopericardium—rare; can be in infants
- Pneumothorax—coughing, trauma, post-op
TWO EXAMPLES OF PNEUMOMEDIASTINUM

P.S. Also look for PNEUMOTHORAX!
APICAL PTX – SEE VISCERAL PLEURA

PTX IN A NEONATE

PNEUMOPERICARDIUM –
  Surrounds heart (unlike pneumomediastinum)
TIP #1 – INCORRECTLY LABELLED FILMS

THIS TURNED OUT TO BE SITUS INVERSUS

- Note: Aorta on left side

- Abdominal situs inversus in this case, so heart and stomach on same side (could confuse)
TIP #2
ORDERING AN MRI OF LIMBS OR SPINE?
GET X-RAYS

EMPHYSEMA (AND ASTHMA)
- Hyperinflated lungs
- Diaphragm height on PA—count ant. ribs >6
- Diaphragm height on lateral—height <2.5 cm
- Rely on spirometry first

COUNT ANTERIOR RIBS >6
(e.g. 8)
COMPARE TO NORMAL

DIAPHRAGM ON NORMAL LAT VIEW
>2.5 CM HEIGHT

HEIGHT <2.5 CM = EMPHYSEMA
DON'T OVER-DX EMPHYSEMA IN YOUNG OR THIN PTS.

SPEAKING OF DIAPHRAGMS

- Normal = Right higher than left

- If right higher >3 cm, consider: atelectasis, phrenic nerve, abdominal mass/bowel

- If left higher > right: subpulmonic effusion, phrenic n., abdominal process

POSTOP ATELECTASIS, DIAPHRAGM PARESIS
NOT ALL AIR IS IN THE CHEST:

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PNEUMOPERITONEUM

- Ruptured bowel or ulcer, SBO
- Rare in appendicitis and diverticulitis (wall off)
- Normal post-operative (1-2 weeks), peritoneal dialysis, vaginal air, even PTX crossing diaphragm.

FREE AIR CAN CROSS THE MIDLINE
WHILE YOU’RE IN THE ABDOMEN

- Look for calculi (GB, renal)
- Look at aorta
- Try to ignore pelvic phleboliths (lucent center, often lower than ischial tuberosity unlike ureteral calculi)

GALLSTONES 10% CALCIFY

KIDNEY & URETERAL STONES 90% CALCIFY
PELVIC PHLEBOLITHS:
OFTEN LUCENT CENTERS
& LOW IN PELVIS

AAA ON LUMBAR FILM

BREAKING
BAD
FRACTURES (AND FAKE-OUTS)

- **Epiphysis** — AT a joint
  - e.g. fingers, femoral head

- **Apophysis** — NOT at a joint
  - e.g. calcaneus

BASE of 5 MT — can have both

which is this?

APOPHYSIS

- Not on joint surface (unlike epiphysis)
- Doesn’t contribute to bone elongation like epiphysis
- Pediatric → Apophysis injuries common (tendon or ligament attachment)
NORMAL APOPHYSIS
COMMON ERROR (EVEN BIPARTITE)

CO-EXISTING FX & APOPHYSIS

OSGOOD-SCHLATTER AT APOPHYSIS (SOFT TISSUE SWELLING)
JOINTS HAVE NO APOPHYYSIS

EPIPHYSEAL FRACTURES (SALTER I, II, ETC.)

SALTER II MOST COMMON
BEWARE SUBTLE TORUS (BUCKLE) FX RADIUS

3 GOOD TIPS

#3. INSIST ON PERFECT LATERAL WRIST X-RAY—
It may be the only positive view!

#4. COMPARISON VIEWS IN KIDS—
When in doubt (especially in elbow)

#5. TOES & FINGERS—Magnify if possible

FINALLY, RE: BONES

KNOW YOUR SESAMOIDS (WITHIN TENDON):

- Os peroneum
- Os naviculare
- Patella (yes, it is a sesamoid)
- Thumb and great toes
FOOT: OS NAVICULARE

OS PERONEUM

TOE SESAMOIDS CAN BE BIPARTITE
PATELLA
BIPARTITE OR TRIPARTITE

BIPARTITE—LOOK FOR SCLEROTIC, ROUNDED BORDERS

NOT A BIPARTITE PATELLA
ACCESSORY OSSICLES
SIMILAR—
SMOOTH, CORTICATED

PART DEUX
ORDERING THE RIGHT TEST

• Call your friendly radiologist

• Use the Am. College of Radiology website: “Appropriateness Criteria”
  https://acsearch.acr.org/list

ACR APPROPRIATENESS CRITERIA

• Panels of radiologists and non-radiologist specialists in each area (breast, GU, GI, neuro, ortho, etc.)

