

A nighttime photograph of the Singapore Eye, a large Ferris wheel illuminated with purple lights, set against a dark sky. In the background, the city skyline is visible with various buildings lit up in different colors like blue, green, and red. The foreground shows the dark water of a harbor with some ripples.

# Pelvic Ring Fractures Stable vs Unstable

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Kadlec Regional Medical Center

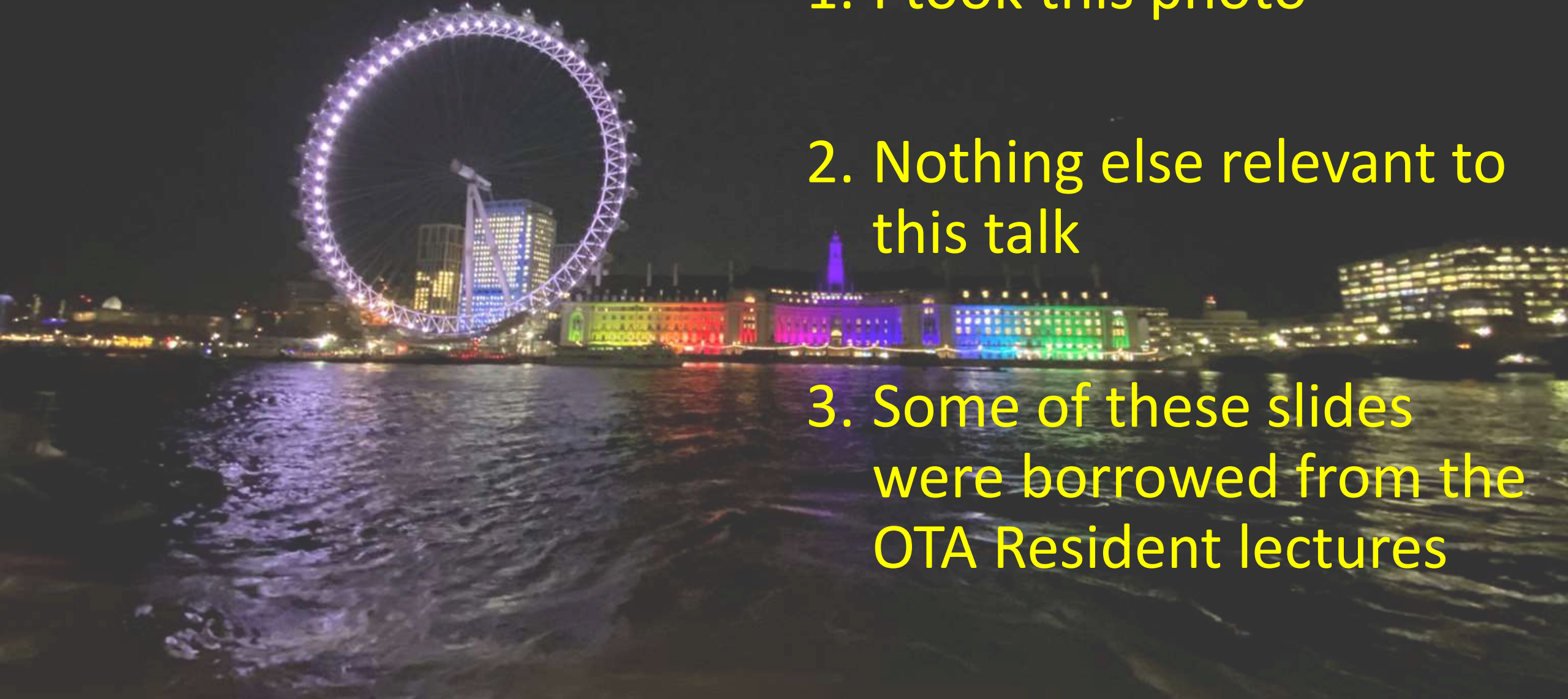
PAOS, Phoenix, AZ February 2020

# Pelvic Ring Fractures: Stable vs Unstable

- Objectives:
  - Review of Pelvic Anatomy
  - Identify clinical and radiographic keys to pelvic stability
  - Initial management of pelvic ring injuries
  - When do we need to ask for help
  - Q&A



