NB Trauma Program
Programme de traumatologie du NB

Horizon Health Network
Réseau de santé Horizon

Vitalité Health Network
Réseau de santé Vitalité

Ambulance NB

New Brunswick Department of Health
Ministère de la santé du Nouveau-Brunswick

Moncton Orthopaedic Group

THE INITIAL MANAGEMENT OF PELVIC AND ACETABULAR TRAUMA

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DISCLOSURES + BACKGROUND

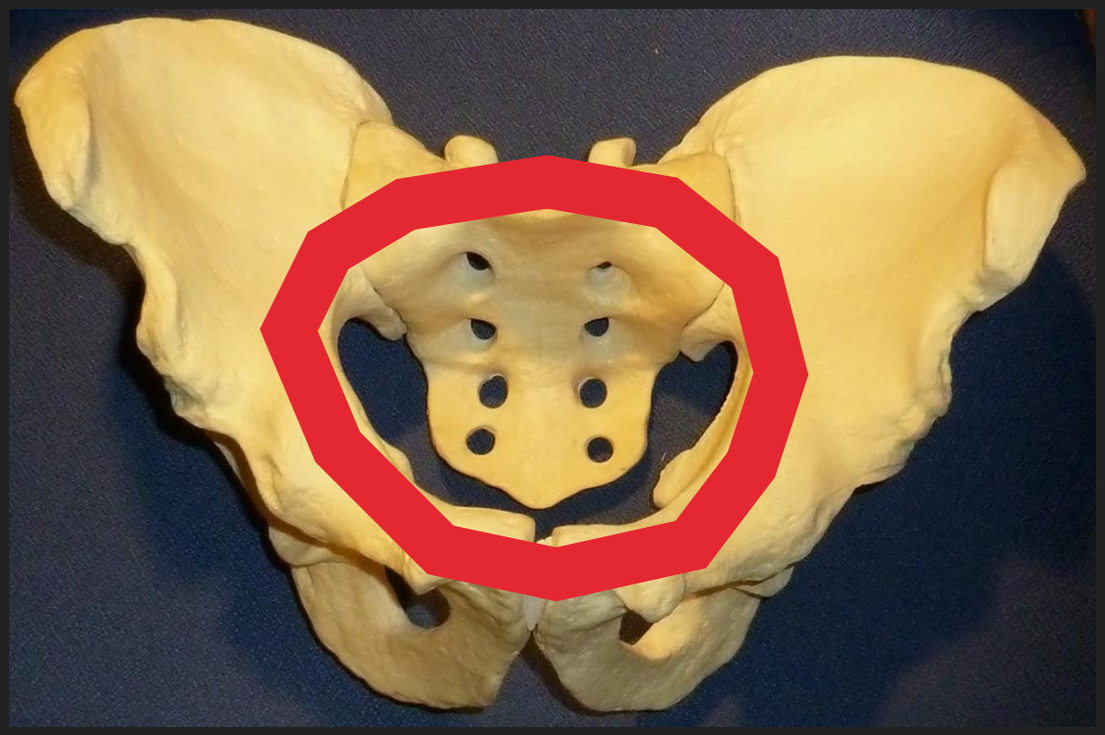
- No.

- Centre de formation médicale du NB
- Orthopaedic residency Université de Sherbrooke
- Orthopaedic Trauma Fellowship, Auckland City Hospital

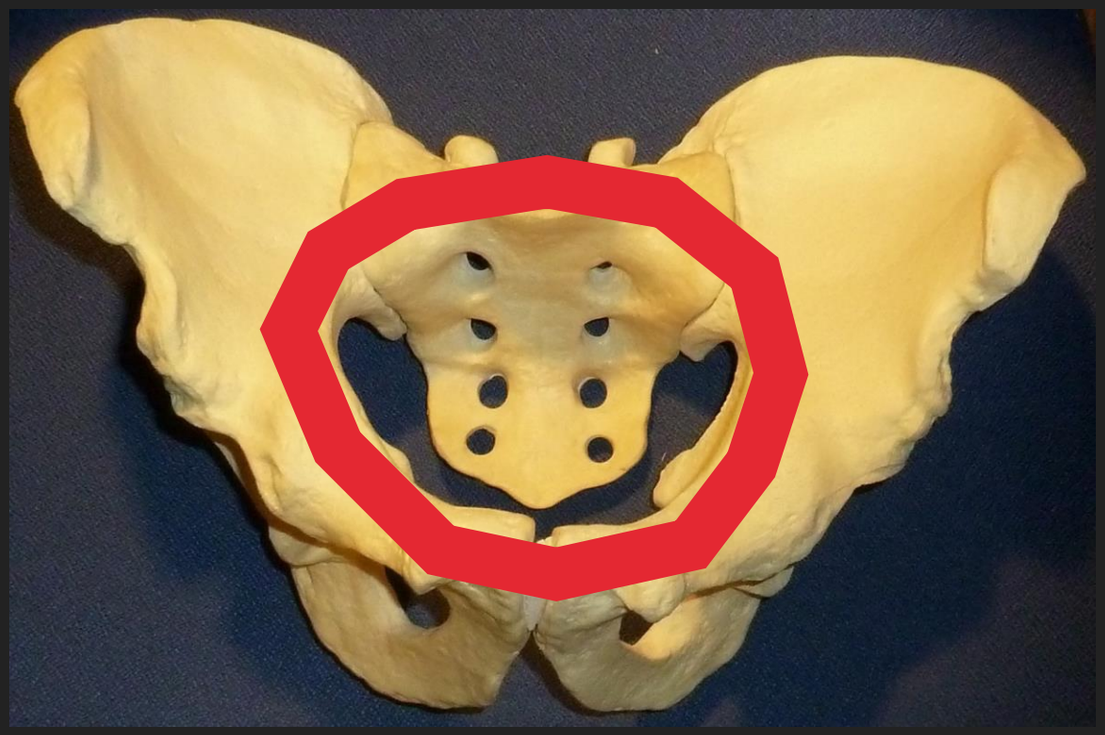
OBJECTIVES

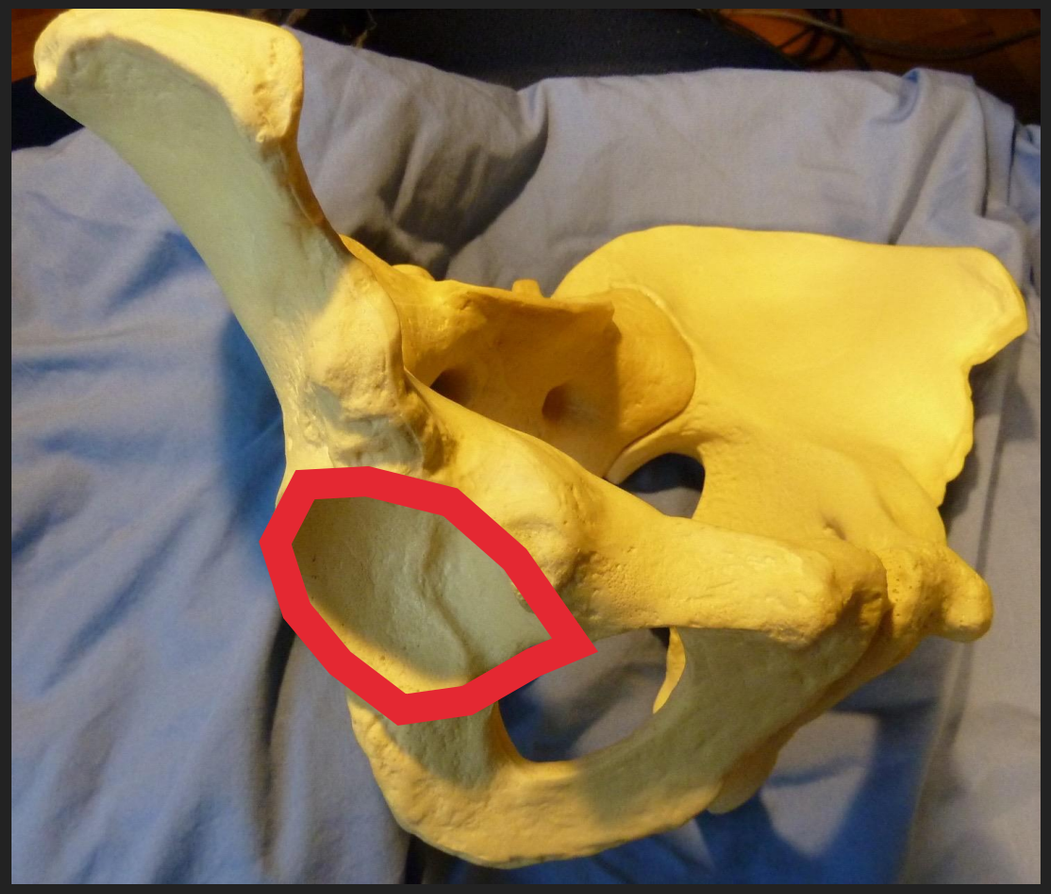
- Prehospital management
- Initial assessment in the ER
- Initial treatment in the ER
- The management of hemodynamic instability
- Preparation for definitive care
- Outcomes

- Pelvic ring # VS acetabulum #

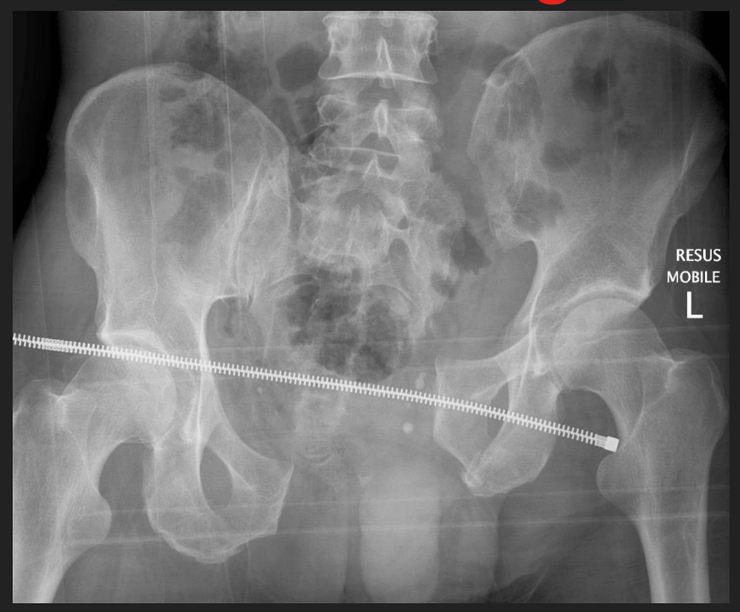


- Pelvic ring # VS acetabulum #

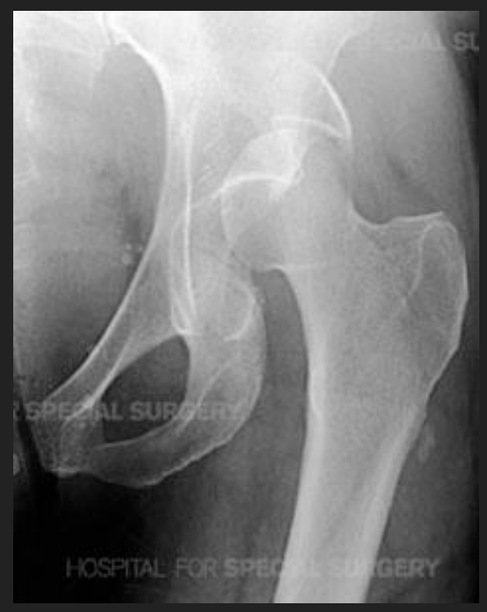




- Pelvic ring fracture VS Acetabulum fracture
  - Both high energy injuries (in non-osteoporotic pts).
    - Ring more associated with life threatening haemorrhage

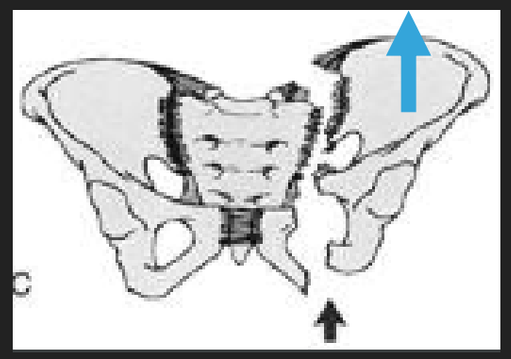


    - Acetabulum more associated with long term threat to hip

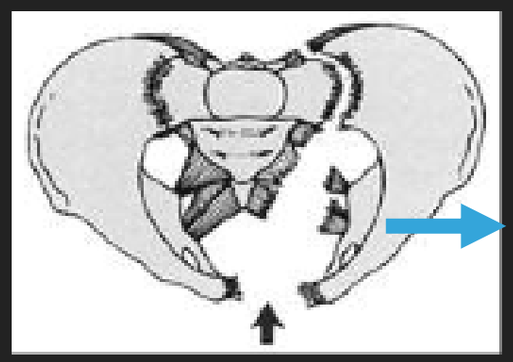


- Pelvic ring # classification
  - Lateral compression

  - Vertical shear



  - Open book



- Acetabulum # classification
  - Hip dislocated or not
  - Associated femoral neck fracture or not
  - Smashed or not so bad

PRE HOSPITAL MANAGEMENT

- Level of aggression ☞ energy of mechanism

PRE HOSPITAL MANAGEMENT

We’re going straight to the OR, NOW.

PRE HOSPITAL MANAGEMENT

Life threatening, hours to days

Associated injuries frequent:

-CNS

-Chest

-Abdo (40%)

-MSK (70%)

-Urological (12%)

PRE HOSPITAL MANAGEMENT

Life threatening, weeks to months, because of complications

PRE HOSPITAL MANAGEMENT

Circulatory collapse from pelvic facture is the exception rather than the rule.

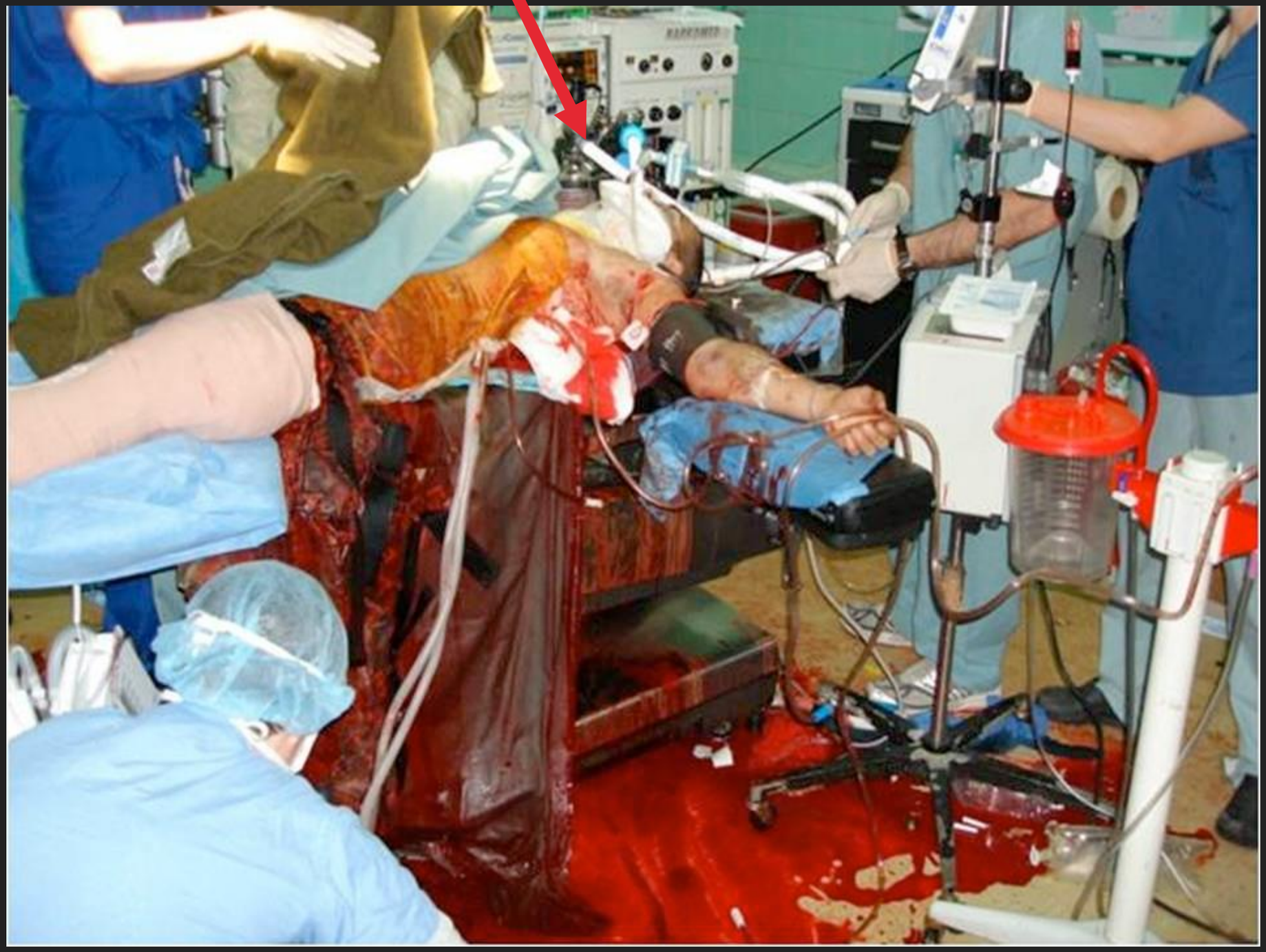
PREHOSPITAL MANAGEMENT

- Use of pelvic binders is advocated by most and has been endorsed by NB Trauma Program.
- “ Ambulance New Brunswick procedures for paramedics should direct use of the pelvic binder for all patients with an unstable pelvis. “
- Assess and correct vital signs.
- Warm IV fluids + pack wounds + immobilize.

http://horizonnb.ca/media/770411/consensus_statement_pelvic_binders_-_december_2015.pdf