• For specific Clinical Conditions:
  Rate from 1 (Not valuable)
  to 9 (Most valuable)
EXAMPLES

- Hematuria, flank pain → CT renal colic (without contrast)
- Hematuria, painless → CT Urogram (wo/w contrast); replaced IVP
- Renal failure → Ultrasound kidneys

APPROPRIATENESS
Acute Flank Pain

<table>
<thead>
<tr>
<th>Finding/Procedure</th>
<th>Rating</th>
<th>Comments</th>
<th>Appropriateness</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT abdomen and pelvis, without contrast</td>
<td>6</td>
<td>Reduced-dose techniques preferred.</td>
<td>☢☢☢☢</td>
</tr>
<tr>
<td>CT abdomen and pelvis, without and with contrast</td>
<td>8</td>
<td>If CT without contrast does not explain pain or if without has abnormality that should be further assessed with contrast (e.g., stone versus phlebolith).</td>
<td>☢☢☢☢</td>
</tr>
<tr>
<td>CT kidneys and bladder, unenhanced with Doppler and KUB</td>
<td>6</td>
<td>Preferred examination in pregnancy, in patients who are allergic to iodinated contrast, and if NCCT is not available.</td>
<td>☢☢</td>
</tr>
<tr>
<td>Ultrasound kidneys and bladder</td>
<td>6</td>
<td></td>
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<tr>
<td>MRI abdomen and pelvis, without contrast</td>
<td>6</td>
<td></td>
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<tr>
<td>MRI abdomen and pelvis, without and with contrast</td>
<td>6</td>
<td>See statement regarding contrast in text under “Anticipated Exceptions.”</td>
<td></td>
</tr>
<tr>
<td>CT abdomen and pelvis, with contrast</td>
<td>2</td>
<td></td>
<td>☢☢☢☢</td>
</tr>
<tr>
<td>X-ray intravenous urography</td>
<td>4</td>
<td>☢☢☢</td>
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<tr>
<td>MRI abdomen and pelvis, with contrast</td>
<td>4</td>
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OTHER COMMON QUANDARIES

- Appendix — CT iv/oral contrast, except children and thinner adults (ultrasound)
- Contrast? — CT body yes; CT brain no; MR brain-no; MR L-spine post-op or epidural abscess-yes; MR abscess e.g. diabetic foot-yes
- CT or MR for brain? — acute headache CT 9, MRA head 7
YOU ARE ENCOURAGED

TO USE THE ACR WEBSITE (FREE!)

also RADIAX.COM:
“What to order when”

AND FINALLY

PART TROIS

ICD-10 AKA “SCARY MOVIE”

• Started Oct. 1, 2015

• 68,000 codes (was 13,000)

• One-year “Transition” (Medicare “lax”: accepts “Family of codes” if specific one incorrect)
WHY ICD-10?

- SAVE Government $$$$$$ (denials, penalties)
- “Pay for Performance” (i.e. pay less for less-than-perfect documentation; nothing extra for perfection)
- Data mining for research

“HOW” TO ICD-10

- Basically, a “Documentation Partnership” between Provider and Radiologist
- Increased expectations for History and Signs/Symptoms

4 CATEGORIES TO “TELL A STORY”

- 1. LOCATION
- 2. “SEVERITY”
- 3. CONTEXT
- 4. RISK FACTORS
ICD-10 DETAILS

- Location/Laterality ➔ right arm; left upper quadrant abdomen; right lower inner breast
- "Severity" ➔ acute v. chronic, trauma or not, type of each disease (OA, RA...), sequela
- Causation/Context ("due to", fall from a skyscraper; pre-existing)
- Co-morbid risk factors (history of aneurysm, CHF, cancer...)

ADVANTAGE?

Radiology reports more relevant and helpful

Examples: "Chest pain, sudden onset. Hypertension."

or "Left hand pain, shark attack."

ICD-10 DON’TS

- DON’T need to put Code Number on request
- DON’T say "Rule out"
- DON’T be too wordy — 1-2 sentences enough
ICD-10 BIZARRE?

- V97.33XD: Sucked into jet engine, subsequent encounter
- Swimming-pool of prison as the place of occurrence
- Problems in relationship with in-laws. (don’t we all?)
- S10.87XA: Other superficial bite of other specified part of neck (a Hickey?), initial encounter (first date?)

OBSESSED WITH HITTING THINGS!!

- STRUCK OR INJURED BY:
  - PIG bite W55.41XA
  - Struck by DUCK W61.62XD
  - Collision with ROLLER SKATER V00.01XD
  - Walked into LAMPPOST, subsequent encounter
  - Struck by MACAW, initial encounter (once should be enough)

  - SPACECRAFT COLLISION INJURING OCCUPANT

SUMMARY OF TODAY’S TOPICS

- X-RAY INTERPRETATION: Know normal anatomy and artifacts to avoid overcalling normal structures
- X-RAY QUALITY: Don’t accept substandard images; Get more x-rays pre-MRI
- IMAGING ORDERING: Ask the radiologist and/or use ACR Appropriateness on website
SUMMARY (continued)

- ICD-10: No more “rule/out”—more detail required, including better history and location of symptoms.

THANK YOU!

- P.S.

CALL A RADIOLOGIST AND MAKE FRIENDS!

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