# Disclosures:

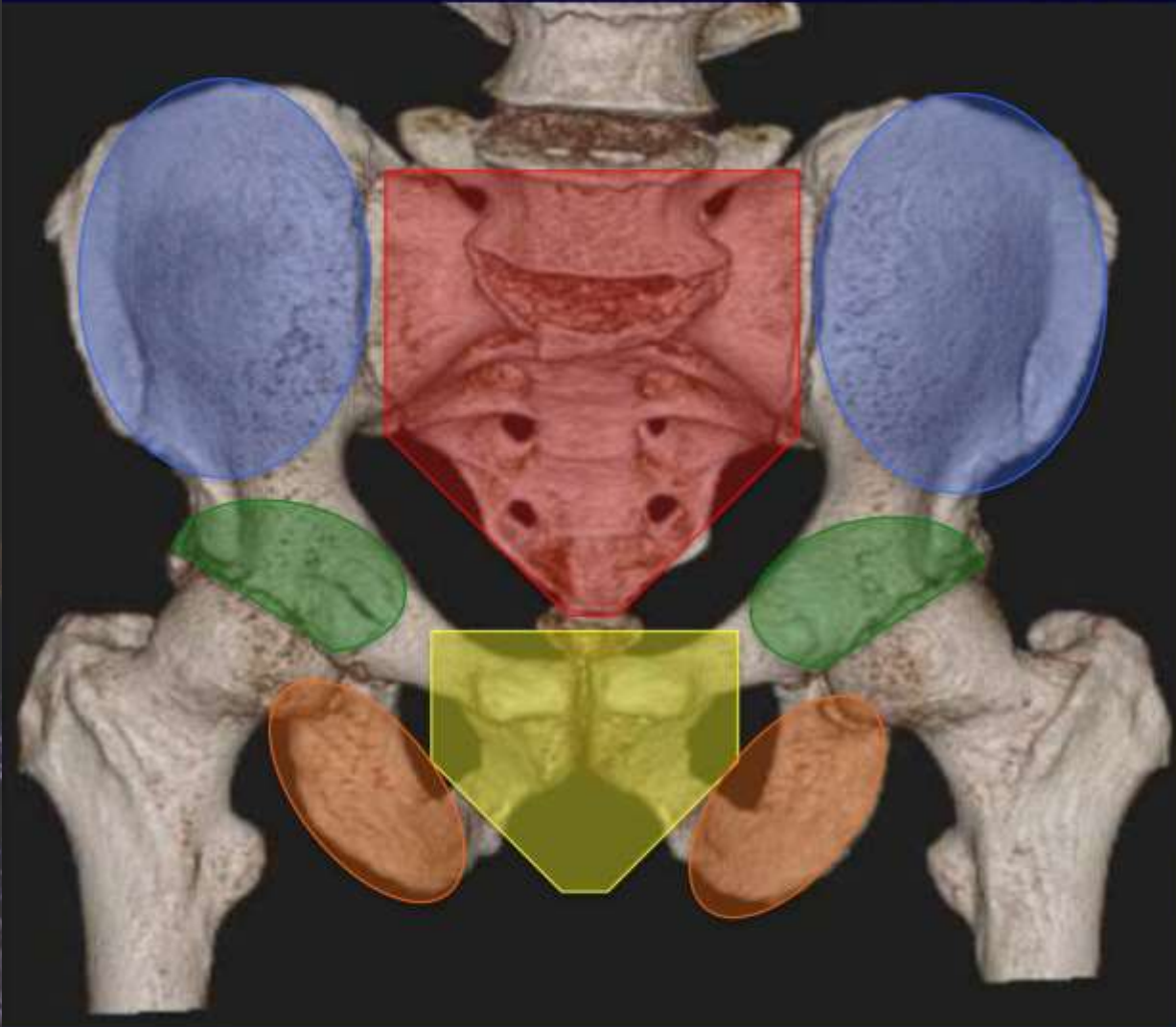


1. I took this photo

2. Nothing else relevant to this talk

3. Some of these slides were borrowed from the OTA Resident lectures

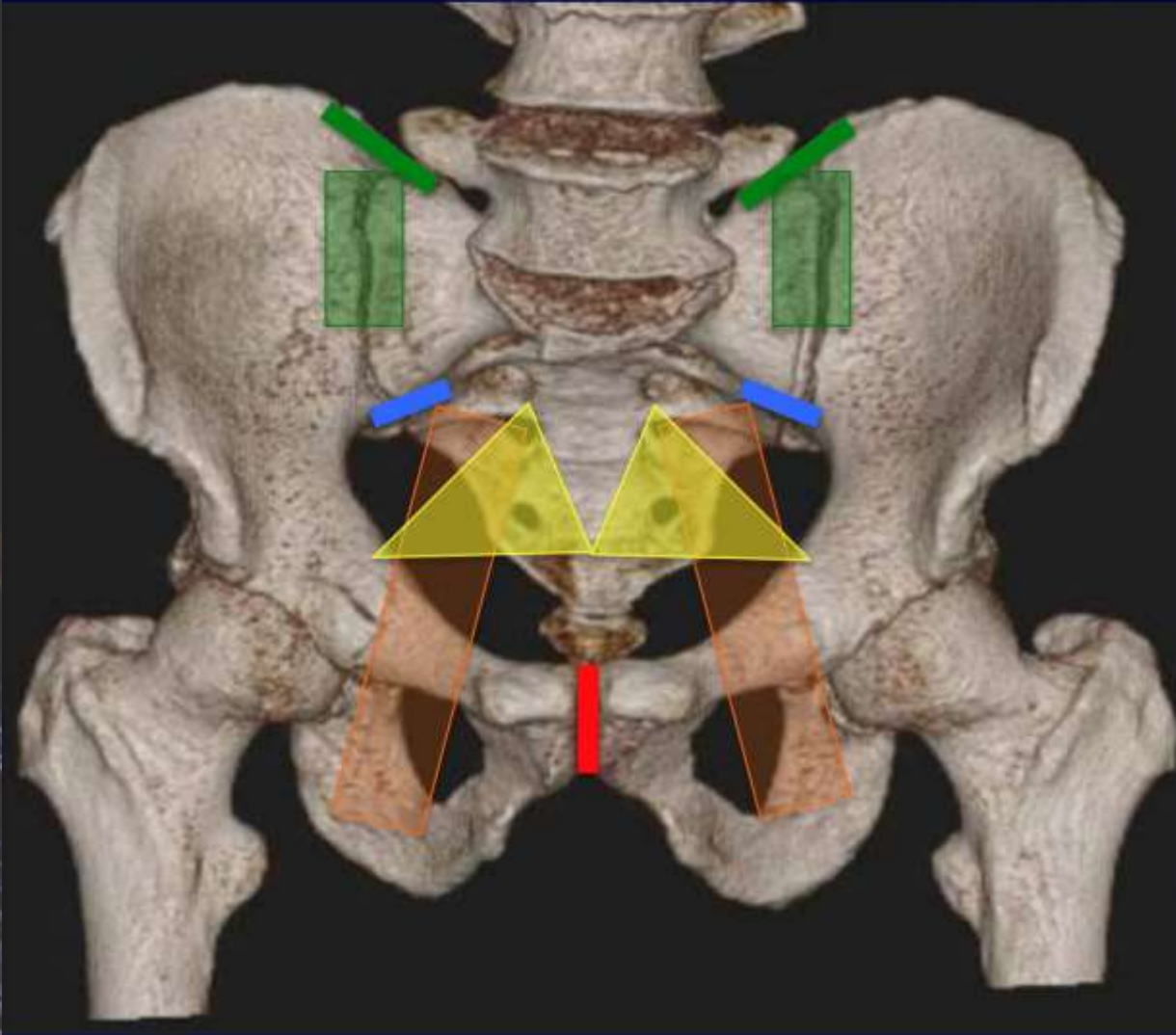
# Osteology



- Sacrum
- Iliac Wing
- Acetabulum
- Pubis
- Ischium

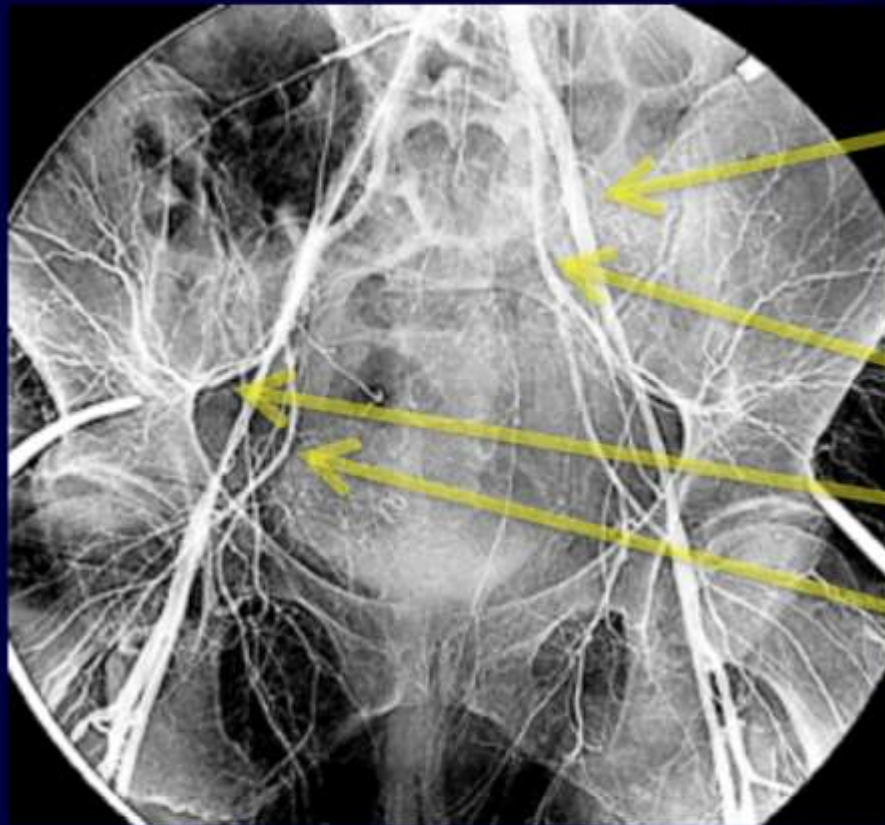


# Ligamentous Anatomy



- Pubic Symphysis