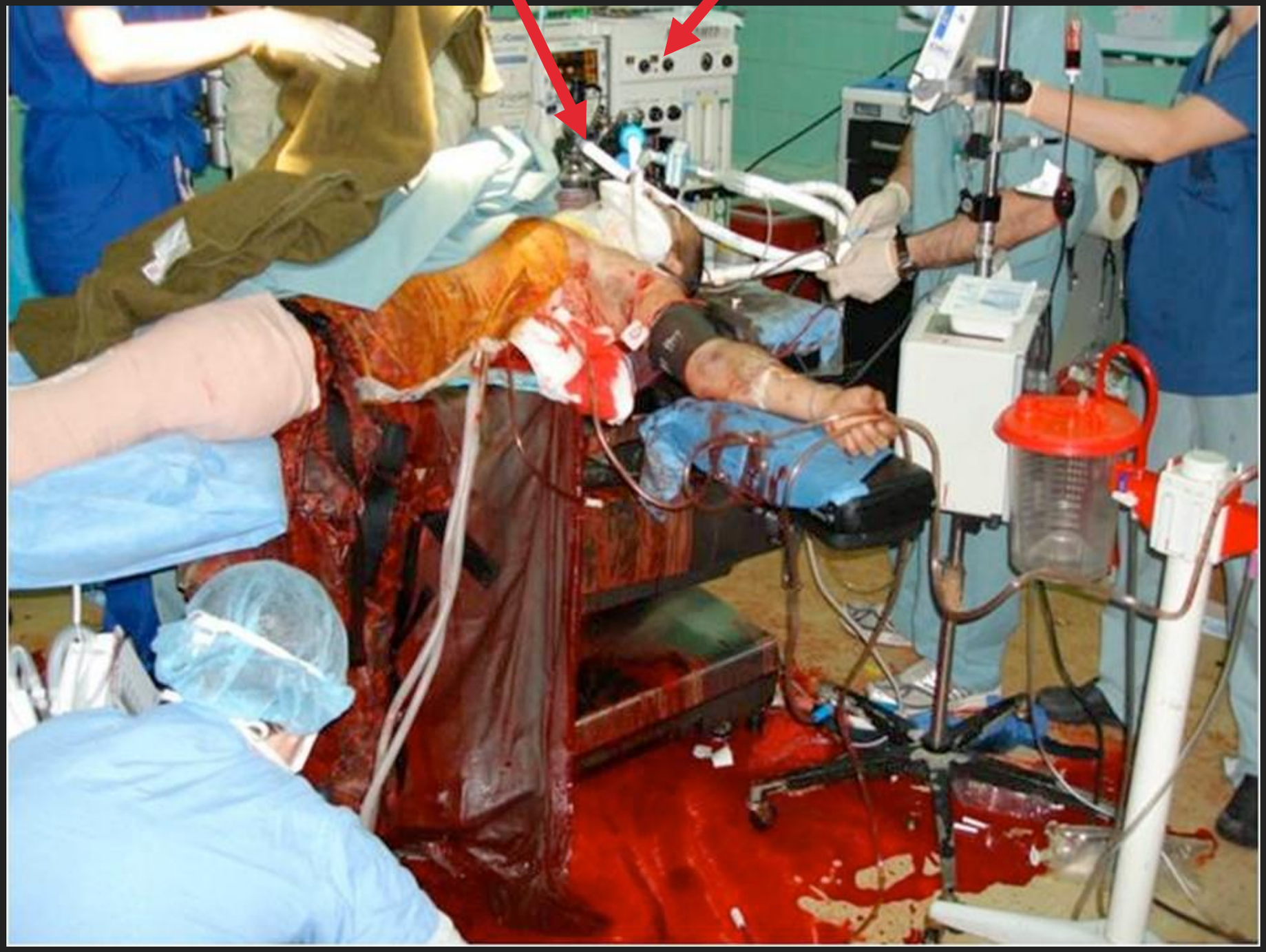
INITIAL ASSESSMENT IN ER

A



INITIAL ASSESSMENT IN ER

A B

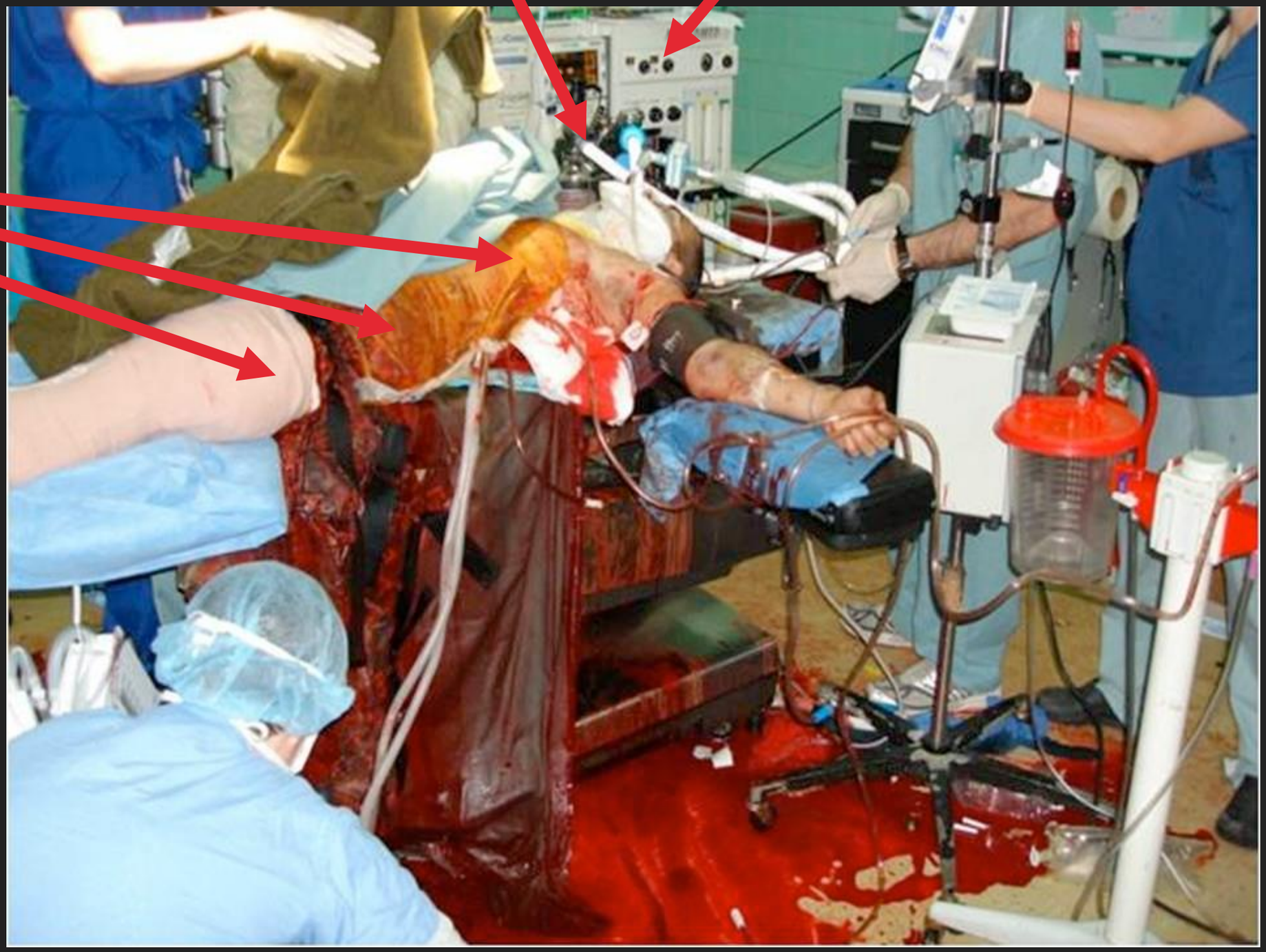


INITIAL ASSESSMENT IN ER

A

B

C



INITIAL ASSESSMENT IN ER

- Is there an injury to the pelvis or acetabulum?
  - Is it contributing to hypovolemic shock?
  - Is there an injury I can identify and treat acutely in the ER?
    - Visual inspection
    - Physical exam
    - AP pelvis film

INITIAL ASSESSMENT IN ER

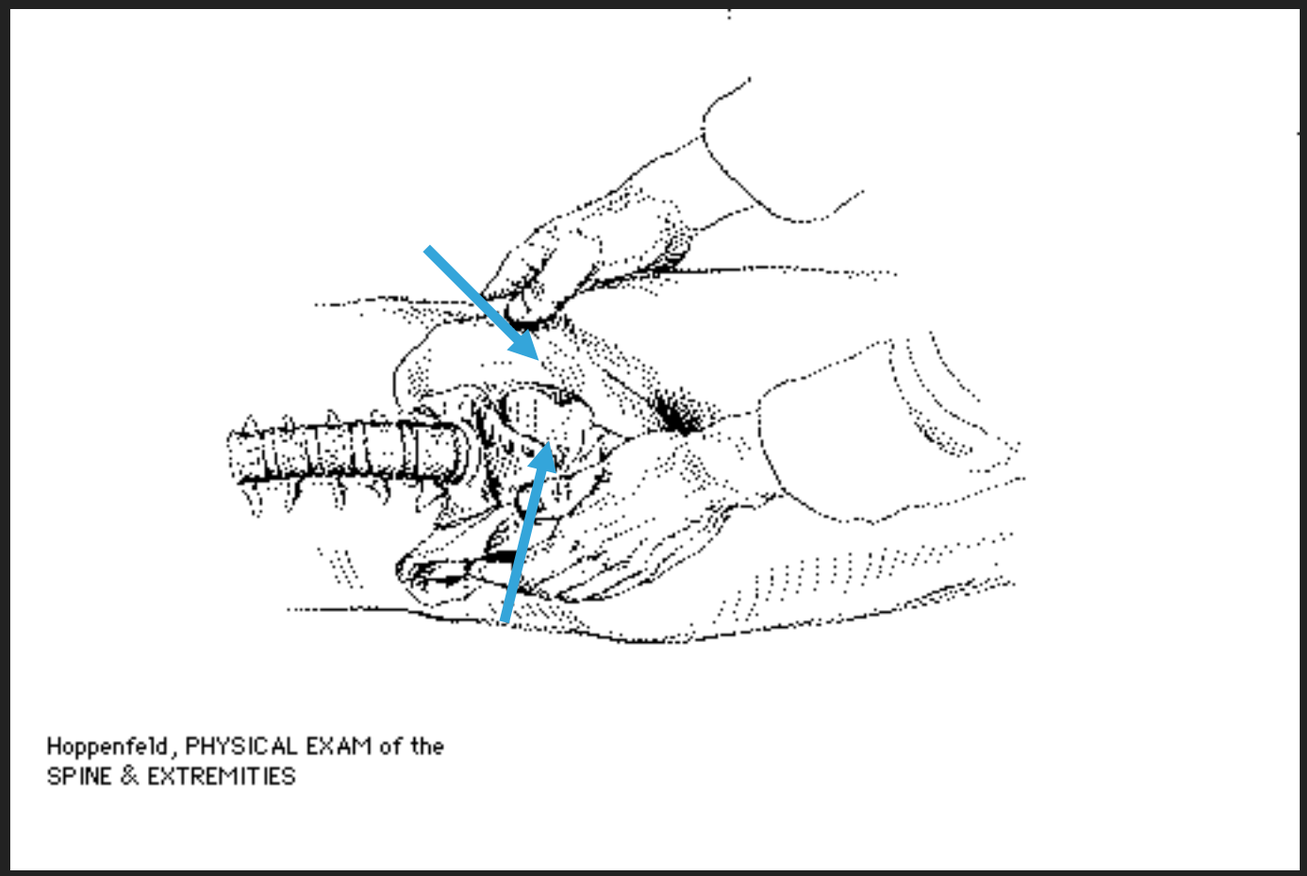
- Essential to expose and observe the skin, front and back.
- Inquire from EMS personnel as to the integrity of the skin under a pelvic binder

INITIAL ASSESSMENT IN ER

- Other clues to pelvic injury :
  - Leg length discrepancy
  - External rotation of lower limb
  - Bruising and swelling over crest, pubis or perineum
  - Neurological abnormality

INITIAL ASSESSMENT IN ER + MANAGEMENT OF HEMODYNAMIC INSTABILITY

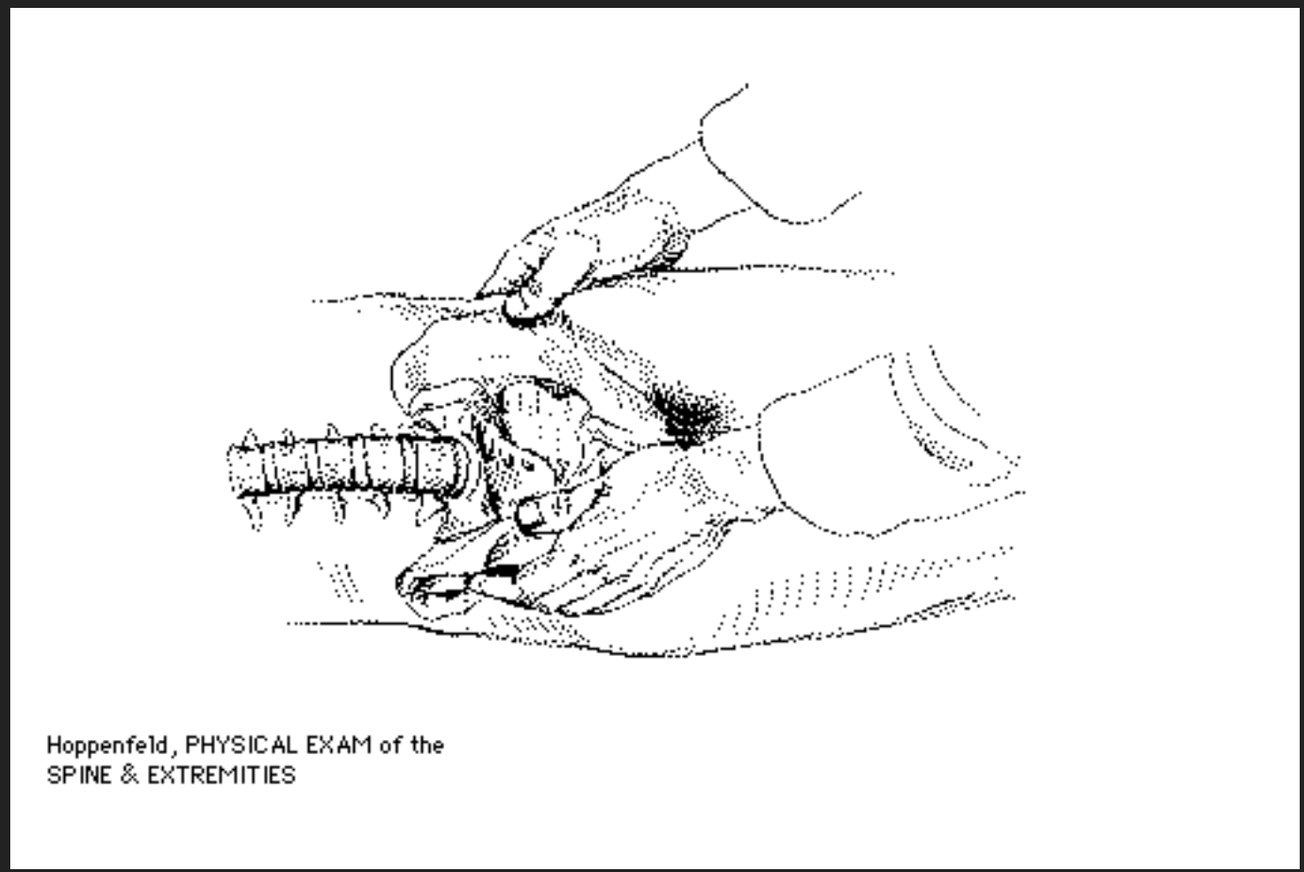
- In the setting of hemodynamic instability, radiological cues to pelvic instability are probably best sought out, rather than manipulation (“springing”) of the pelvis.
- Alternatively, one may push inwards so as to identify any open book component.



Hoppenfeld, PHYSICAL EXAM of the SPINE & EXTREMITIES

INITIAL ASSESSMENT IN ER + MANAGEMENT OF HEMODYNAMIC INSTABILITY

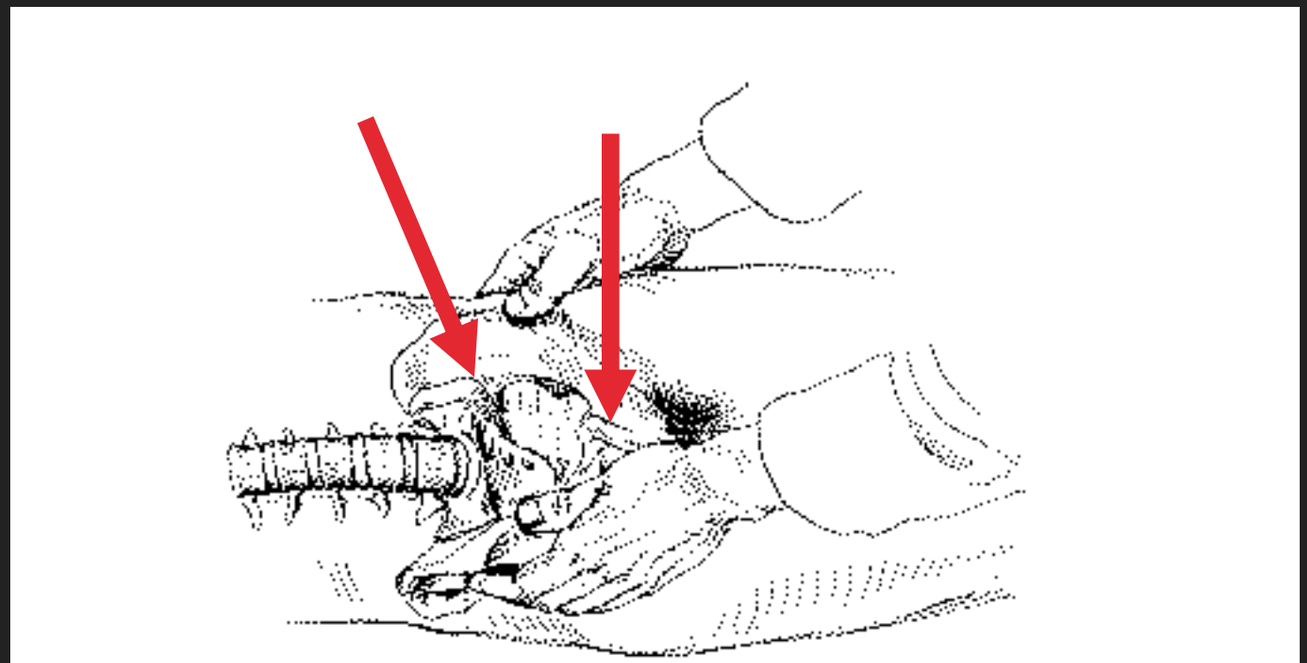
- If instability is felt to be present (with inward force), APPLY BINDER.



Hoppenfeld, PHYSICAL EXAM of the SPINE & EXTREMITIES

INITIAL ASSESSMENT IN ER + MANAGEMENT OF HEMODYNAMIC INSTABILITY

- Manipulating the pelvis in an unstable patient may cause dislodgement of a clot and more bleeding. It generally becomes a safer maneuver after 12-24 hours.



