Orthopedic X-Rays most commonly missed



Vukiet Tran, MD, MHSc, MBA

University Health Network Toronto, Canada

COI Disclosure

I am the current Medical Director for Best Doctors Canada.

Presenter: Dr. Vu Kiet Tran

Disclosure

• I missed 80-90% of these cases

I have made many...



ONLY TO SERVE AS A WARNING TO OTHERS.

More mistakes to come

I'VE LEARNED SO MUCH FROM MY MISTAKES...

I'M THINKING OF MAKING A FEW MORE.

Our work environment



Chaotic



Distraction



Objectives

- Recognize the most frequent Xrays missed by ED
 health care professionals
- Understands the factors that lead to misinterpretation
- Learn about some radiographic signs that allows one to mitigate the rate of misses
- Apply tools learned to reduce the miss rate

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Do as I say and not as I do!



Let's start!

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Scaphoid fractures

• No longer commonly missed!

Which is the normal?







Lines Humerus Humerus Anterior Humeral Line а Anterior Humeral Line Proximal Radial Line Proximal Radial Line Radius Radius Ulna Ulna a'

- Anterior Humeral Line
 - Passes through middle third of capitulum
- Proximal Radial Line
 - Bissects through centre of capitulum

Is there a Fracture?







Radial head fractures are often missed

Tip 1

 Know exactly what you are searching for before you look at the film itself

Tips 2

Always get proper perpendicular views (AP and lateral)

Hurt my wrist swinging a club

- Golf clubs, Baseball bats or Direct Blow to palm
- Pain with Gripping
- Pain at Hypothenar Eminence



Hamate Bone Fracture

- Fractures of the Hamate Body can be seen by X-Ray
 - LESS Common than Fractures of the Hook

Hamate body fracture



Hook of Hamate Fracture

- Fractures of the Hamate Hook require a special X-Ray (or CT)
 - o Carpal Tunnel View
 - o 20 degree Supinated Lateral View

Fracture of the hook of the hamate





Hook of Hamate Pull Test

- Examiner pulls on 4th and 5th digits
- Flexor Digitorum Profundus tendons will displace the broken hook and reproduce exact severe pain
- Or you can push on it!





What is the injury?



- Unstable
- Rarely diagnosed
 - Replaces scaphoïd fracture
- FOOSH
- Scapho-lunar Pain





- 1. Terry-Thomas
- 2. Shortening of scaphoïd
- 3. Cortical Ring of the scaphoïd
- 4. Trapesoidal Semi-lunar
- 5. Taleisnik V





Closed fist

What is the injury?



Lunate Dislocation

Lateral view

PA view

- Disrupt 3 Cs
- "Spilled teacup"
- Capitate rest on radius
- "Piece of pie"
- Carpal fractures

What is the injury?





Disruption of C's

Spilled teacup

Capitate rest on Radius

Tip 3, 4, 5, 6

- Be aware of specific occult fracture/dislocation radiographic signs
- Know what a "normal" should look like
- Look for the second injury/fracture
- Avoid being distracted

What is the most commonly missed major joint dislocation?

- Posterior Shoulder Dislocation
- 2% of shoulder dislocations
- 60% missed initially
- Associated with
 - Epilepsy (Seizures)
 - o Electricity
 - o Blow to anterior shoulder

Which is normal? Which is abnormal?





The Power of the Axillary View!



Male with ankle pain



Female with ankle pain



Medial Dome of Talus



Lateral Process of Talus



Posterior Process of Talus



Ankle sprain mimics

• Talar dome

- o Medial dome
- Lateral dome
- o Anterior process
- Posterior process
- o Lateral process

• Anterior process of the Calcaneum



Tip 7-8-9-10

- Your history and physical exam trumps any radiographic finding (or lack thereof)
- For the ankle, apply the Ottawa Ankle Rule
- For any lower extremity injury, always observe the gait and watch the patient walk
- Keep in mind some of the most common misses by ED doctors

Other missed injuries

- Supracondylar fractures
- DRUJ injuries
- Triquetum fractures
- Volar plate fractures (Phalanges)
- Hip fractures
- Patella injuries
- Tibial plateau fractures
- Calcaneal compression fractures

Diagnostic errors in the ED

Diagnosis	Number of errors	Percentage
Fractures	760	79.7
Dislocations	19	2
Tendon injuries	21	2.2
Nerve injuries	5	0.5
Ligament injuries	15	1.6
Foreign bodies	19	2.0
Other trauma	51	5.4
Non-trauma (MI, abdo pain)	36	3.8
Incidental findings	27	2.8
	953	

Why do I talk about this?

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• Emerg Med J 2001; 18: 263-269

Diagnostic errors in the ED

Areas	Specific injury
Shoulder	Clavicle
Elbow	Radial Head, Supracondylar
Wrist	Distal radius, Greenstick radius, Scaphoid, Triquetrum
Hand	Base of 5 th metacarpal, Thumb, Proximal phalange of fingers, Volar plate fracture
Hip	Neck of femur, One or more pubic rami
Knee	Tibial plateau
Ankle	Lateral malleolus, Calcaneum, Avulsion fractures
Foot	Base of 5 th metatarsal
Spine	Odontoid, Jefferson fracture

• Emerg Med J 2001; 18: 263-269

Misread rate by ED docs

Author	Year	Accuracy	Clinically significant	Comments
Fleischer et al.	1983	91.1%	1.2%	Pediatric ED
Mucci et al.	1983		2.5%	
Overton et al	1987		0.59%	
Graton et al.	1990		2.8%	ED residents
Walsh-Kelly et al.	1995	86%	1.4%	Adult ED
Brunswick et al.	1996		1.0%	Adult ED
Preston et al.	1998		0.7%	Adult ED
Berman et al.	2000	99%	0.8%	Adult trauma
Benger et al.	2003	98.5%	0.3%	Adult ED
Petinaux et al.	2008	96.5%	0.056%	Adult ED

Misread rates vary from 0.4-16.4%

Significant misread rates vary from 0.06-3%



How to avoid misinterpretation of an Xray



Examine the patient first



The clinical findings trump everything

Note to self:-She is ALWAYS right.

Examine the joint above and below the fracture



Avoid being distracted



Know what you are looking for



Obtain multiple views of the same are of interest



Be familiar with specific radiographic signs







Look for the second...or third fracture



Look for the ring disruption



Pay more attention to the common misses



Thank you



"IF WE REALLY DID LEARN FROM OUR MISTAKES YOU WOULD BE AS SMART AS EINSTEIN BY NOW ! "