- Anterior Sacroiliac Ligaments
- Posterior Sacroiliac Ligaments
- Sacrospinous Ligaments
- Sacrotuberous Ligaments

# Vascular Anatomy



External Iliac System

Internal Iliac System

- Posterior Division
- Anterior Division



# High energy vs Low energy



# Pelvic Ring Injuries

## Clinical considerations

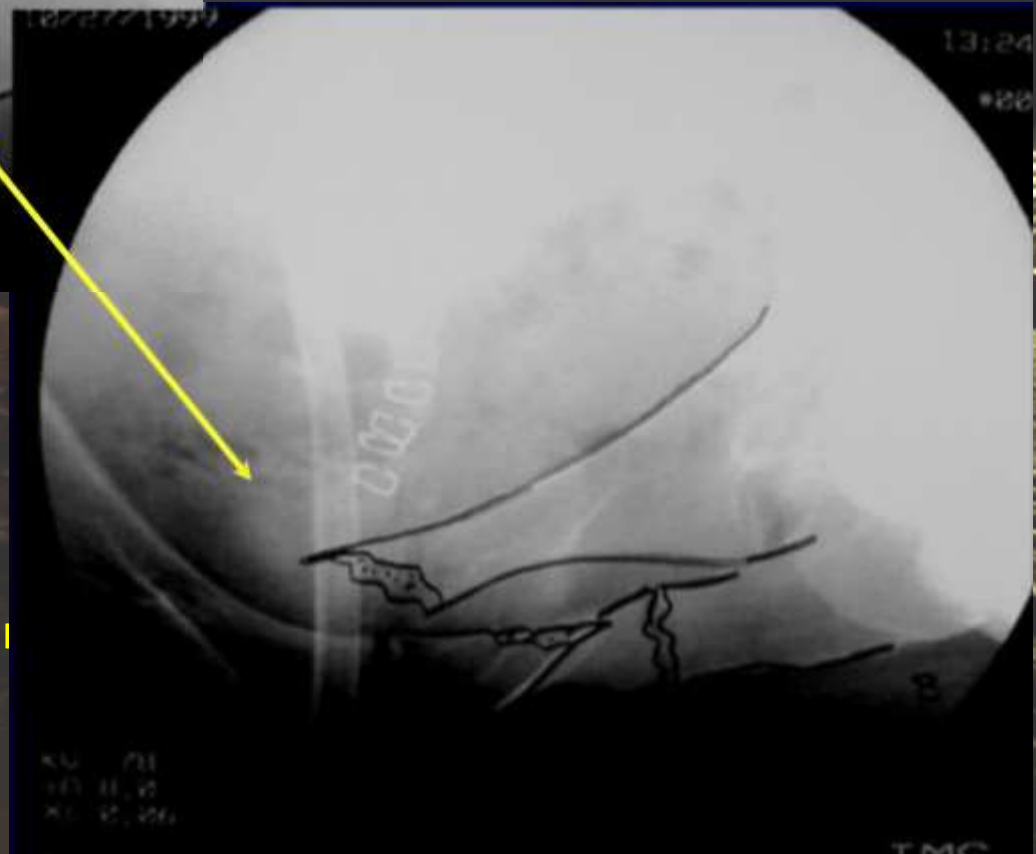
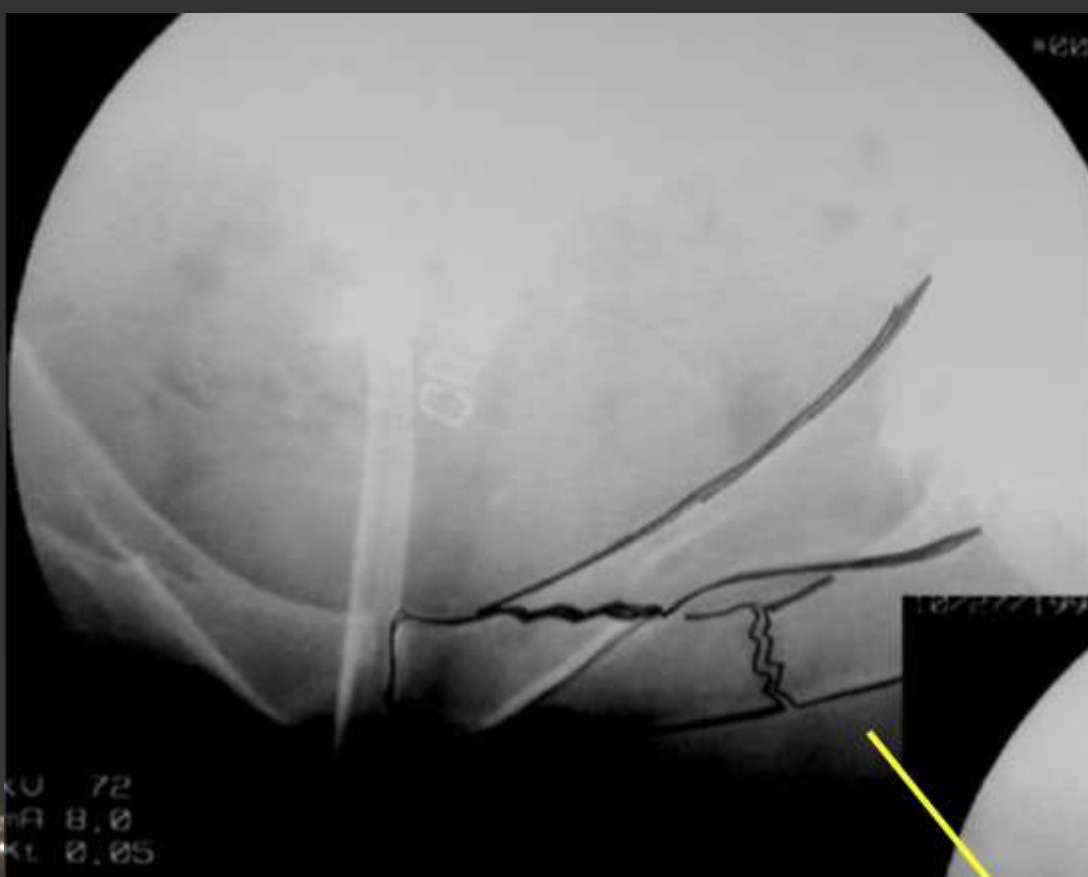