Hoppenfeld, PHYSICAL EXAM of the
SPINE & EXTREMITIES

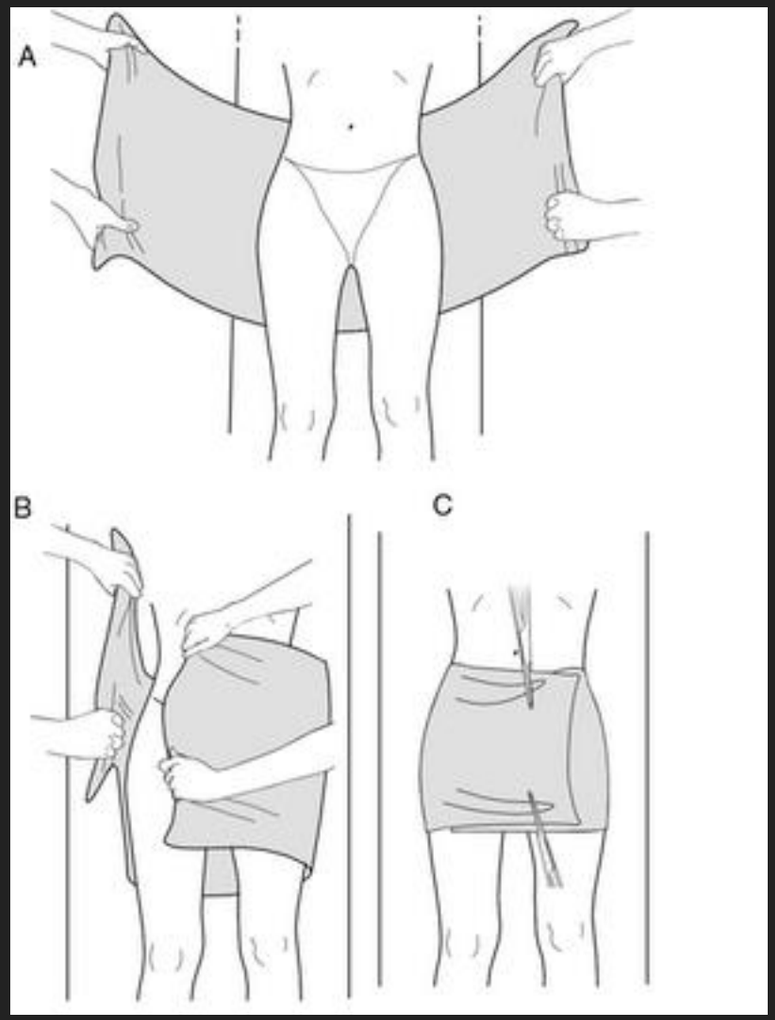
Binder = Sheet = Ex Fix

Binders and sheets should be applied over

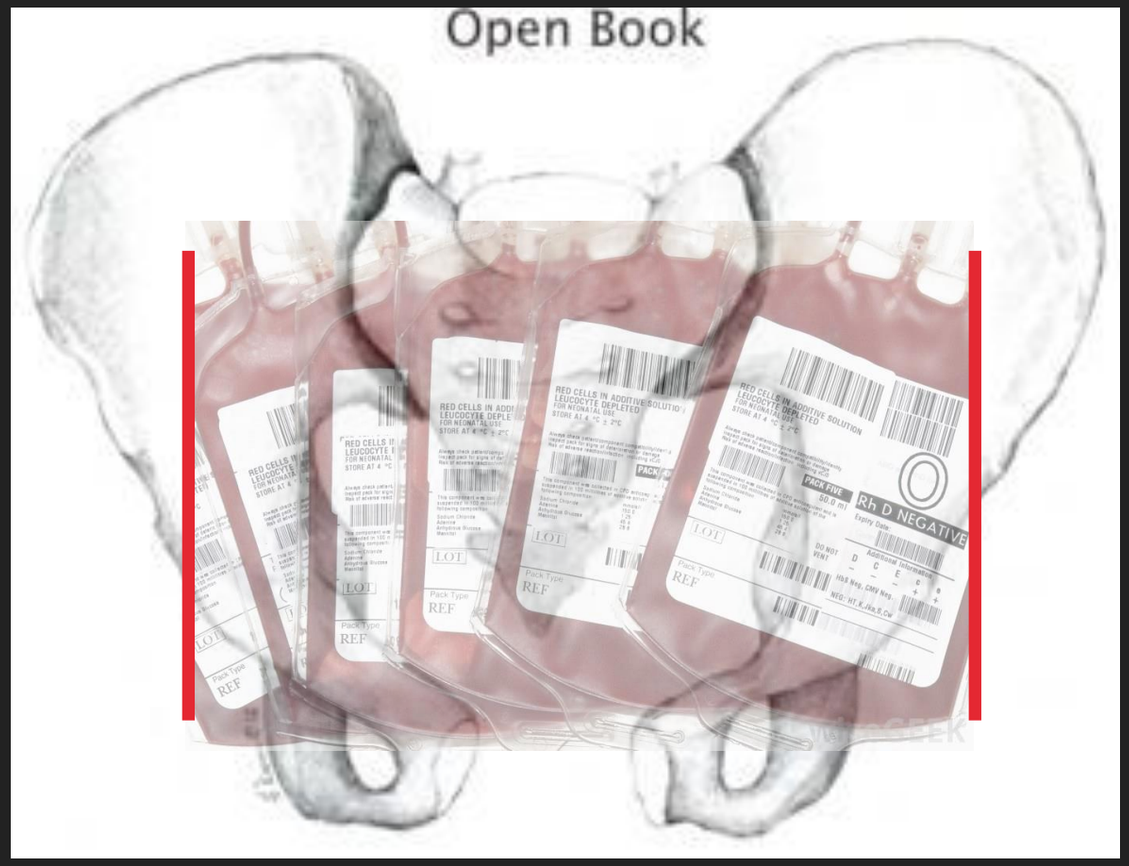
greater trochanters

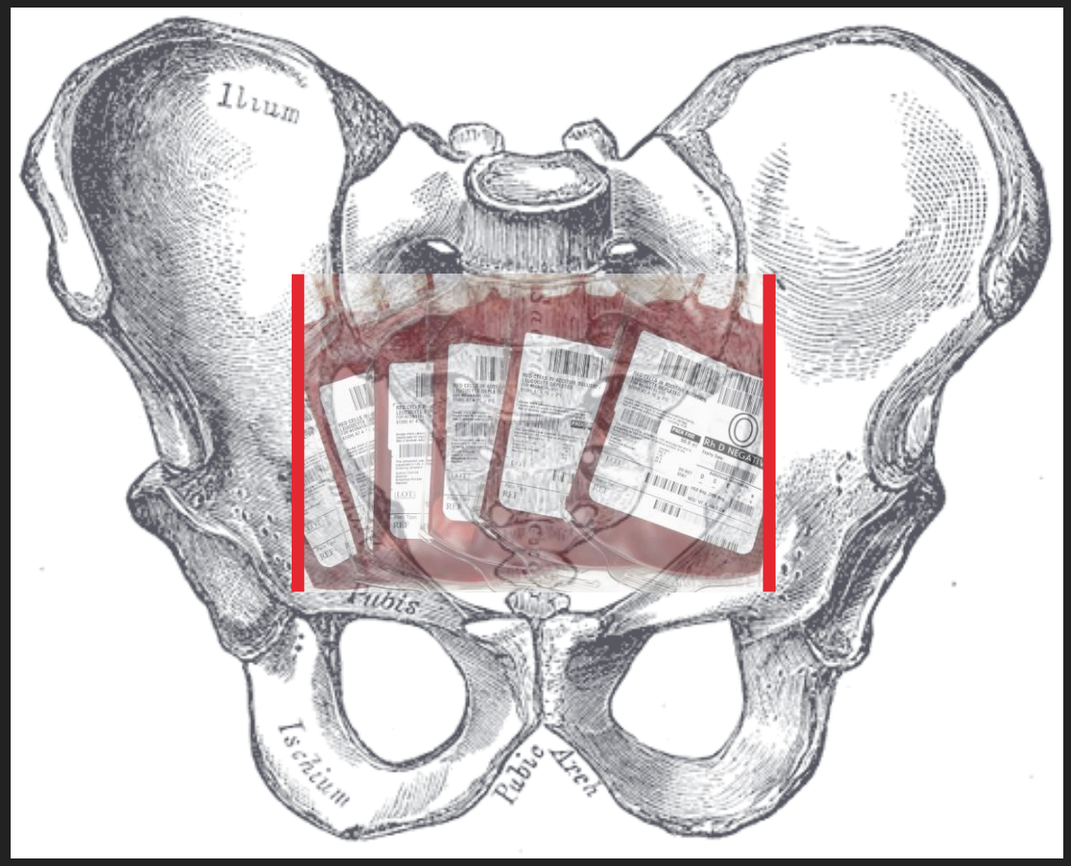
Binder = Sheet = Ex Fix

Binders and sheets should be applied over greater trochanters

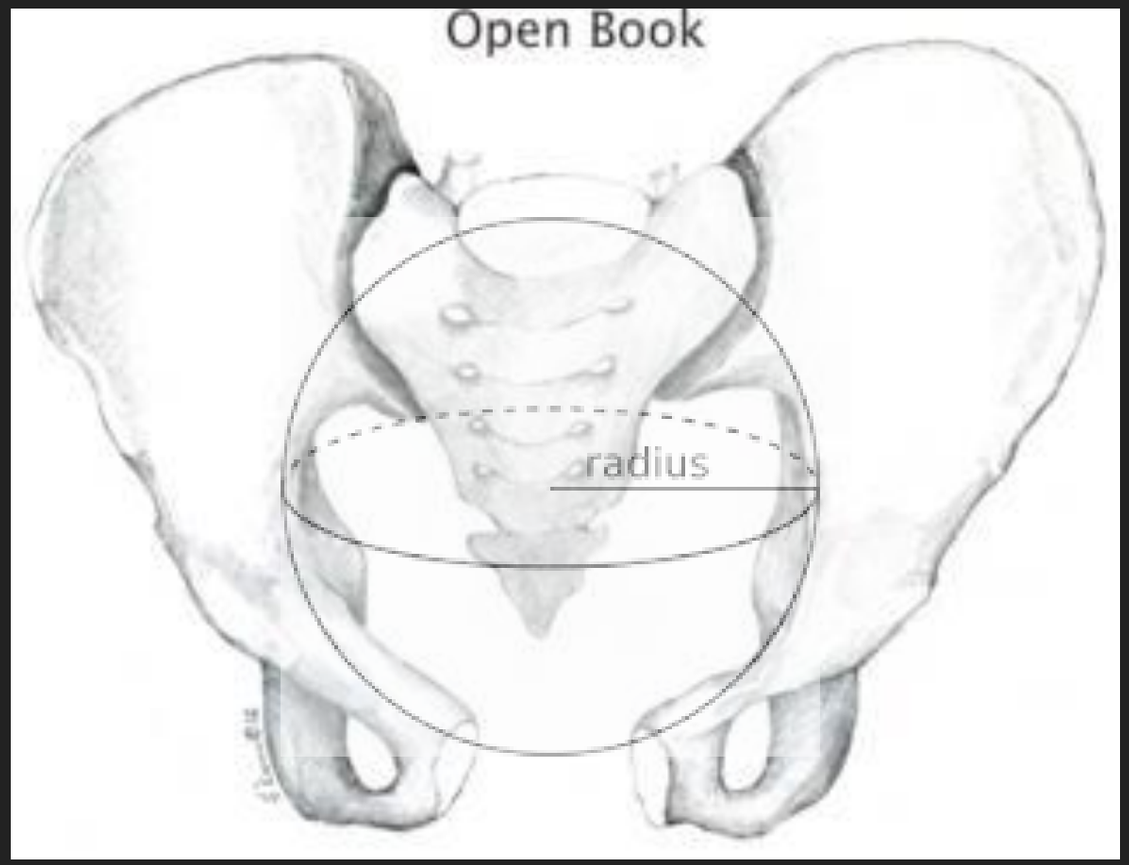


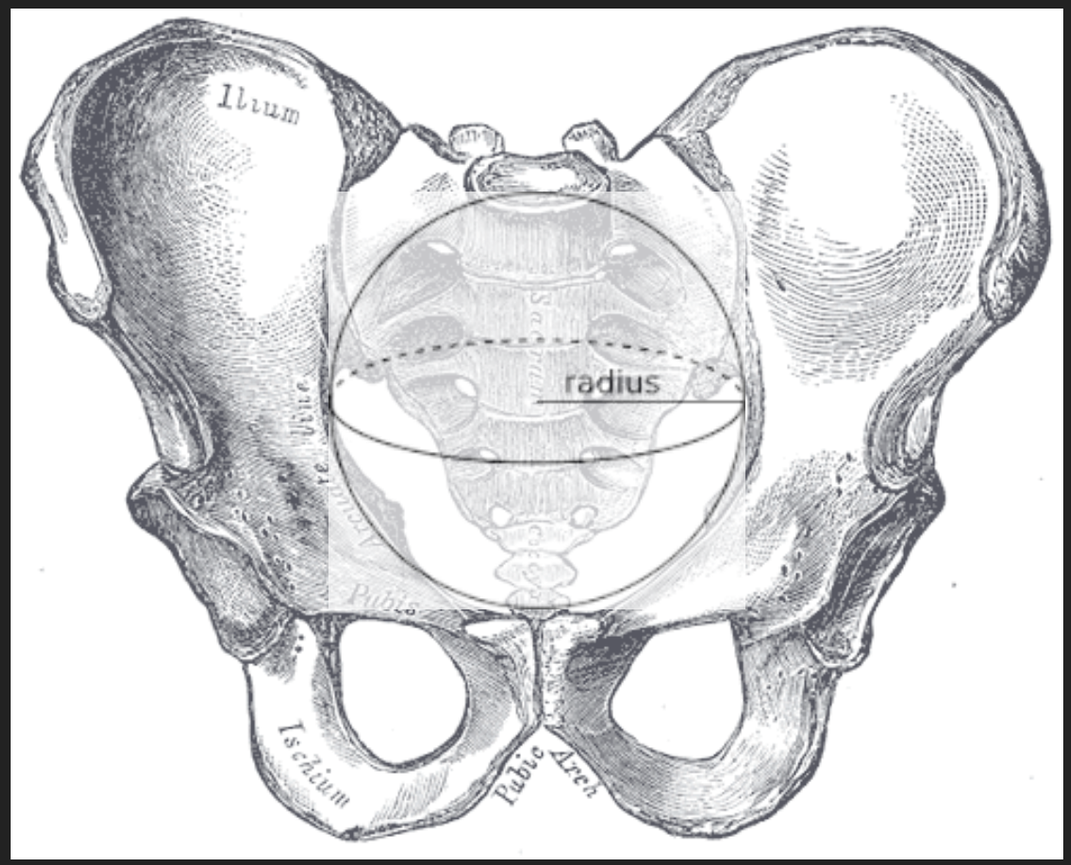
INITIAL ASSESSMENT IN ER + MANAGEMENT OF HEMODYNAMIC INSTABILITY





INITIAL ASSESSMENT IN ER + MANAGEMENT OF HEMODYNAMIC INSTABILITY

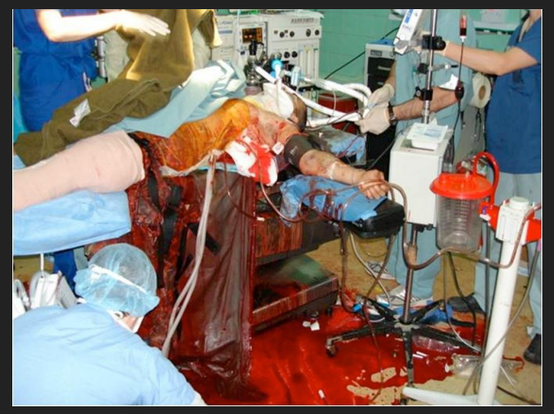




Volume of a sphere = (4/3) πr^3

INITIAL ASSESSMENT IN ER + MANAGEMENT OF HEMODYNAMIC INSTABILITY

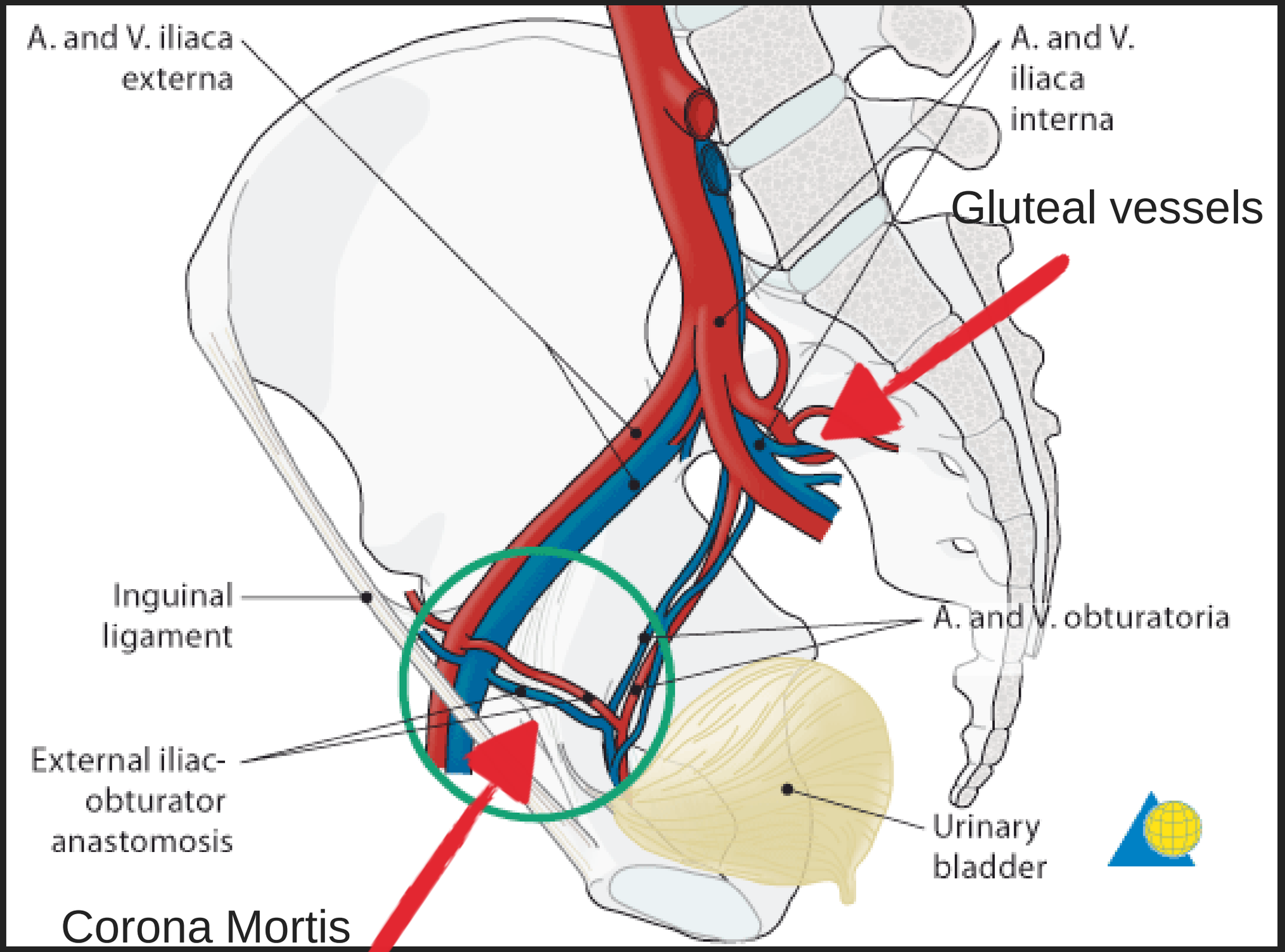
- Shock on presentation to ER is highest predictor of mortality (approx 15% overall).
- Other predictors of mortality include :
  - Large number of blood products over any given timeframe
  - High ISS



  - Venous or cancellous bleeding 80-90%
  - Arterial bleeding in 10-20% (may be higher)

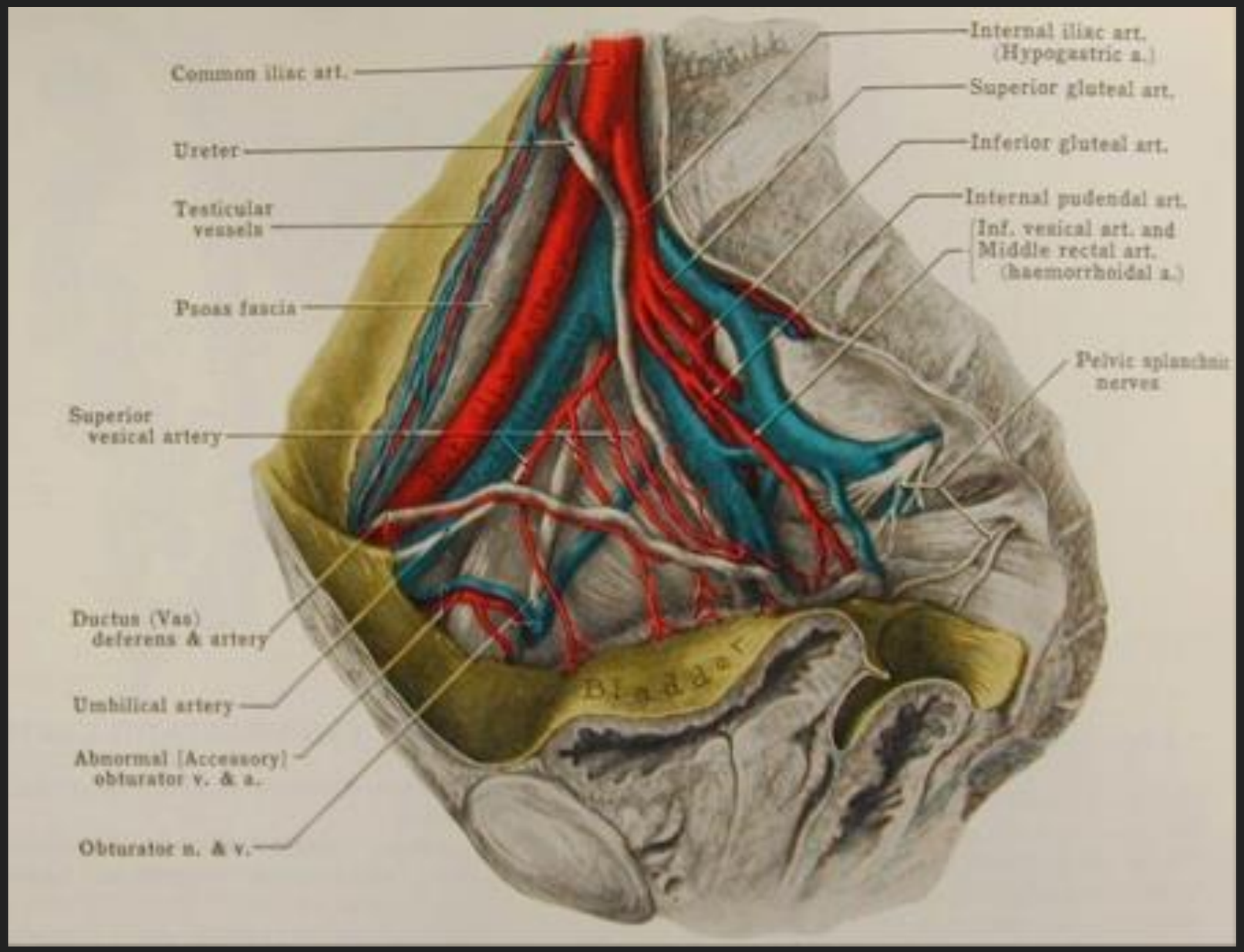
MANAGEMENT OF HEMODYNAMIC INSTABILITY

Common arterial sources of bleeding



Pelvic venous plexus - valveless

Bleeding will eventually tamponade due to filling (by blood or sponges) of the true pelvis which is extraperitoneal.



MANAGEMENT OF HEMODYNAMIC INSTABILITY

- Large bore access
- Warm fluids quickly
- No response to 2 L crystalloid = initiate 1-1-1 transfusion protocol or as per local institution
- Tranexamic Acid
- Obtain AP pelvis + trauma CT ideally
- Further treatment depends on other injuries + needs

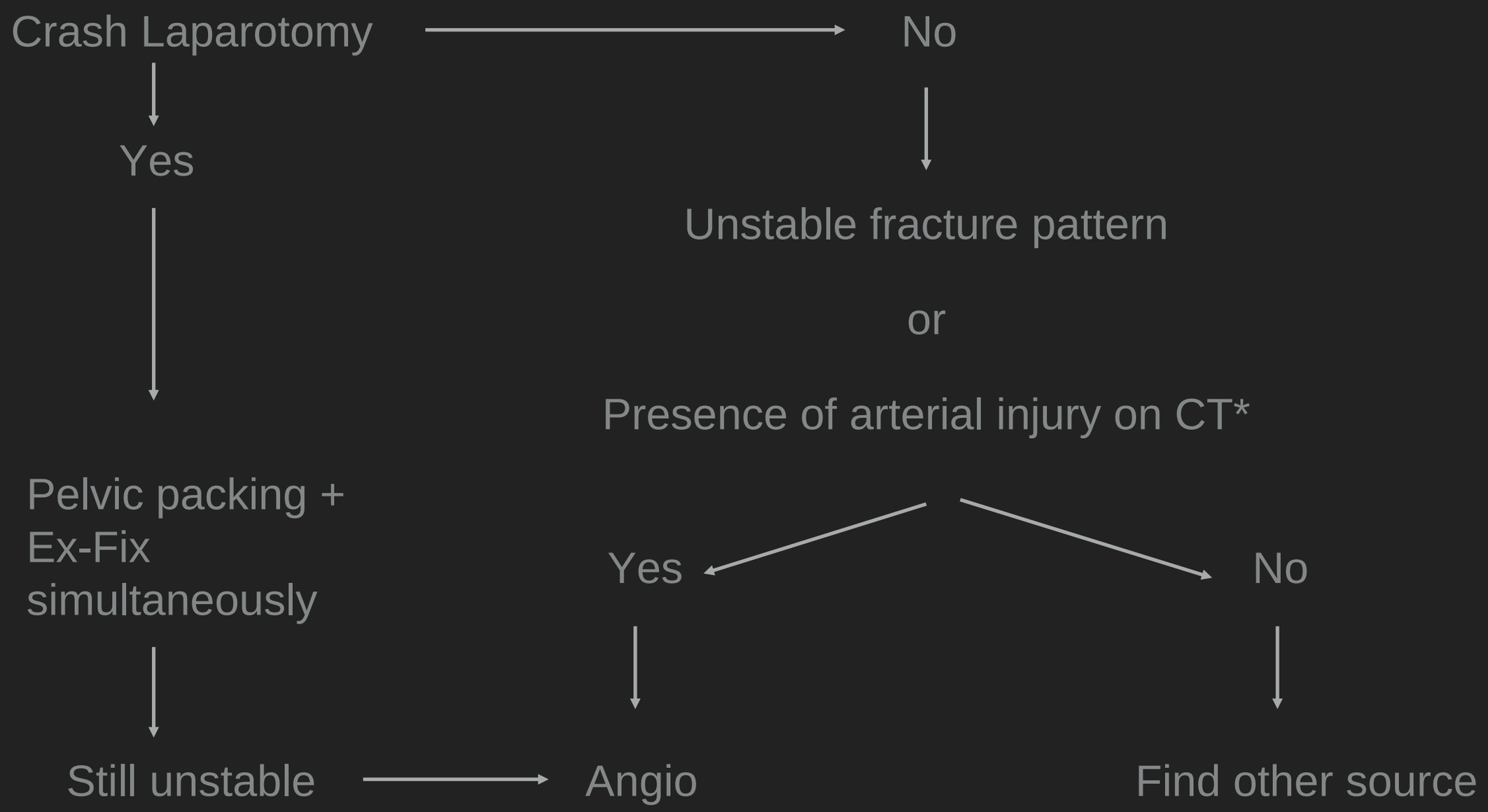
Lancet. 2010 Jul 3;376(9734):23-32. doi: 10.1016/S0140-6736(10)60835-5. Epub 2010 Jun 14.

Effects of tranexamic acid on death, vascular occlusive events, and blood transfusion in trauma patients with significant haemorrhage (CRASH-2): a randomise

MANAGEMENT OF HEMODYNAMIC INSTABILITY

- For every 3 minutes of haemodynamic instability in the trauma bay, mortality goes up by roughly 1%
- Haemodynamically unstable patients should ideally leave the trauma bay within 45 minutes.
- For those “exsanguinating” on arrival with sBP less than 70 mm Hg unresponsive to rescucitation, immediate transfer to the OR is indicated.

MANAGEMENT OF HEMODYNAMIC INSTABILITY



Fractures of the Pelvis and Acetabulum - 4th ed

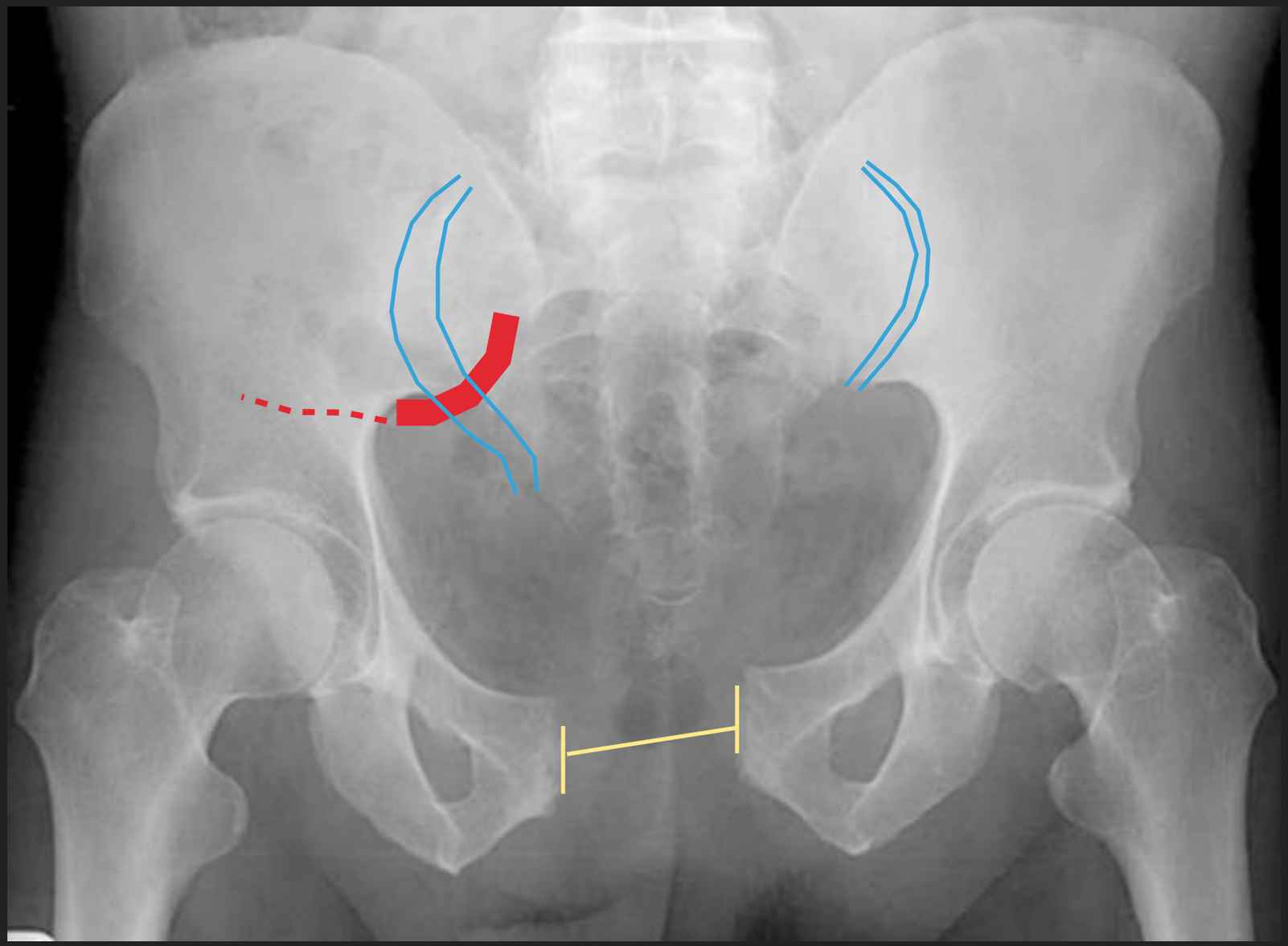
The EAST Practice Management Guidelines Work Group

The Royal Melbourne Hospital HAEMODYNAMICALLY UNSTABLE PELVIC FRACTURE GUIDELINE

INITIAL ASSESSMENT IN ER AND MANAGEMENT OF HEMODYNAMIC INSTABILITY : TO EMBOLIZE OR NOT TO EMBOLIZE?

- AP pelvis

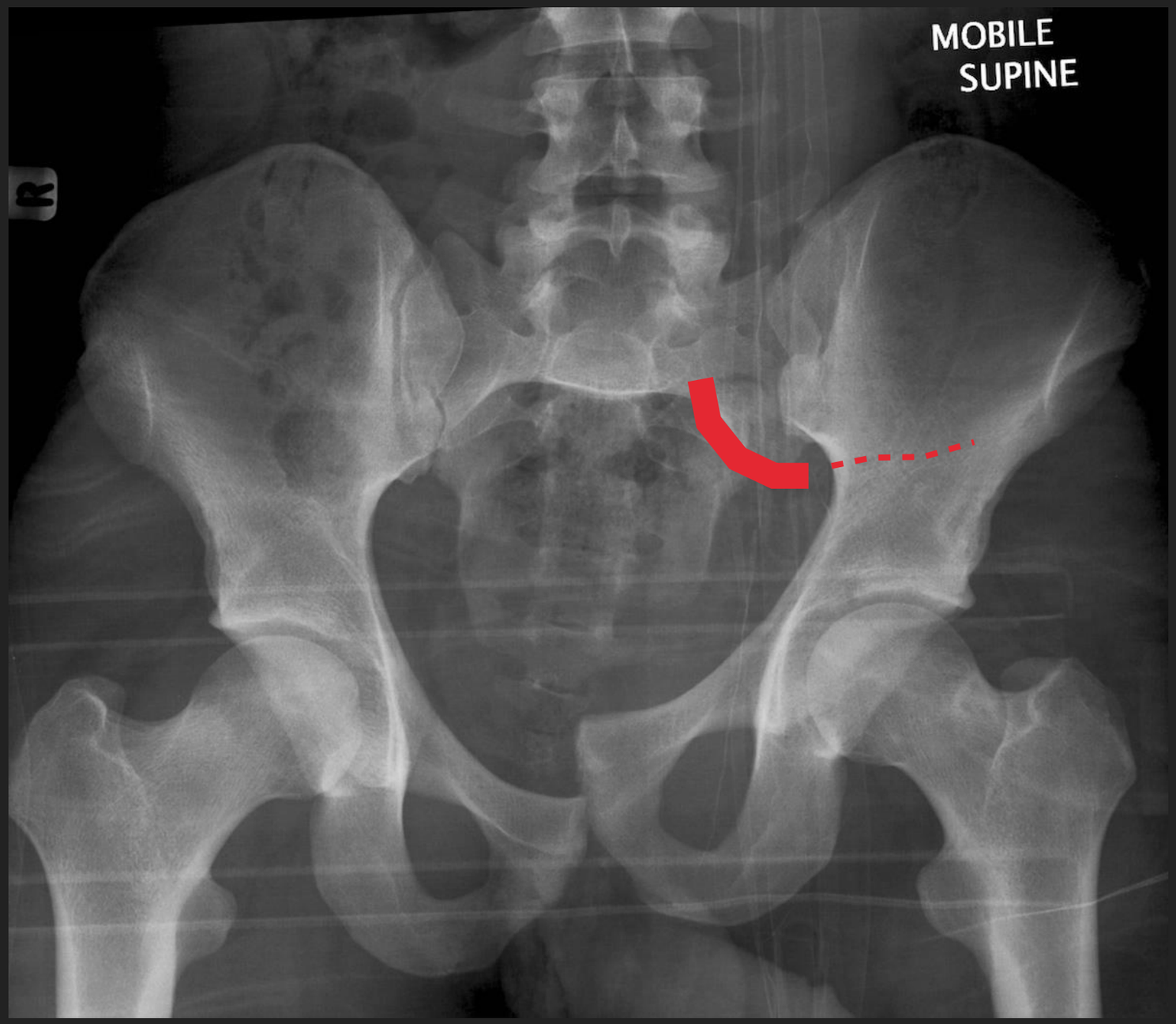
Open book = potential to embolize



INITIAL ASSESSMENT IN ER AND MANAGEMENT OF HEMODYNAMIC INSTABILITY

- AP pelvis

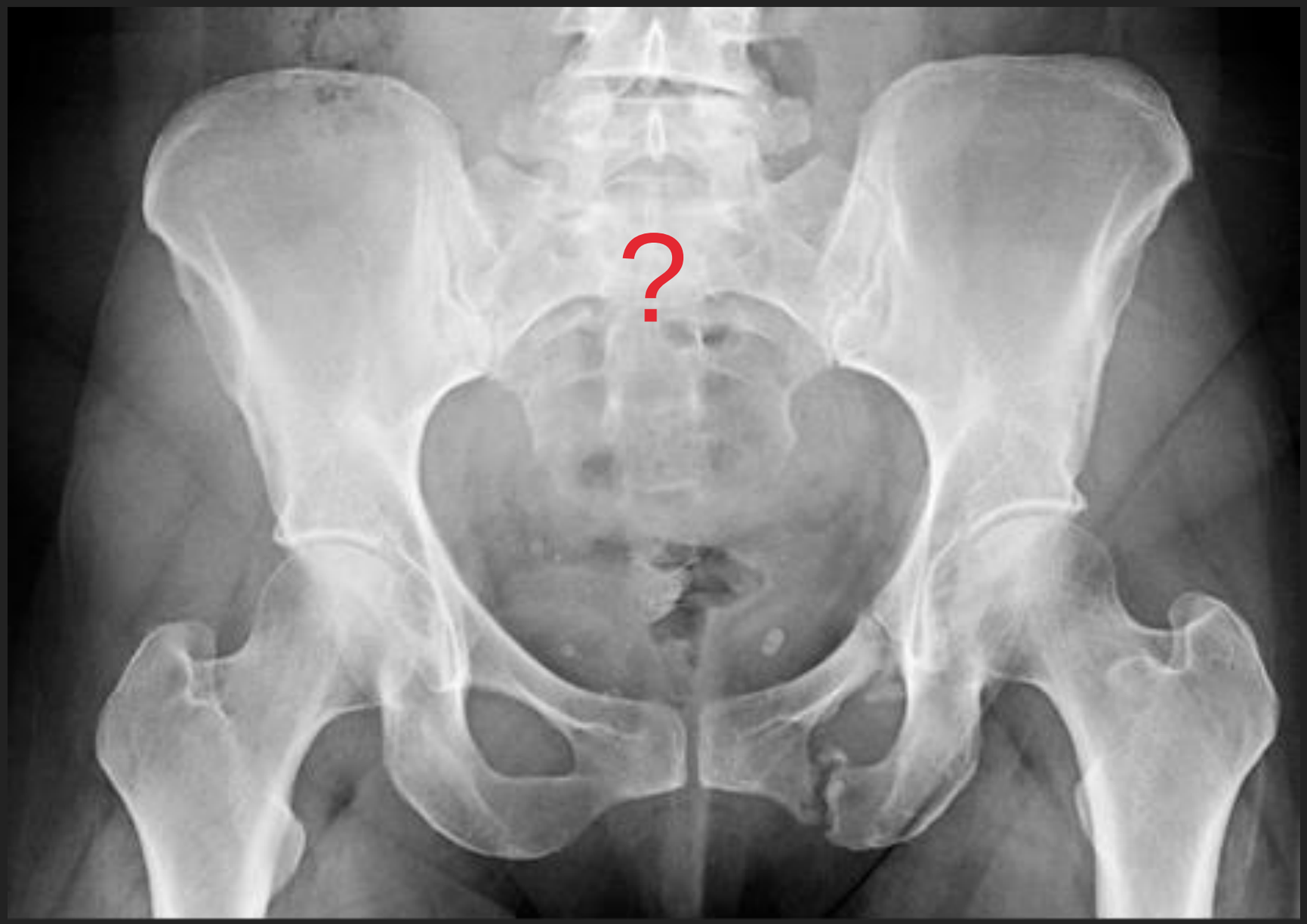
Vertical Shear = potential to embolize



INITIAL ASSESSMENT IN ER AND MANAGEMENT OF HEMODYNAMIC INSTABILITY

- AP pelvis

Lateral compression



INITIAL ASSESSMENT + TREATMENT IN ER

- If pelvic injury is felt to be present, someone needs to do a rectal and vaginal exam in search of blood…
- May be an open fracture!

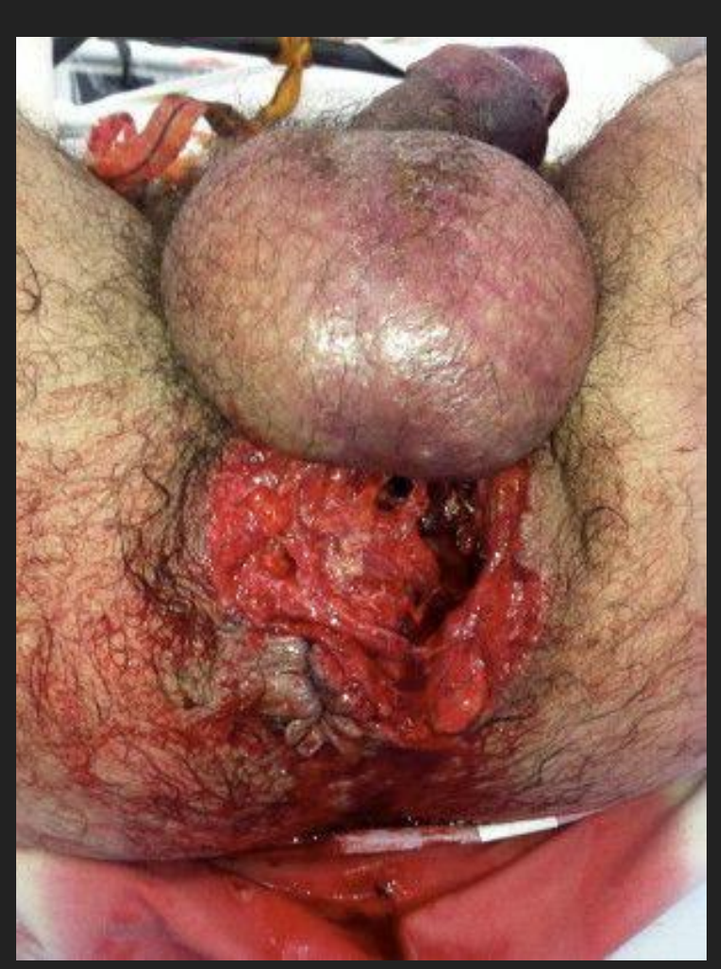
-Antibiotics

-Diverting colostomy

-Vaginal repair

Mortality for open pelvis fracture is 5-50%

Associated injury rate 100%



INITIAL ASSESSMENT + TREATMENT IN ER

- Blood at urinary meatus
  - Bladder rupture or urethral tear
  - What to do?