- High Energy vs Low Energy
- Elevated Morbidity/mortality
  - Comorbid injuries
- Hemorrhage





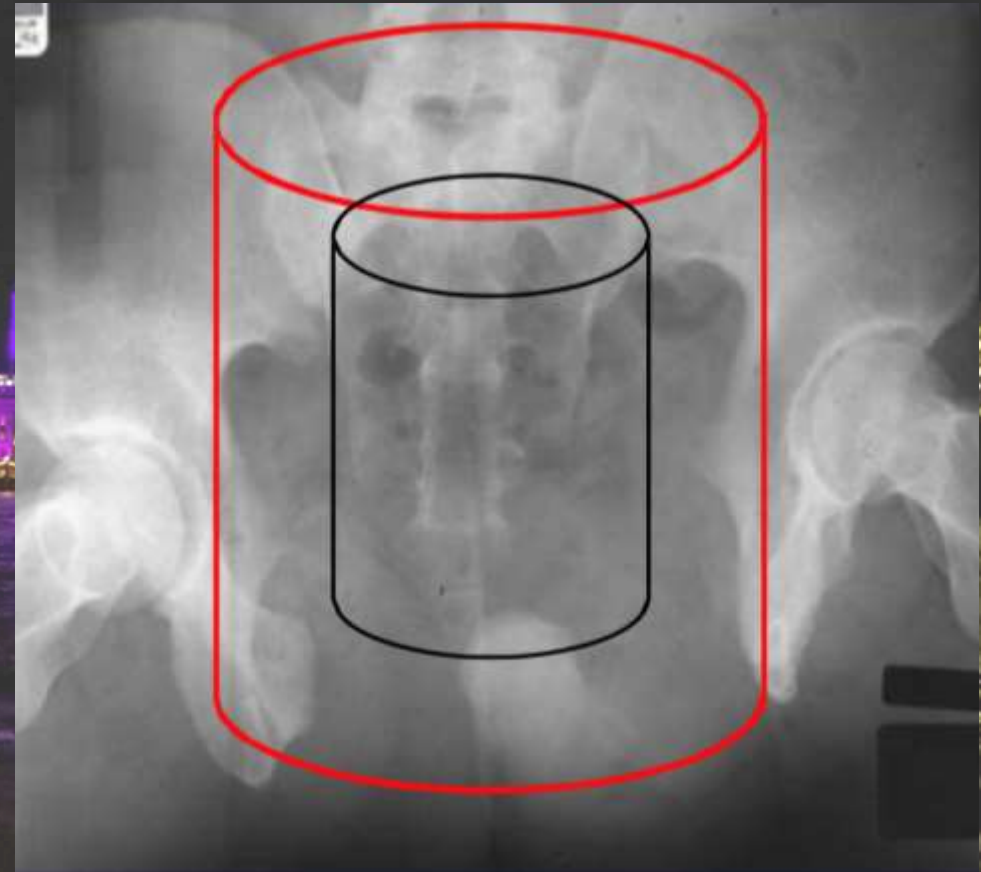
## Physical Exam:



- Lateral compression
- Single examiner preferred
  - Preferably experienced
- Trauma bay XR- AP Pelvis
  - Post-compression XR is important and can change appearance of the injury
  - Documents effect of intervention

# Pelvic Ring Injuries

- Unstable pelvic ring injury may allow hemorrhage to collect in the true pelvis
  - No constraint to provide tamponade
- Volume traditionally assumed to be akin to a cylinder:  $V = \frac{4}{3}\pi r^3$ 
  - Principal is ↑ radius = . ↑ Volume <sup>^3</sup>
- More accurate as a hemi-elliptical sphere





## Primary survey: ABC's

- Airway maintenance with cervical spine protection
- Breathing and ventilation
- Circulation with hemorrhage control
- Disability: Neurologic status
- Exposure/environment control: undress patient but prevent hypothermia



## Physical Exam:

- Swelling/ecchymosis
  - Scrotal/labial edema
- Degloving injuries
  - Fluid waves on palpation
- Limb shortening
- Limb rotation
- Open wounds





# Physical Exam- Open Wounds

- May extend to other
- Colon, rectum, pe
- Grossly contaminate
- irrigation and debrid
- Repair of lacerations





# Stability Defined

- High energy:
  - Radiographic
  - Hemodynamic
  - Biomechanical/Mechanical
- Skeletal motion eliminated/minimized

“Able to withstand normal physiologic forces without abnormal deformation”