-Inflate foley at meatus (2cc)

-Inject contrast up Foley (10cc)

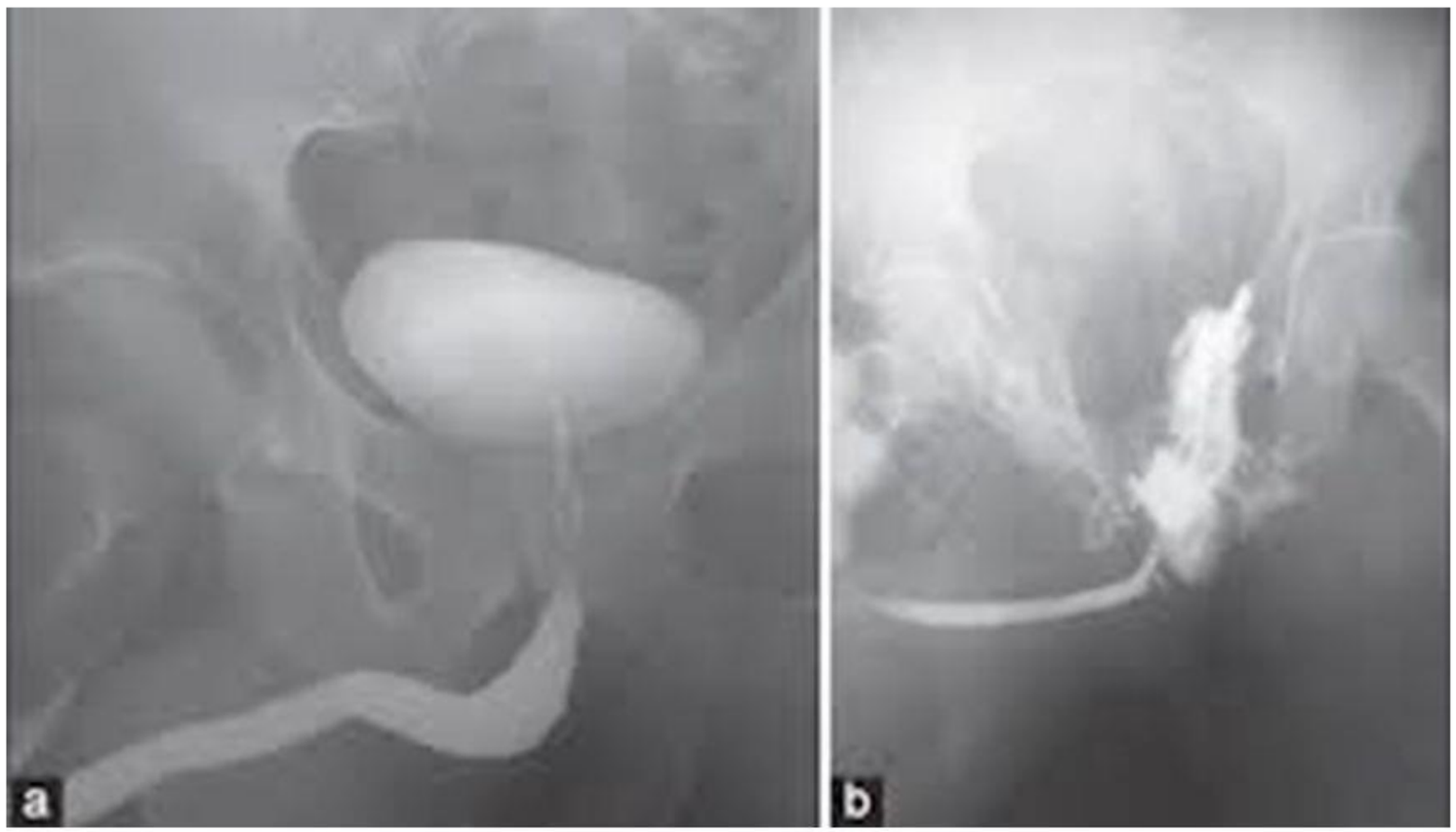
-Take x-ray as last cc is going in

-Retrograde urethrogram

if normal

-Advance Foley and do retrograde cystogram (350cc) or contrast CT cystogram

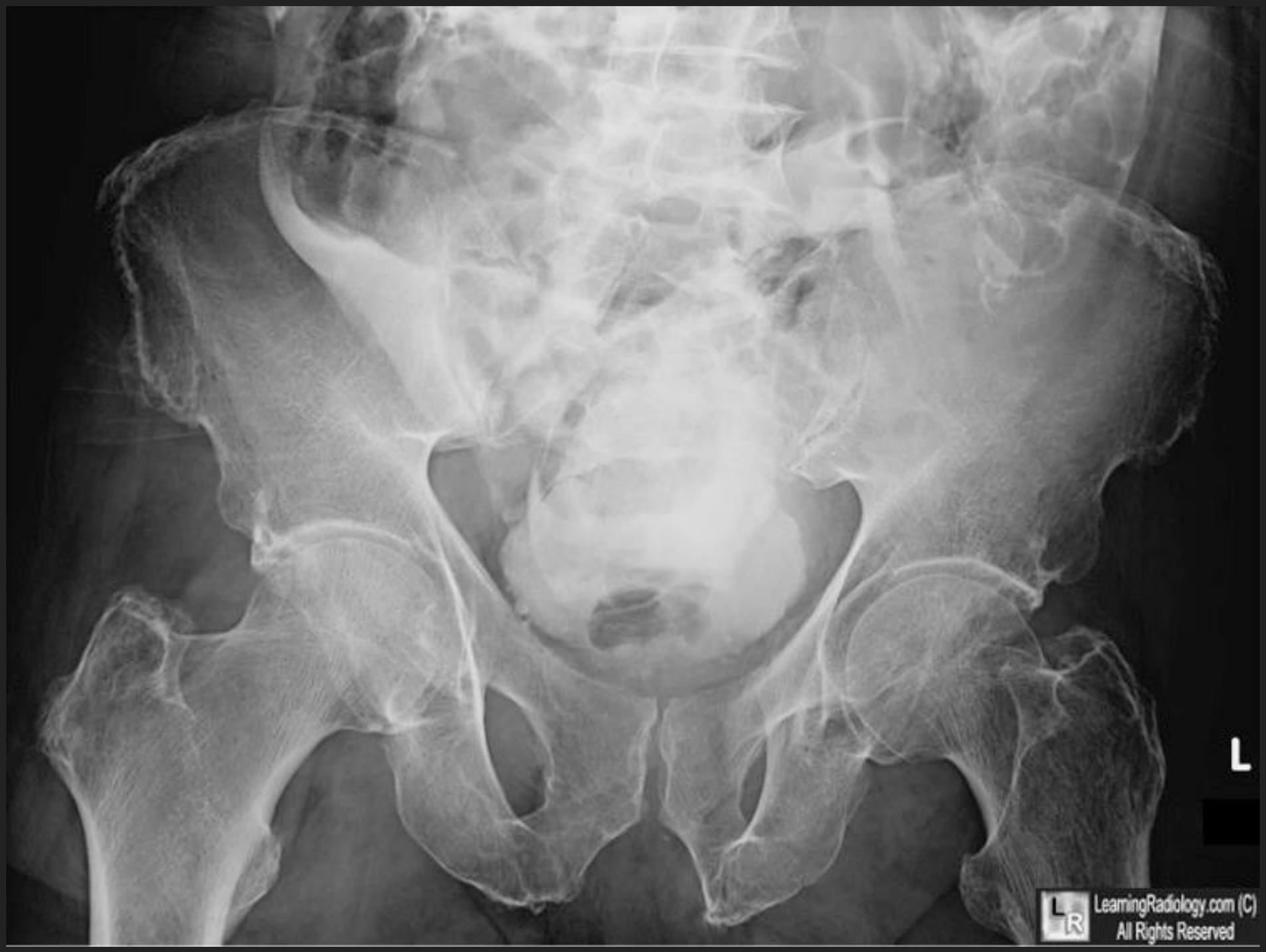
Retrograde Urethrogram



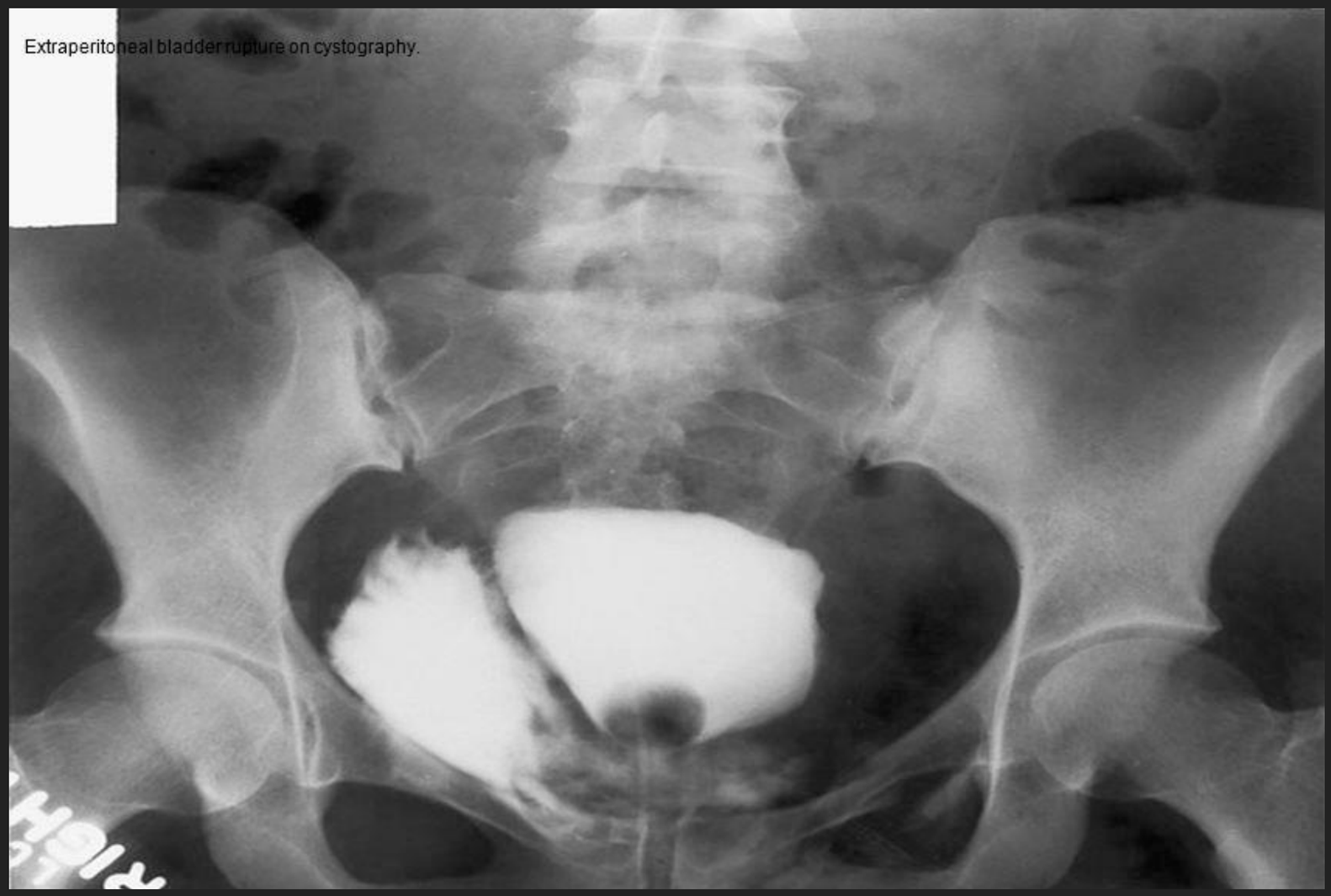
Normal

Urethral Injury

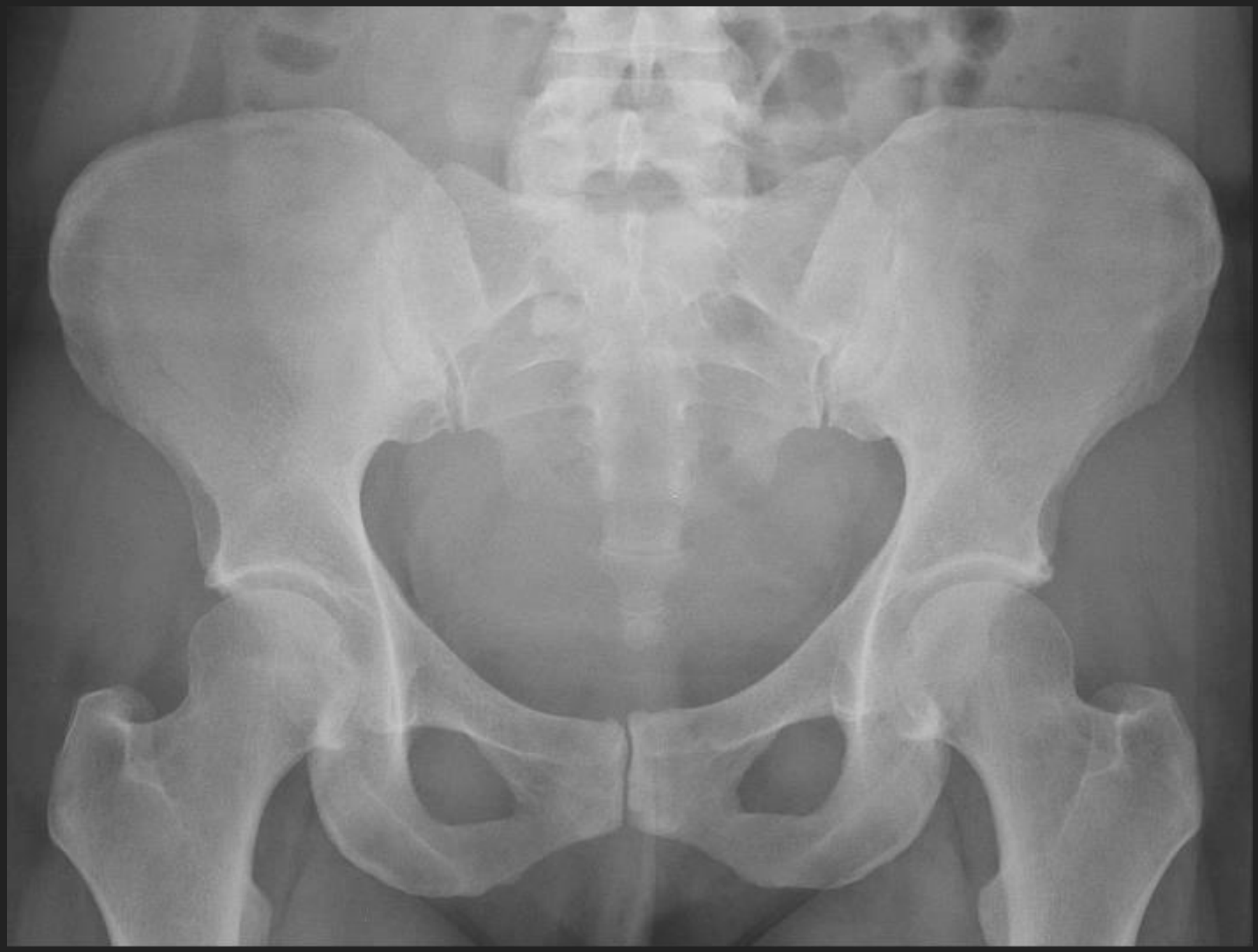
Intraperitoneal bladder rupture



Extraperitoneal bladder rupture



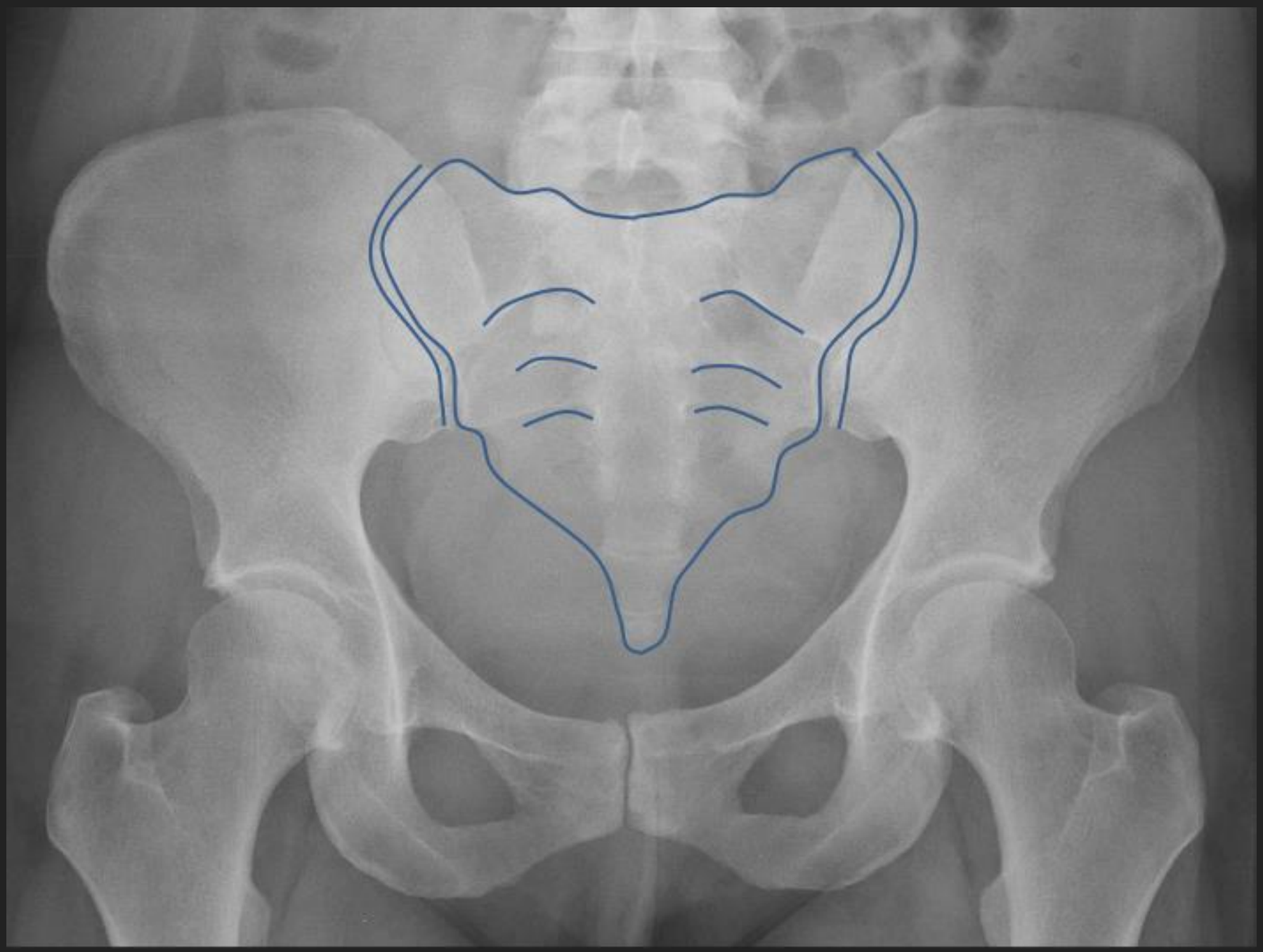
- The AP Pelvis



Credit :

Dr. Wilber

INITIAL ASSESSMENT



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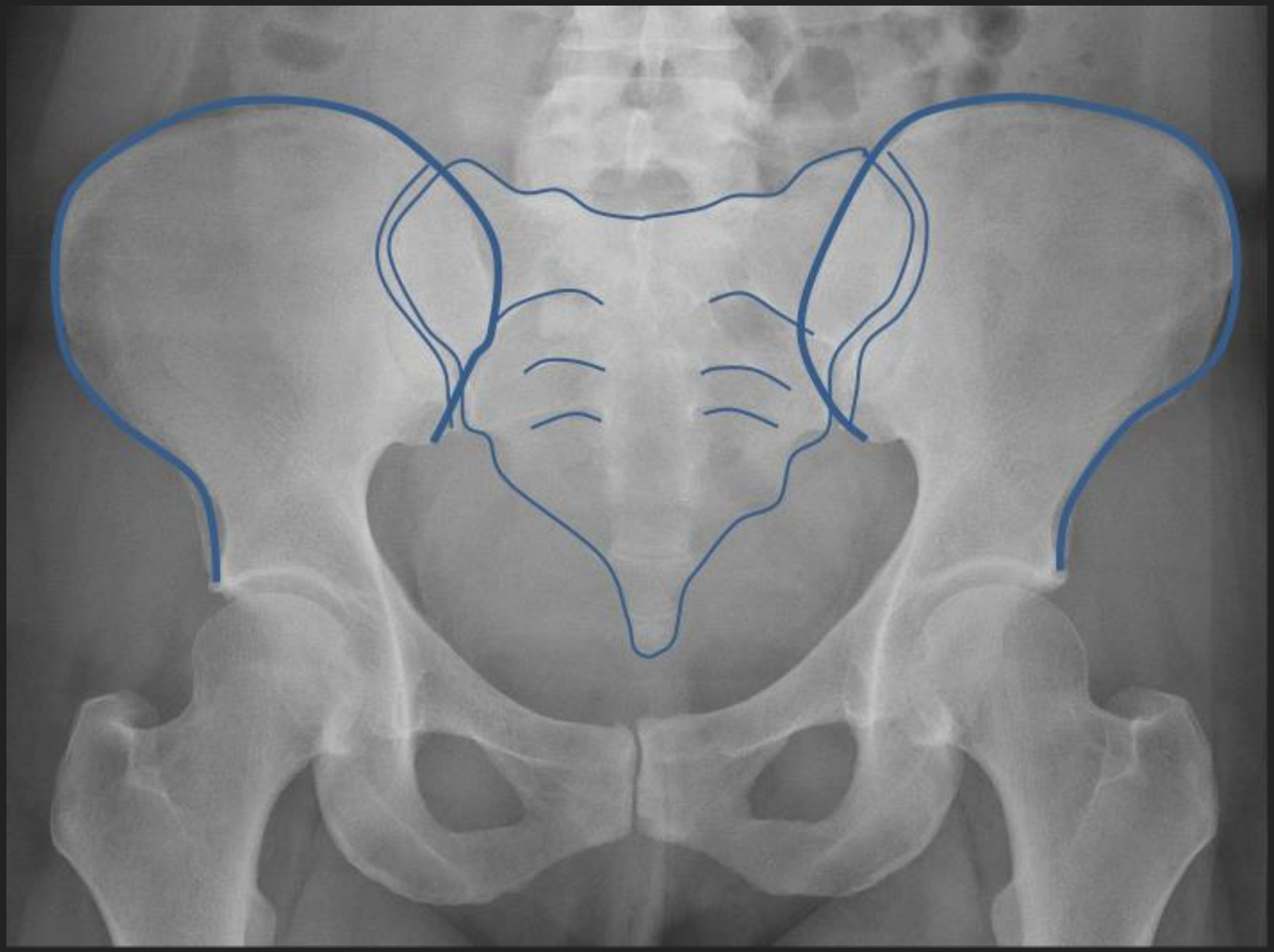

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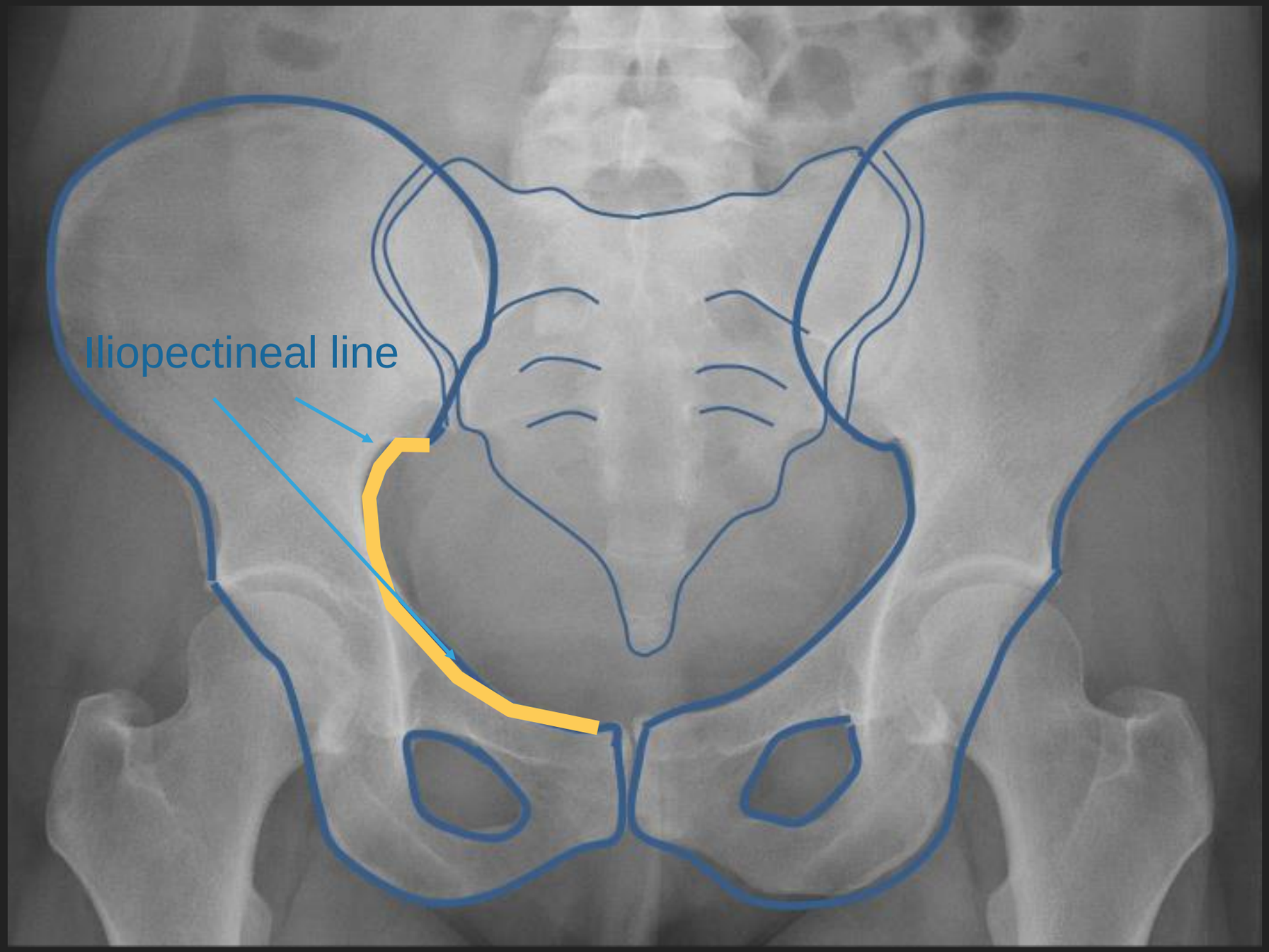

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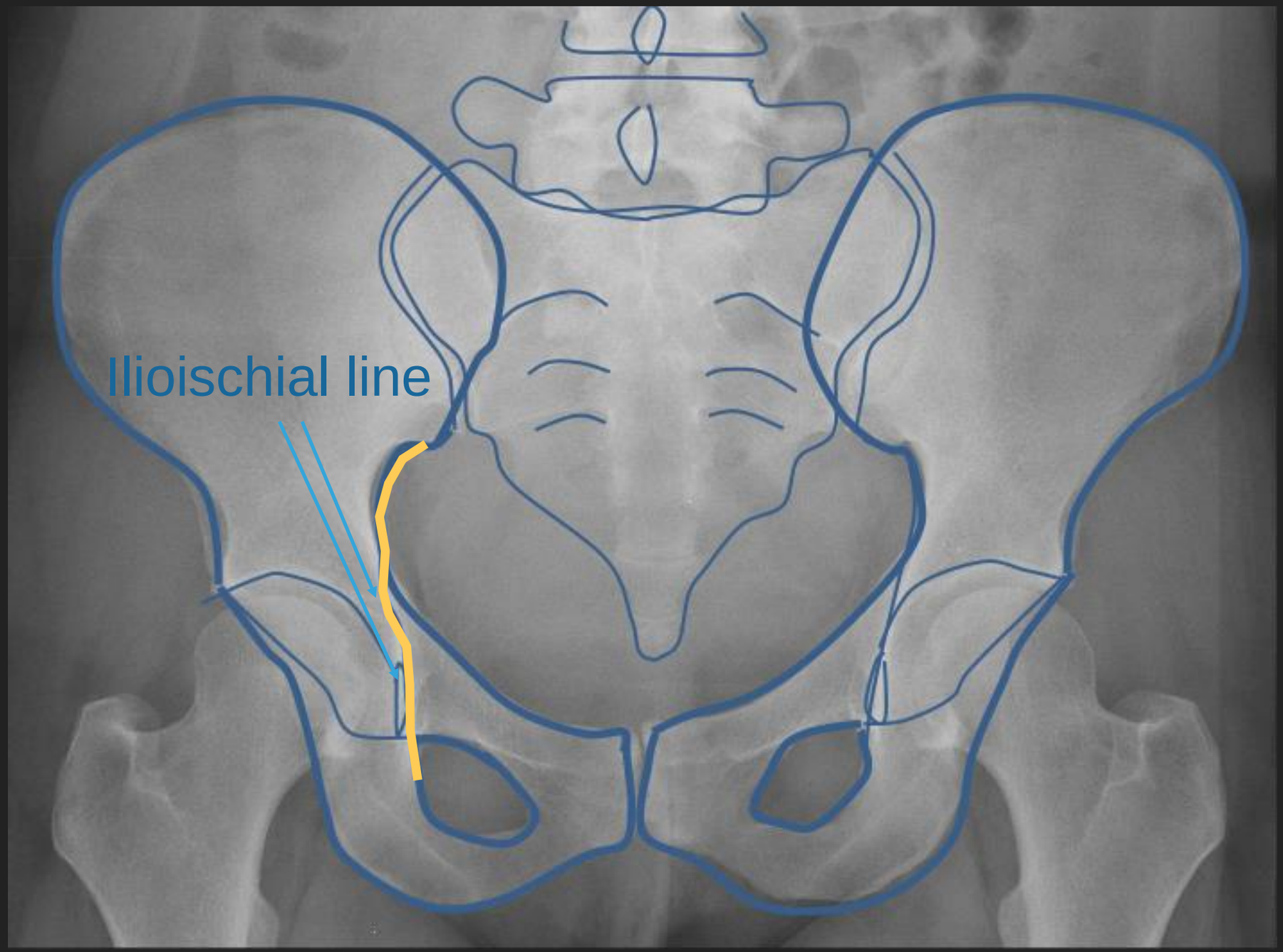

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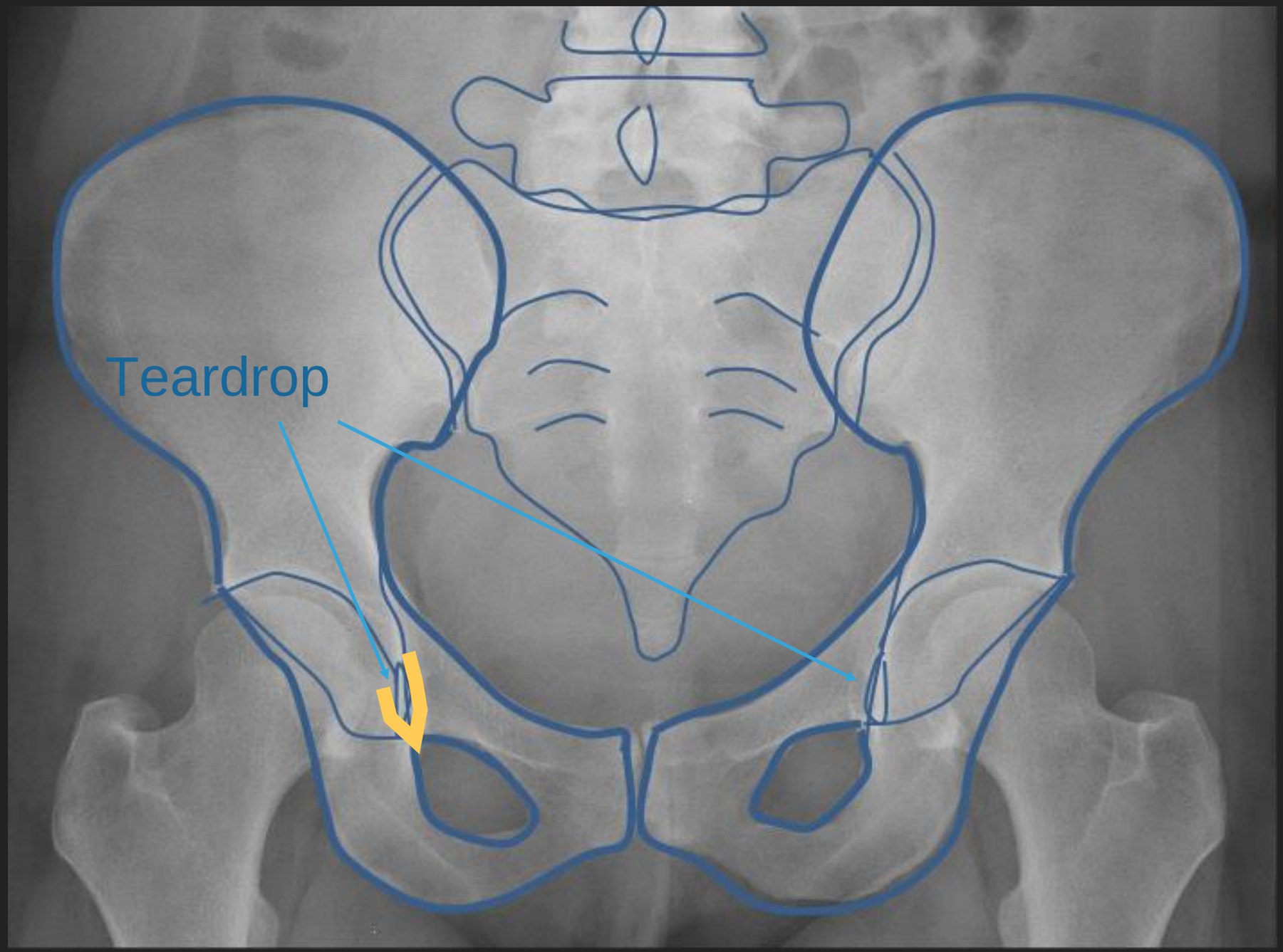

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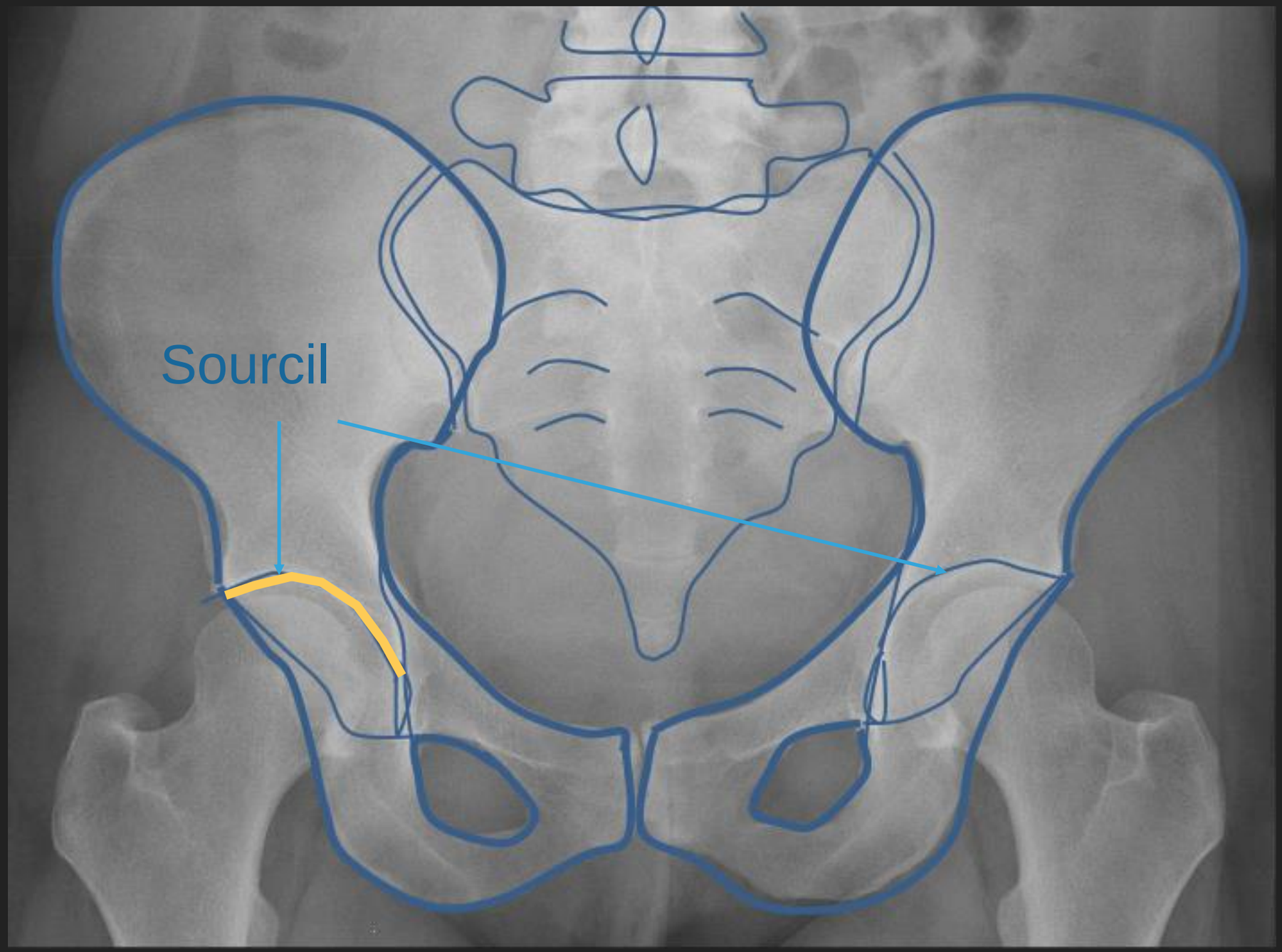

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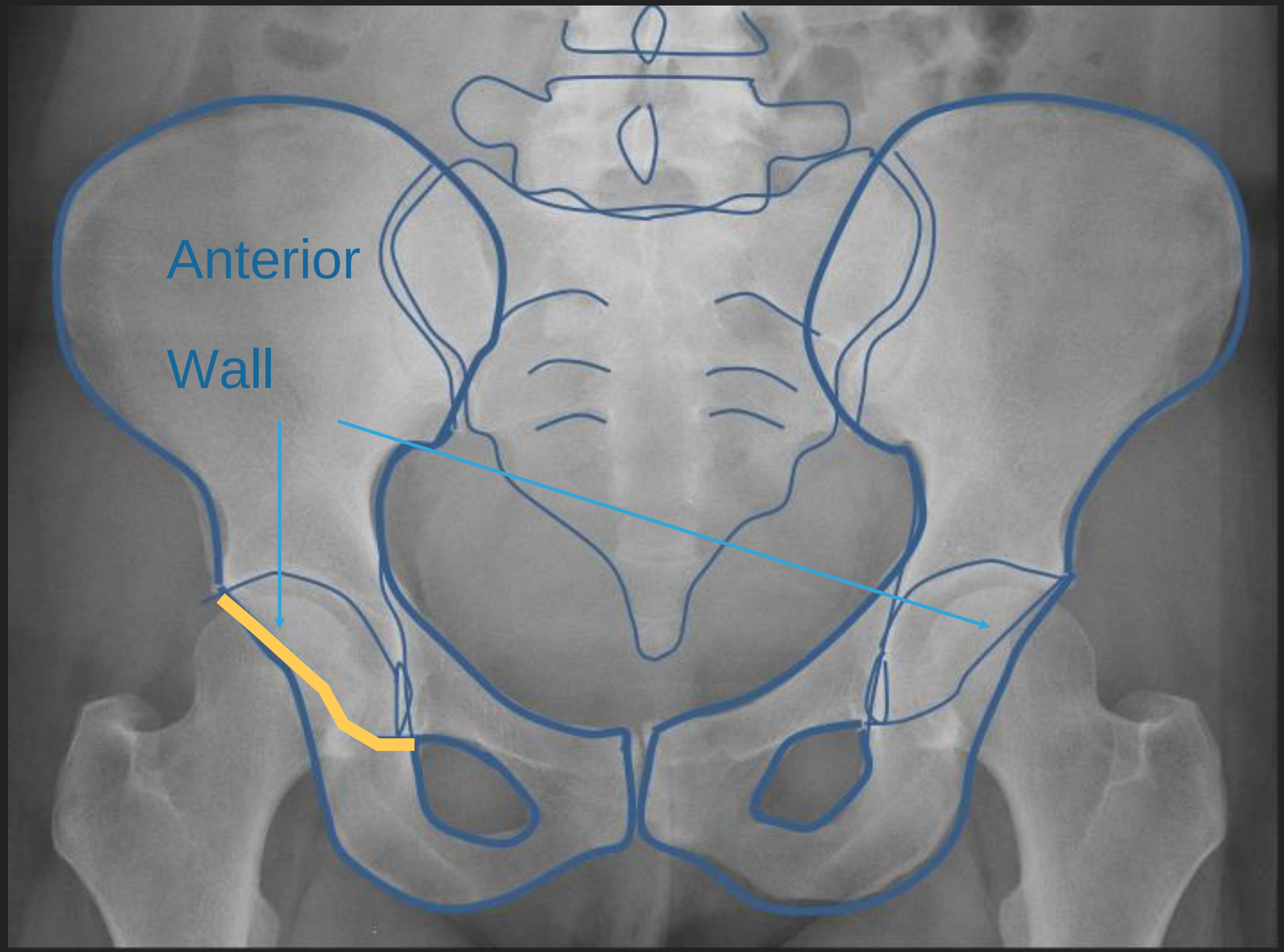