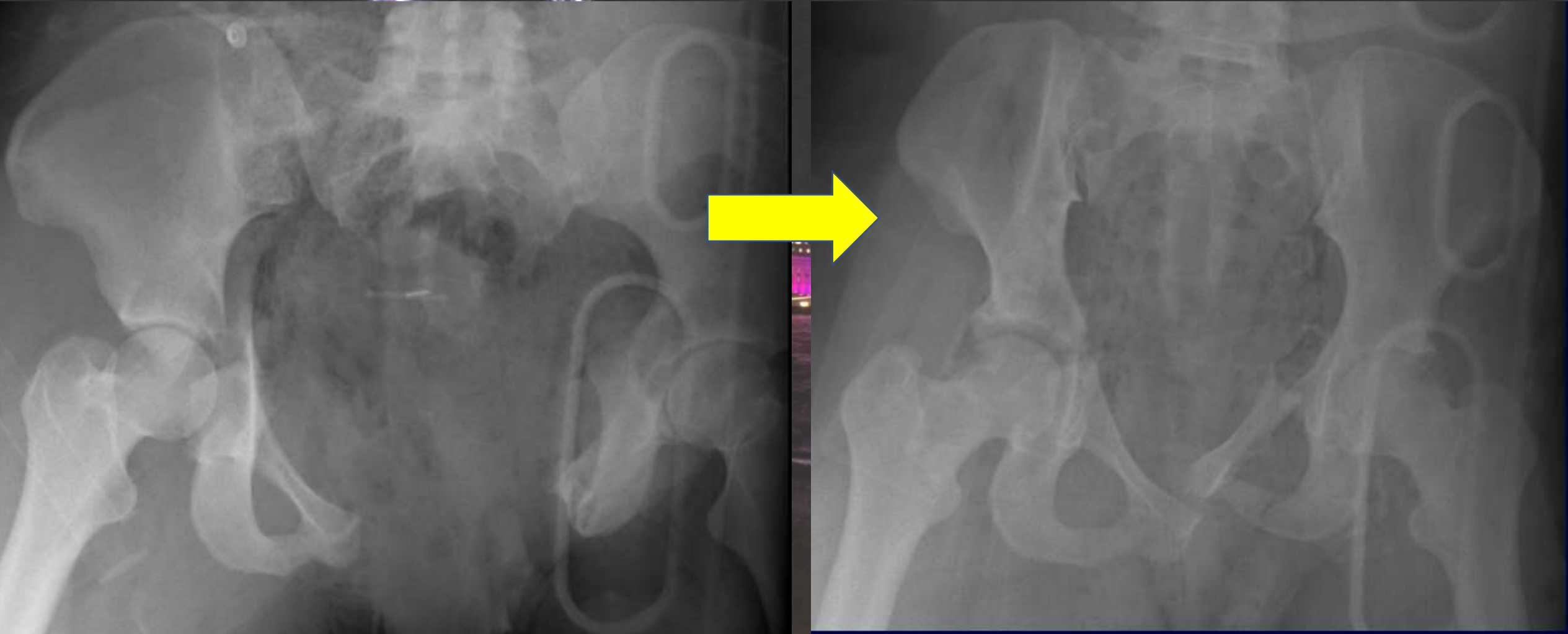
- Low energy:
  - Pain well controlled
  - Able to ambulate/participate in self care





# Imaging

- Take your imaging into the context of the patient's presentation



## AP Pelvis

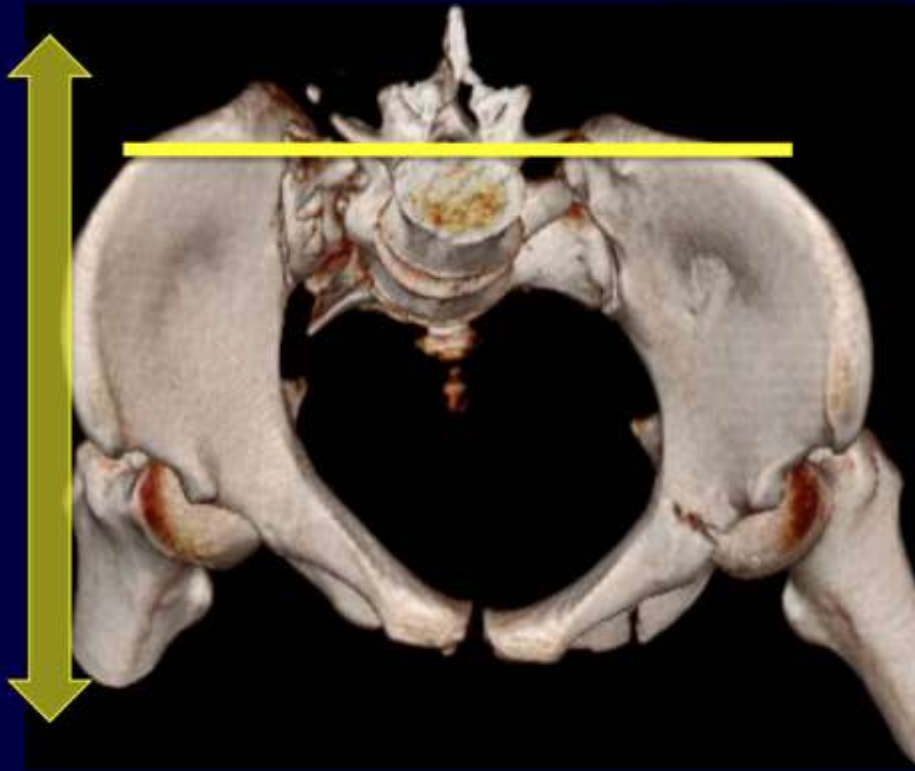


- General idea
  - Stable
  - Unstable
- Immediate interventions if needed
  - Circumferential compression
  - Reduction of hip dislocation



# Inlet

**Anterior / Posterior  
Displacement**

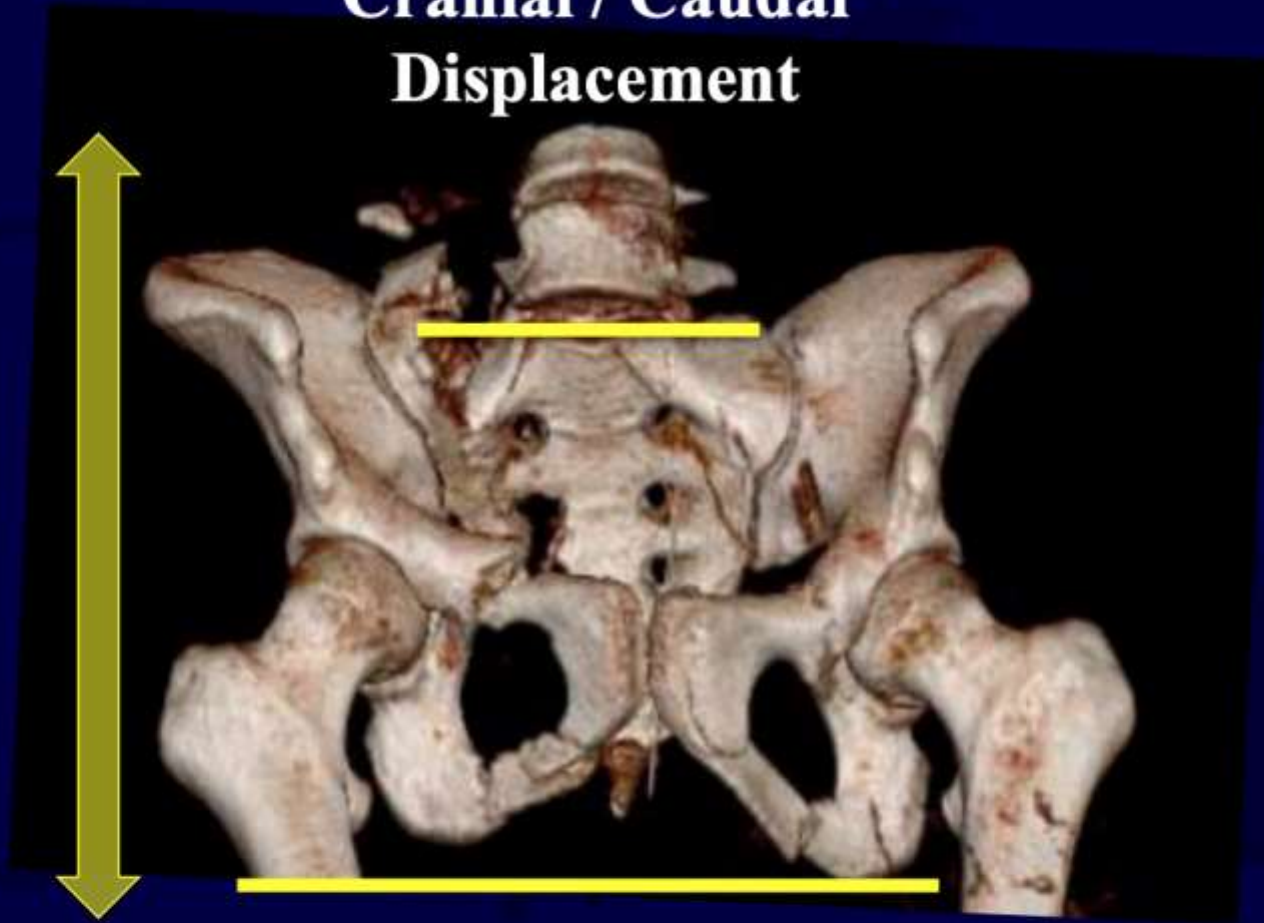


**Internal / External Rotation**



# Outlet

**Cranial / Caudal  
Displacement**

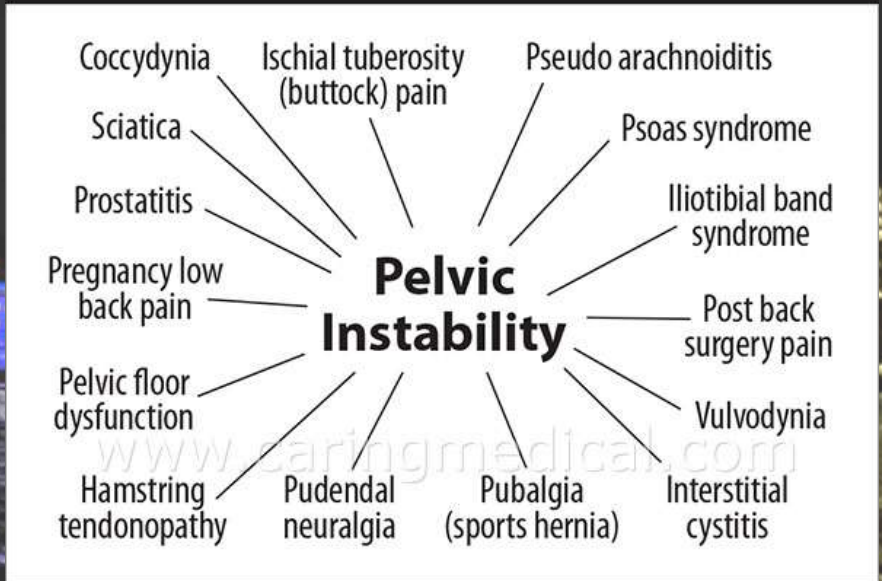




# Radiographic Instability

- Sacroiliac joint displacement of 5mm in any direction
- Posterior fracture gap (instead of impaction)
- 5<sup>th</sup> Lumbar transverse process avulsion

## Chronic pelvic conditions caused by pelvic instability.



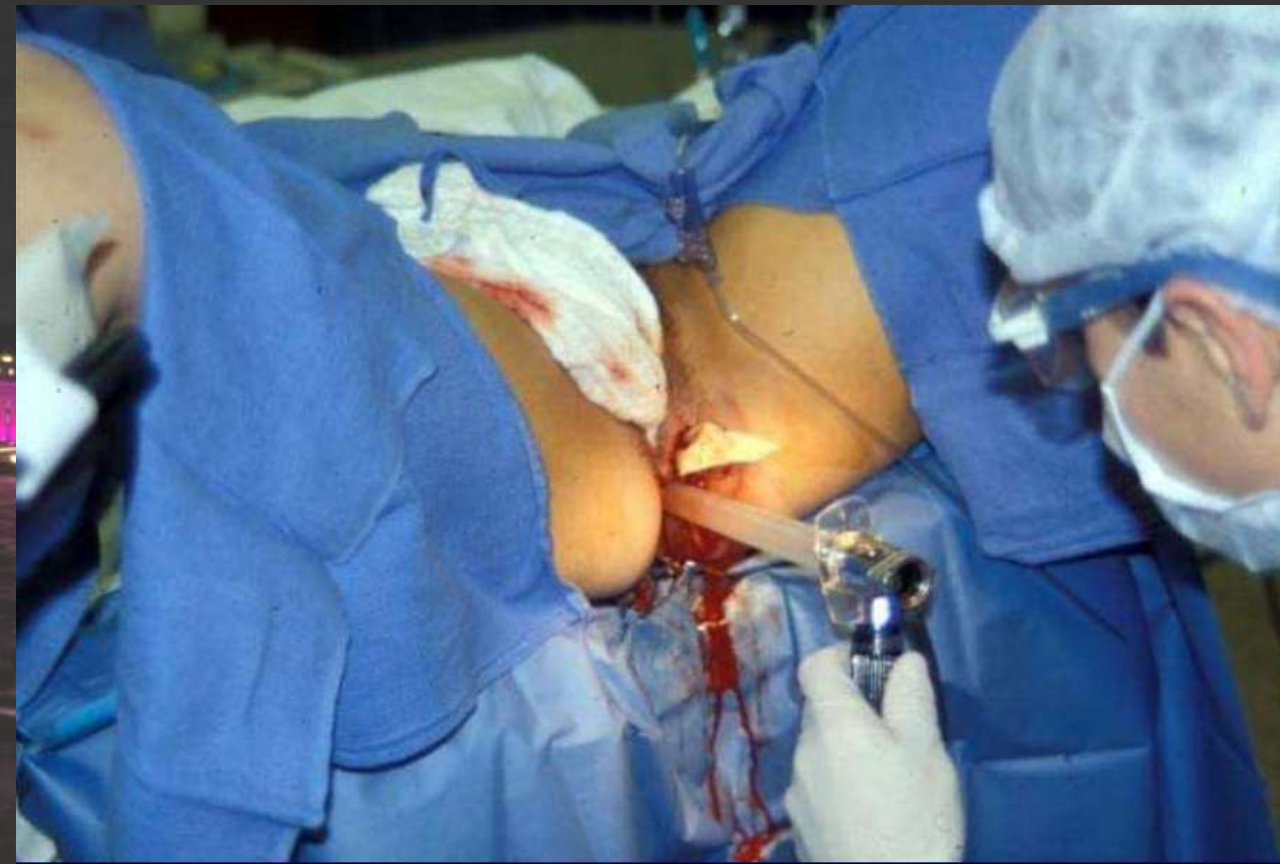
# Initial management



- Treat the **WHOLE** patient!!!!
  - **ATLS Protocol**
    - Good EMS report
    - Appropriate lines/fluids running
    - Team approach
  - Reverse/Treat correctible problems
    - Shock vs Hemodynamic instability
    - Stop/Address obvious sources of bleeding
    - Open fracture antibiotics, tetanus updated