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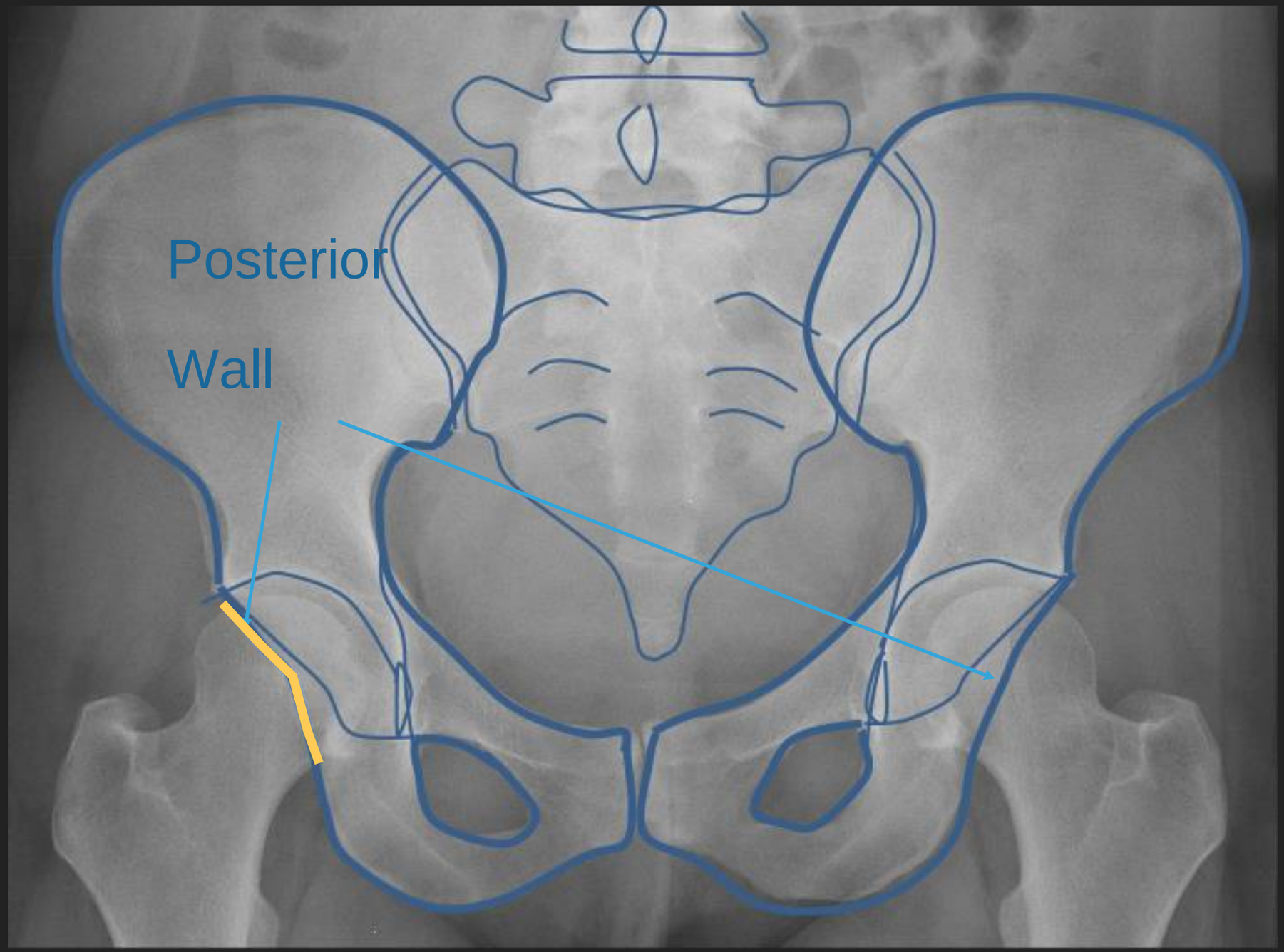

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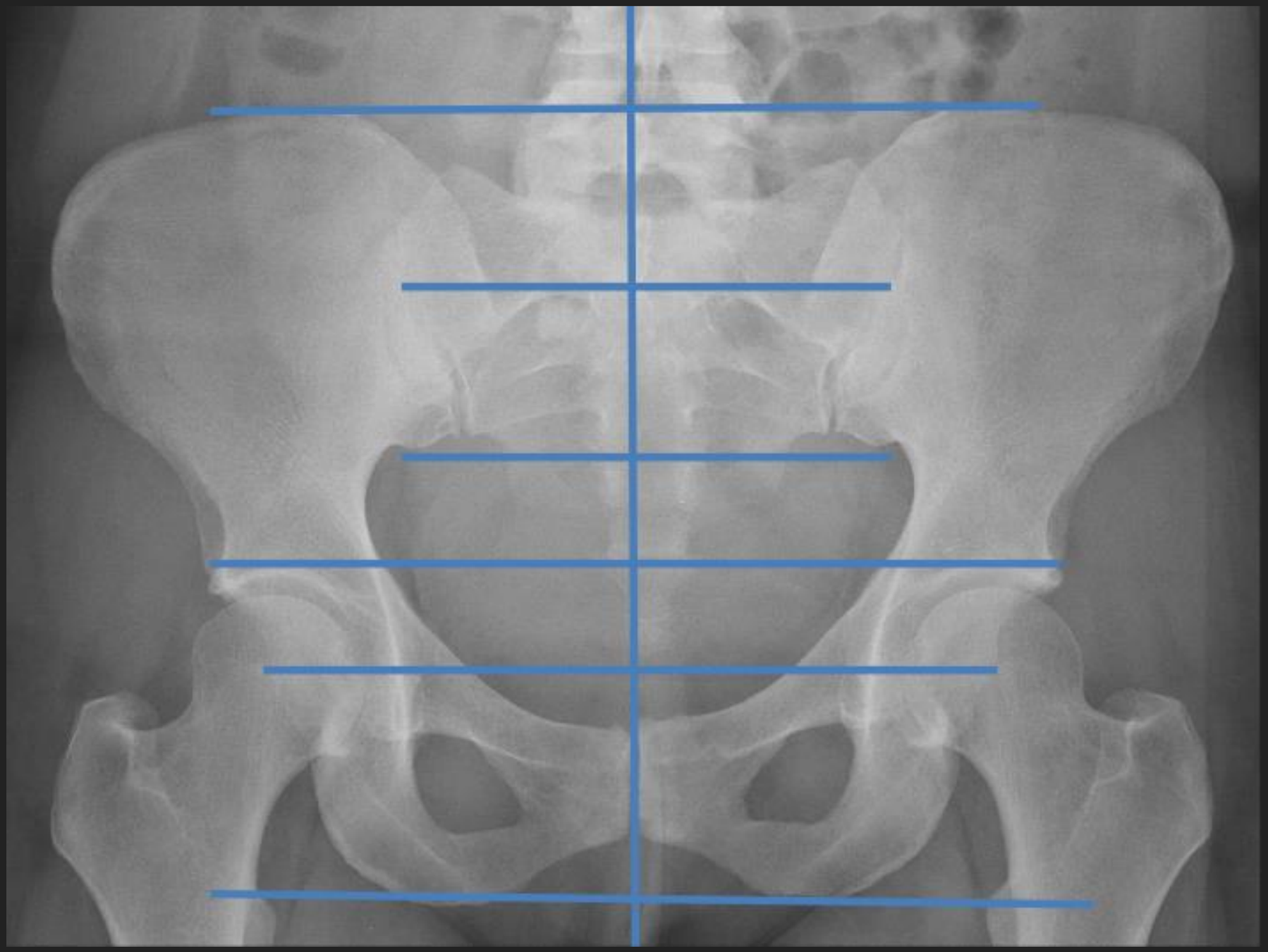
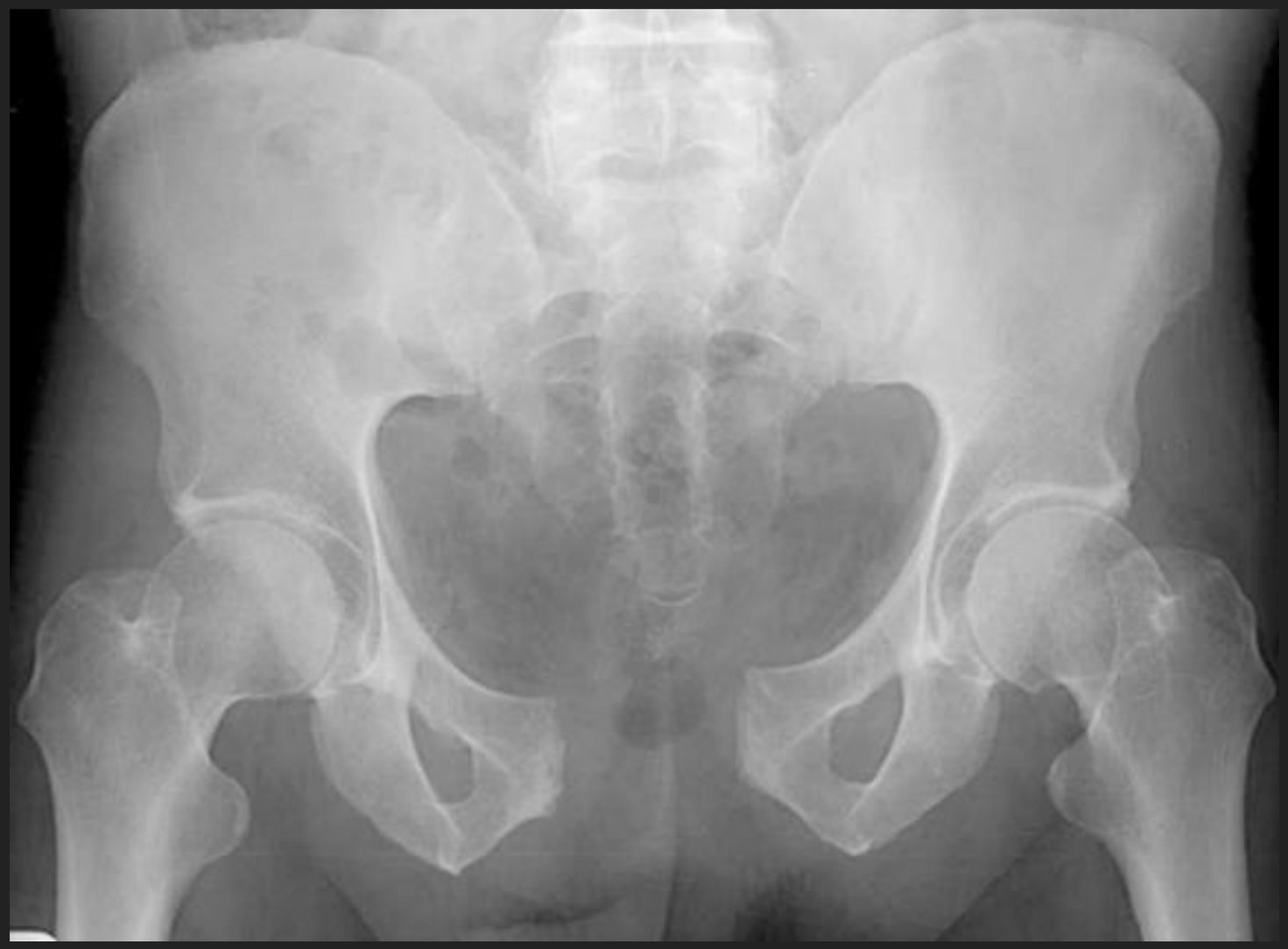


Credit :

Dr. Wilber

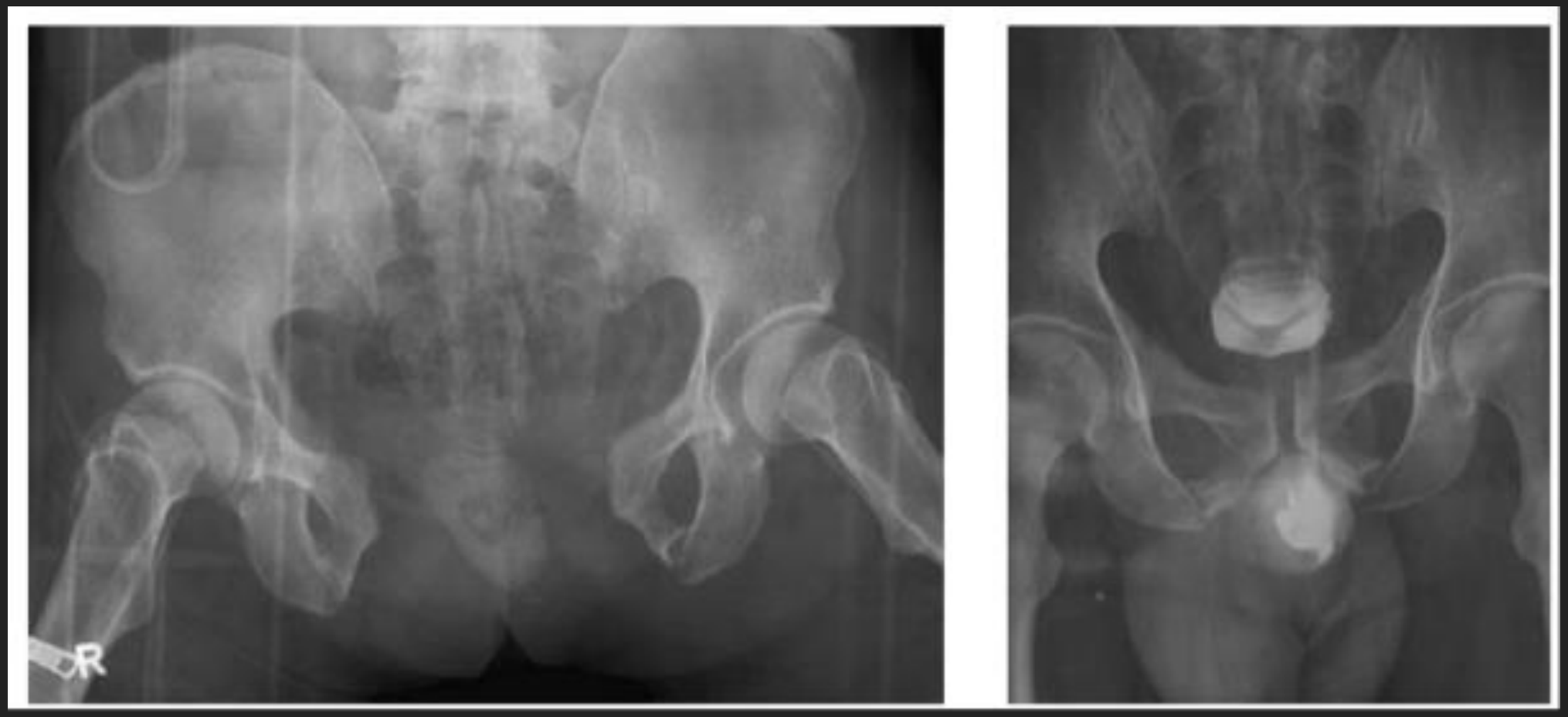
INITIAL ASSESSMENT

- AP Pelvis
  - Will identify all injuries that require urgent treatment.



-Open book type pelvic ring injury with right sacroiliac diastasis

- AP Pelvis
  - Pelvic recoil or application of binder will make the injury seem milder.