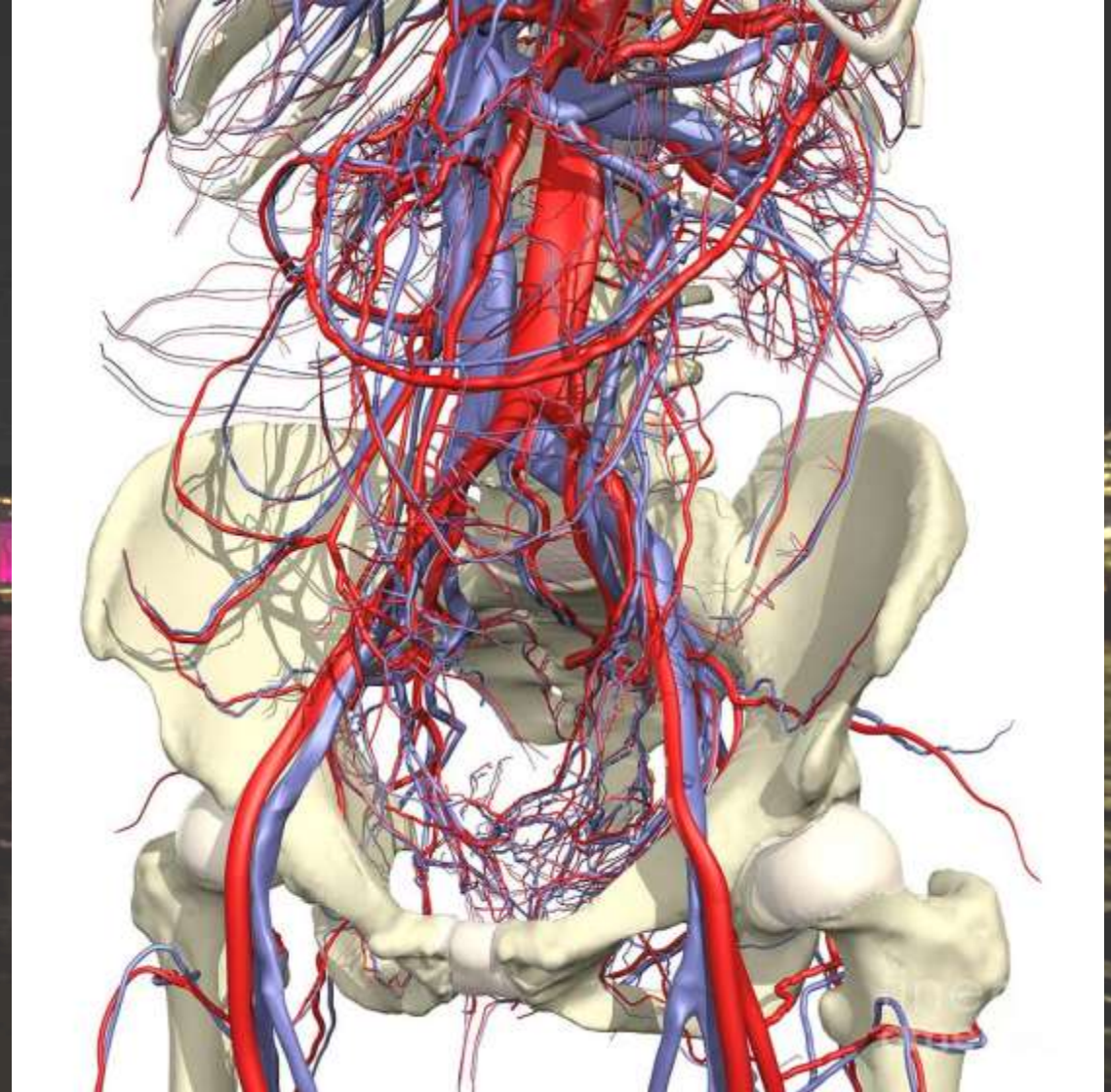
Some wounds can be tricky to find....  
Be suspicious and look at the patient





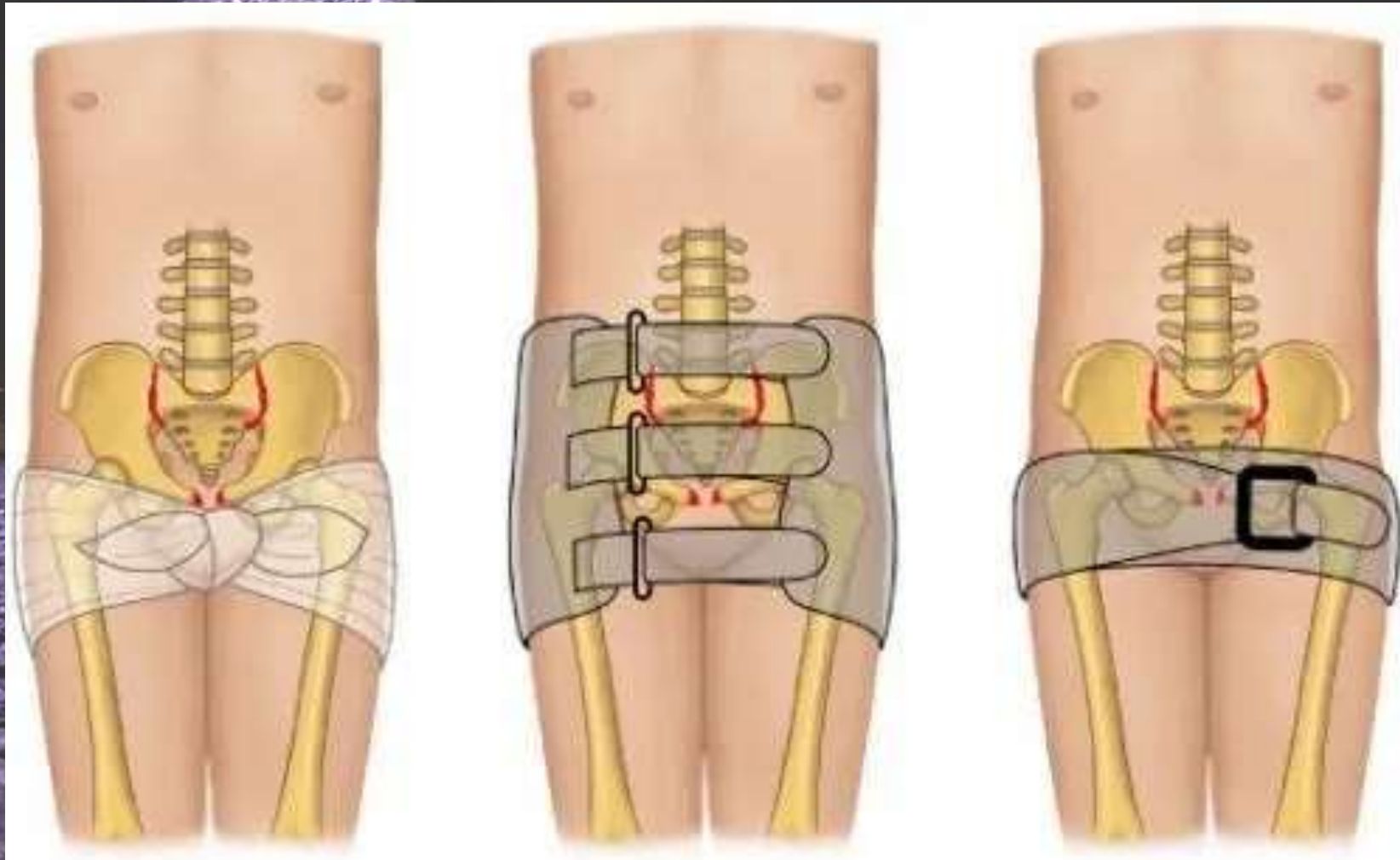
# Intra-pelvic Hemorrhage Control

- Containment, close down space
  - Sheets
  - Binder
  - External Fixation
- Angiography
- Laparotomy and pelvic packing





# Binder or Sheet



# PELVIC BINDERS

**NO**



**YES**





# Beware of Urologic Injuries

- 15% incidence
- Blood at meatus or high riding prostate
- Scrotal/labial swelling/edema
- If indicated, check a retrograde urethrogram
- **CONSULT UROLOGY!**



# Coordination of Care

The **Committee**  
on **Trauma**



- Led by Trauma Surgeon
  - Depends on other injuries
  - Neurosurgery?
  - General surgery?
- Urology?
- OMFS?
- Vascular?
- Others?

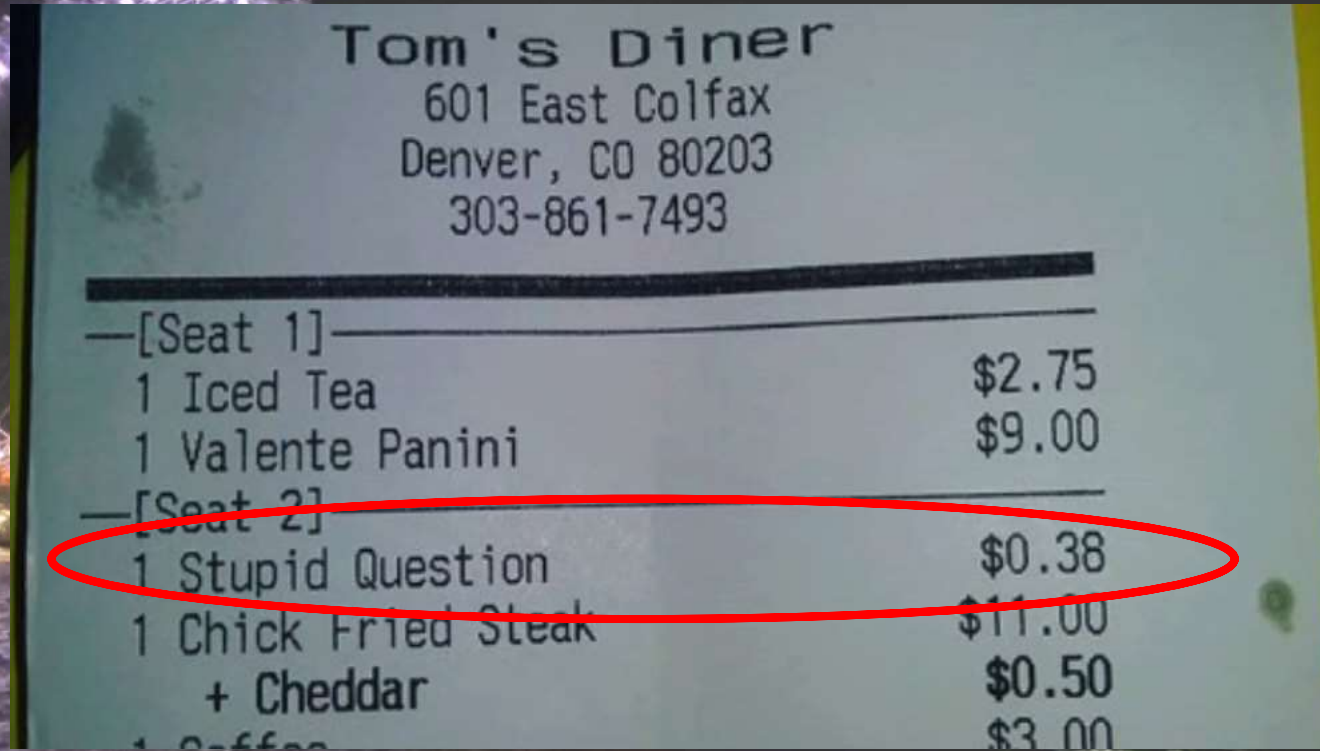


# Considerations for Help...

## It's OK to transfer if needed

- What resources are available at your institution?
  - Potentially life threatening
  - What other injuries are present?
  - What interventions can/should occur early?
- 
- A nighttime photograph of the Singapore Eye, a large Ferris wheel illuminated with white lights, set against a dark sky. The background shows a cityscape with various buildings, some of which are brightly lit with colorful lights (red, blue, green). The foreground is a body of water, likely the Singapore River, with ripples and reflections of the city lights.

# Questions?



Tom's Diner  
601 East Colfax  
Denver, CO 80203  
303-861-7493

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—[Seat 1]—

1 Iced Tea	\$2.75
1 Valente Panini	\$9.00

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—[Seat 2]—

1 Stupid Question	\$0.38
1 Chick Fried Steak	\$11.00
+ Cheddar	\$0.50
1 Coffee	\$3.00

The receipt is overlaid on a night photograph of a city waterfront. In the background, a large Ferris wheel is illuminated with purple lights. To the right, a modern building with many lit windows is visible across the water. The foreground shows the dark, rippling surface of the water.



**Thank you**