■ REVIEW ARTICLE

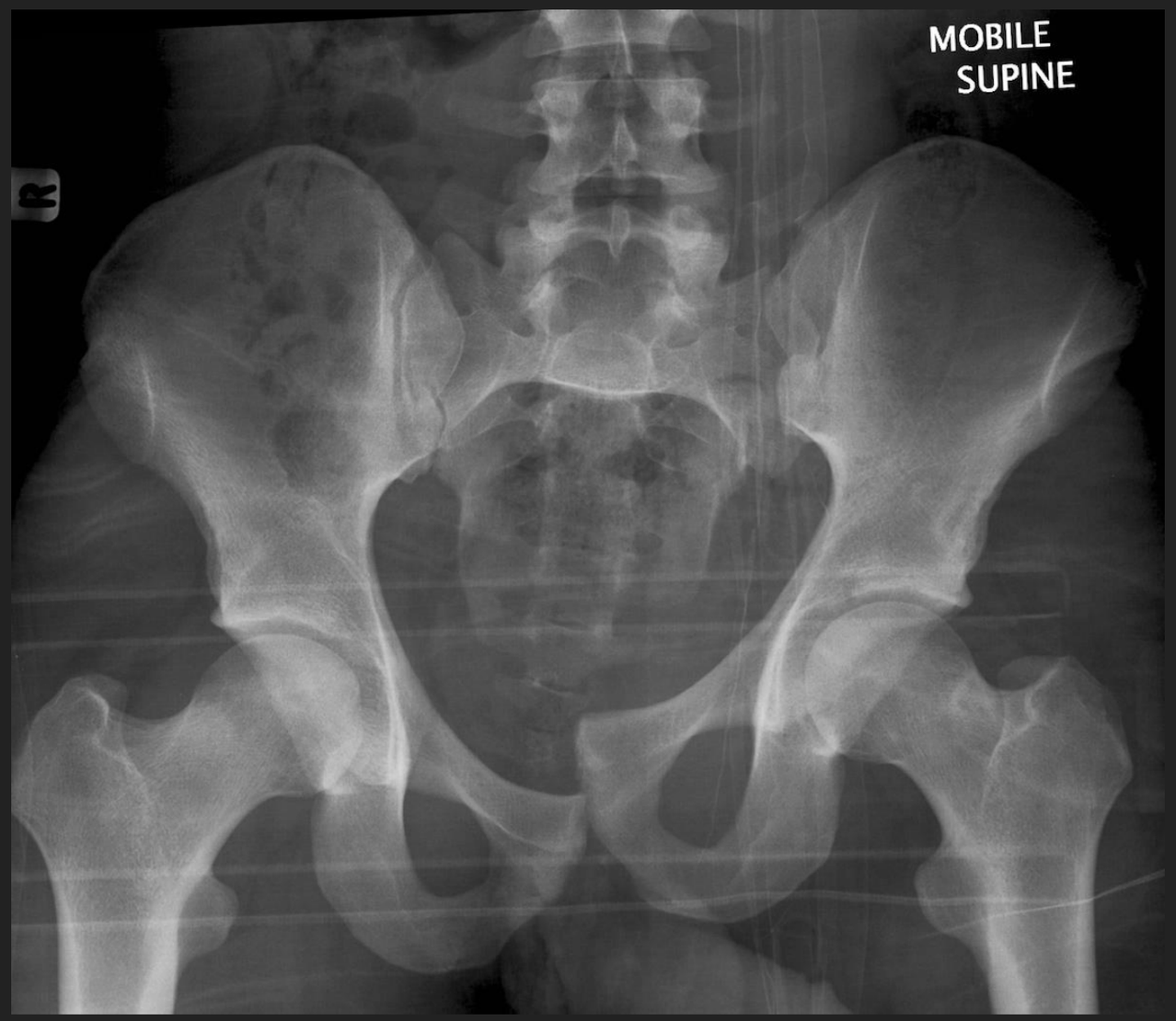
An unstable pelvic ring

THE KILLING FRACTURE

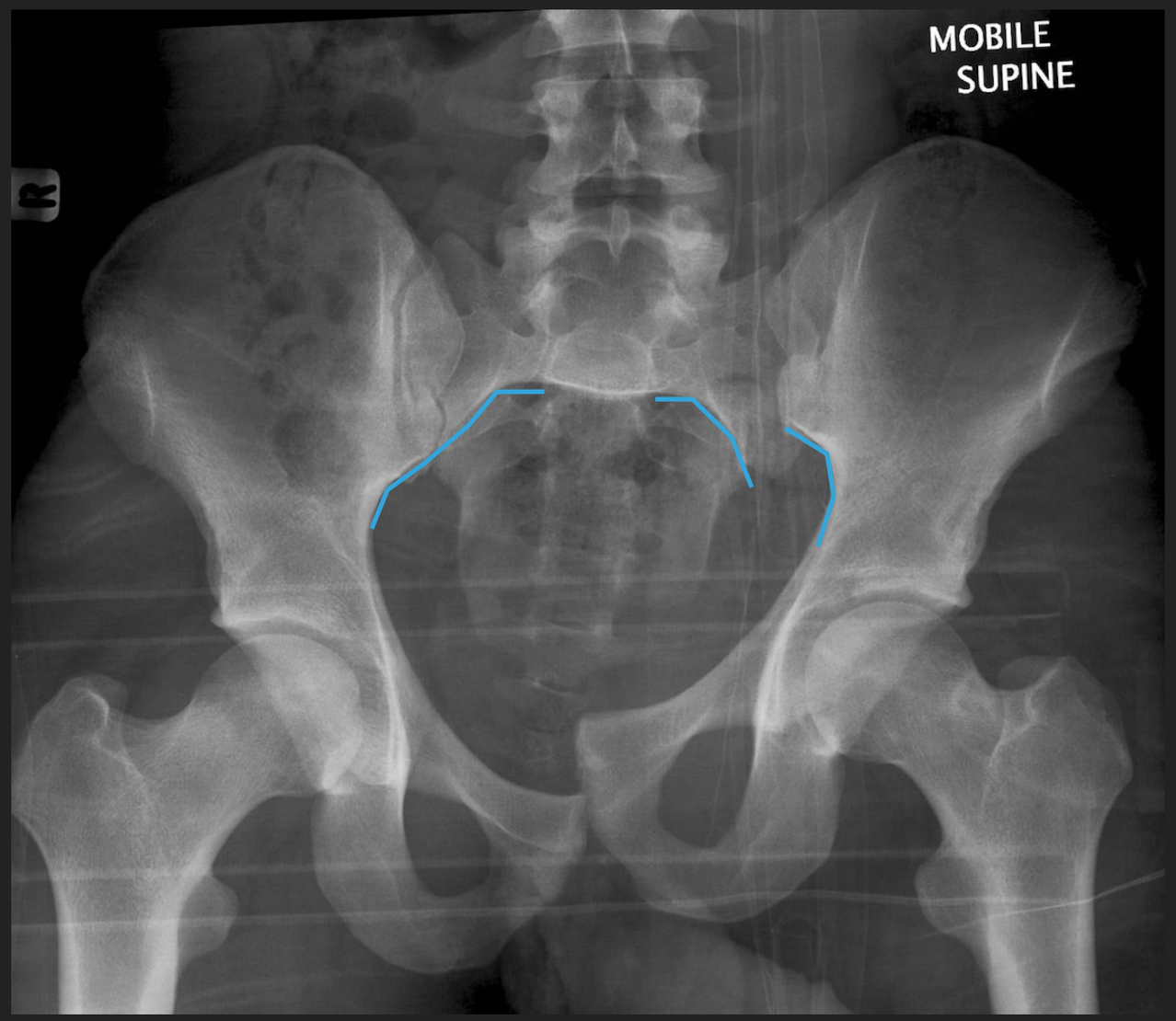
VOL. 88-B, No. 4, APRIL 2006

A. B. van Vugt,
A. van Kampen

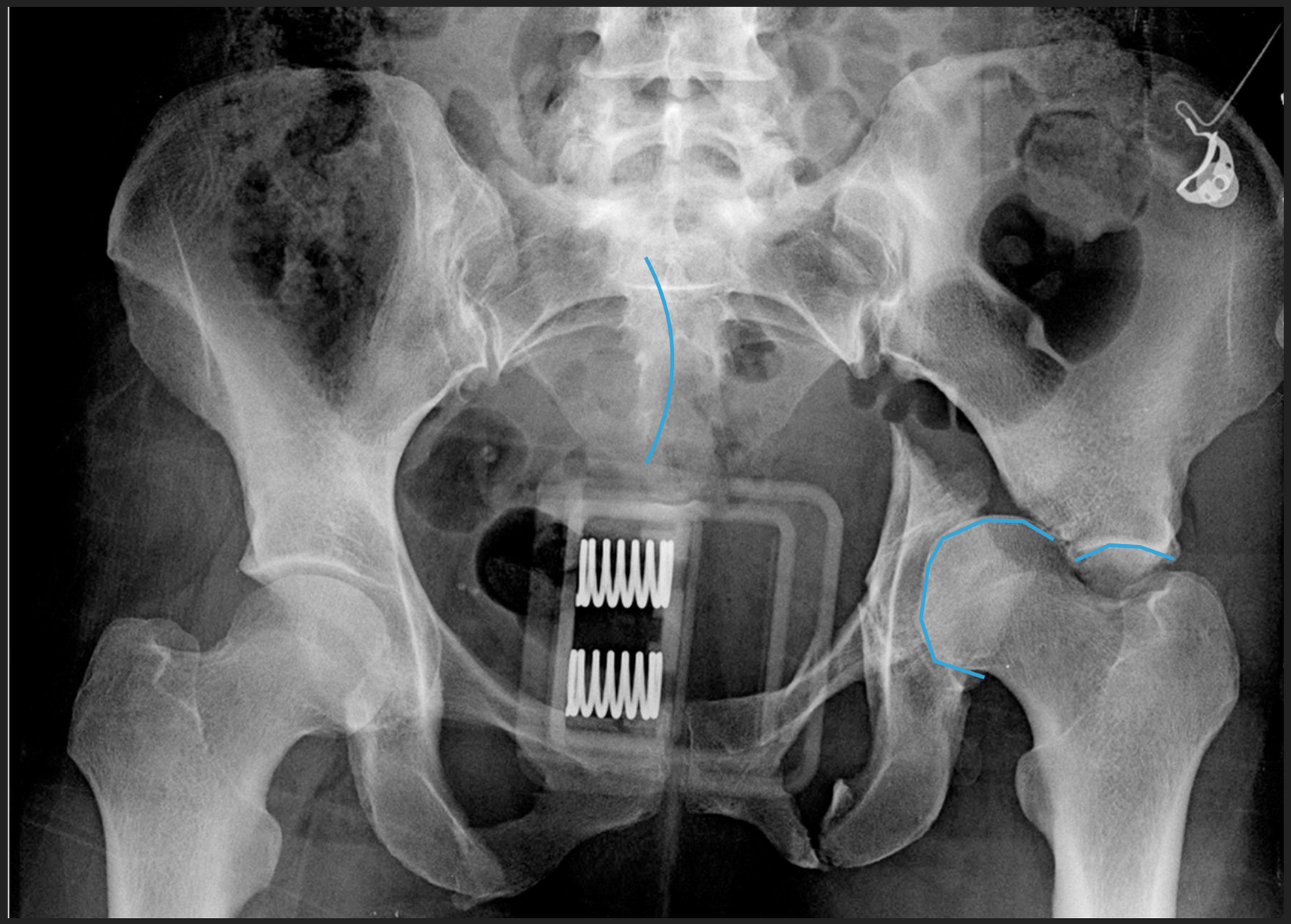
- Vertical shear pelvic ring injury



- Vertical shear pelvic ring injury

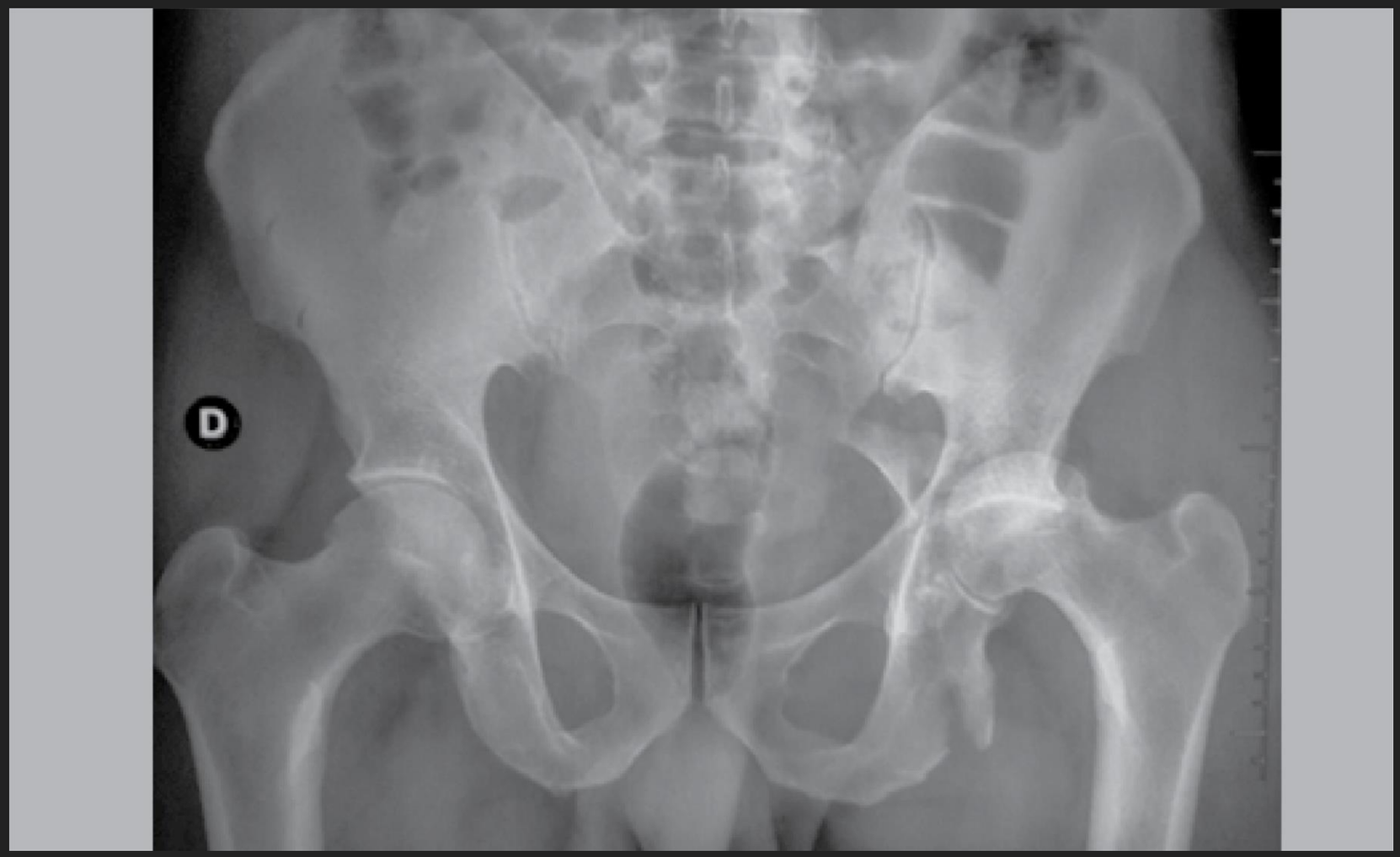


- Binders may make “lateral compression” type pelvic ring injuries or acetabular injuries worse!



Initial Treatment of “Pelvic Injuries” with Commercially Available Pelvic Binders Results in Displacement of Acetabular Fractures - JBJS

- AP Pelvis : other important injuries
  - Hip dislocation



- AP Pelvis
  - Hip dislocation

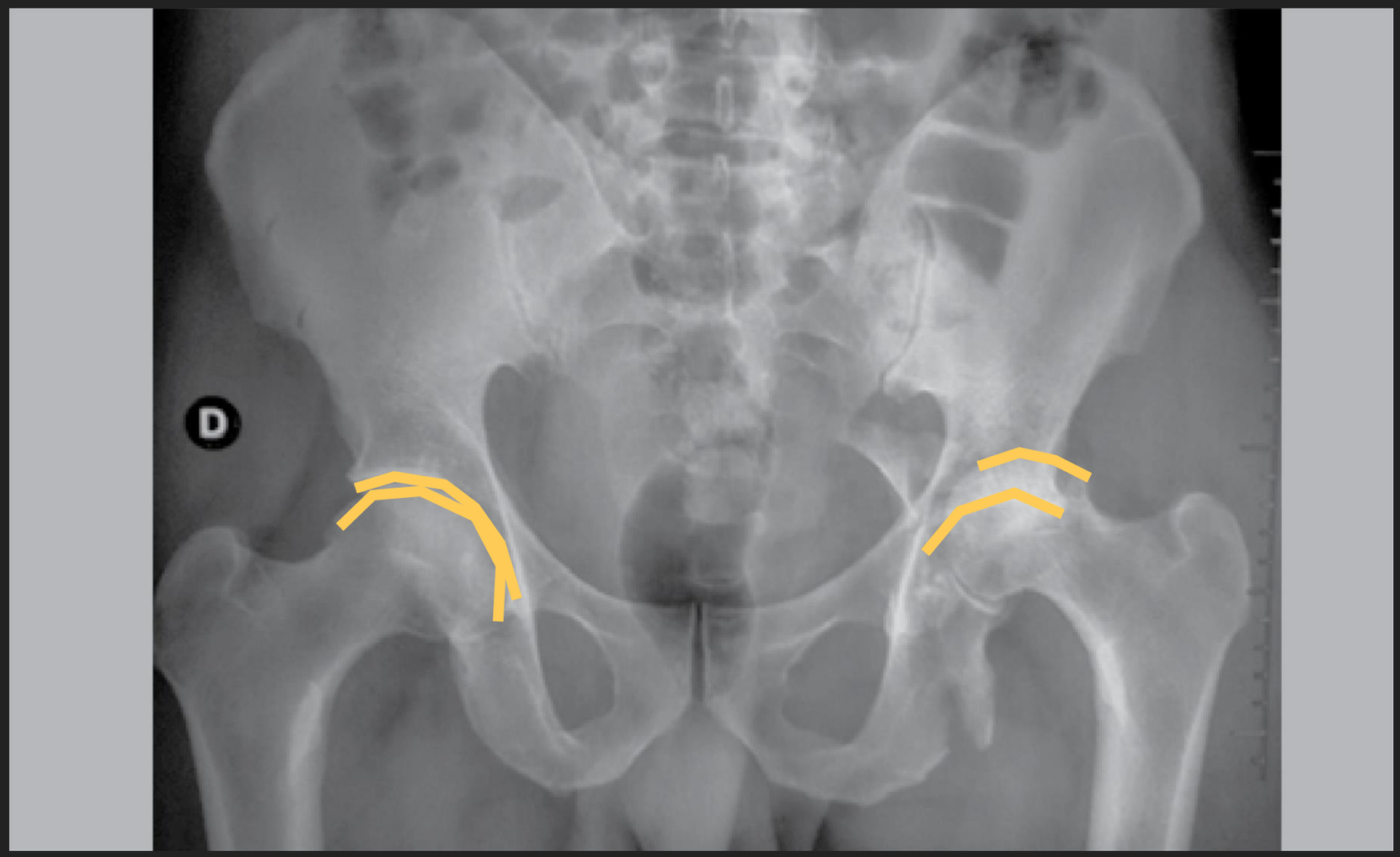
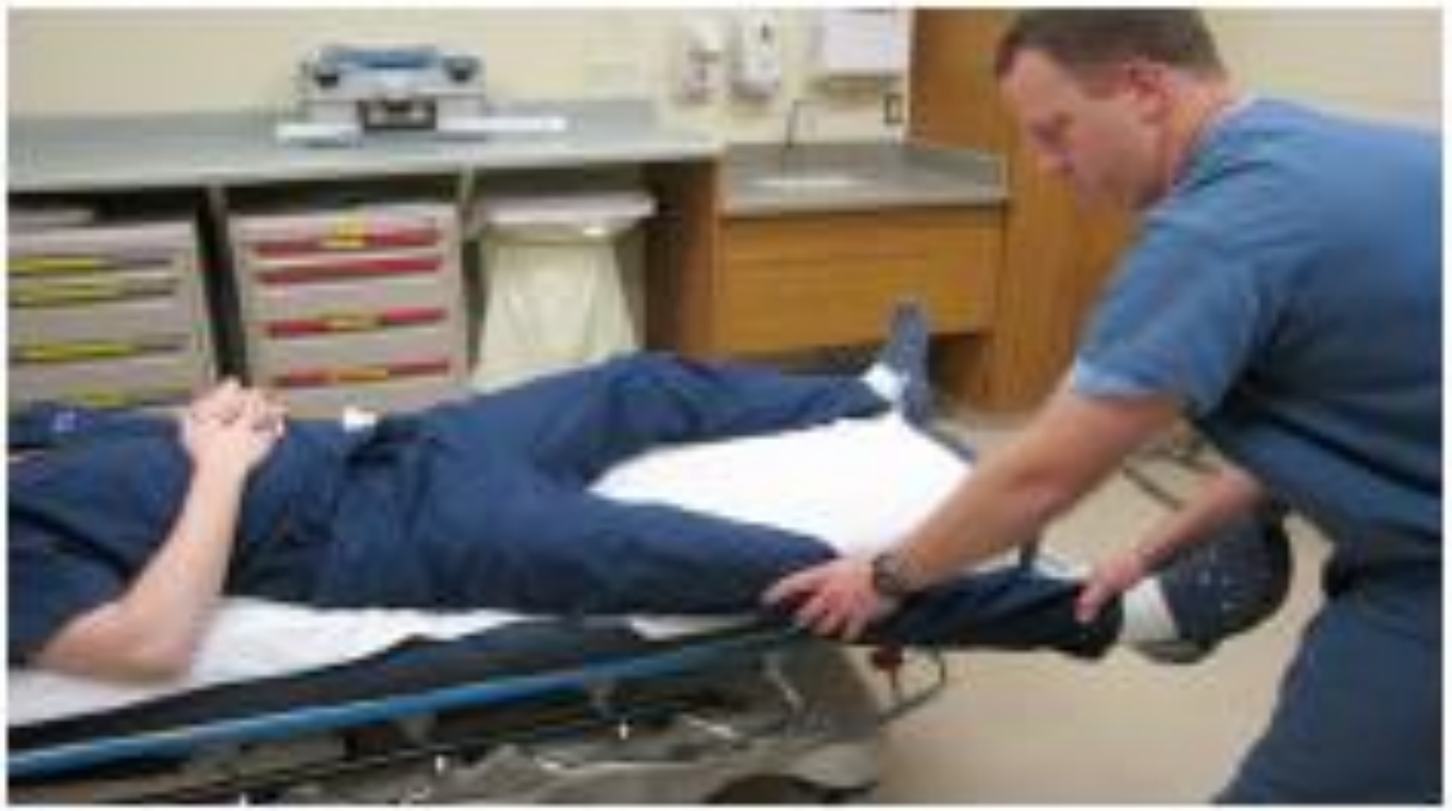


Figure 21. Allis Reduction Technique In Action

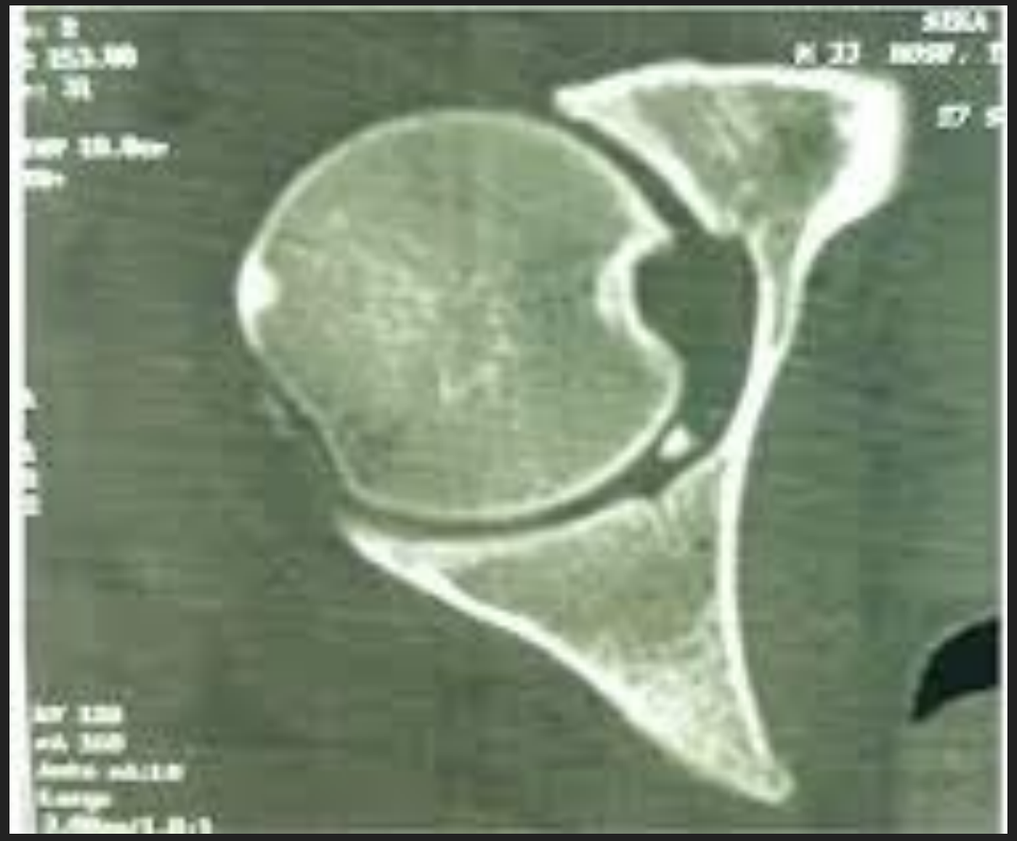
Figure 24. Modified Whistler Technique

Figure 22. Reduction Technique For Anterior-Superior Dislocations



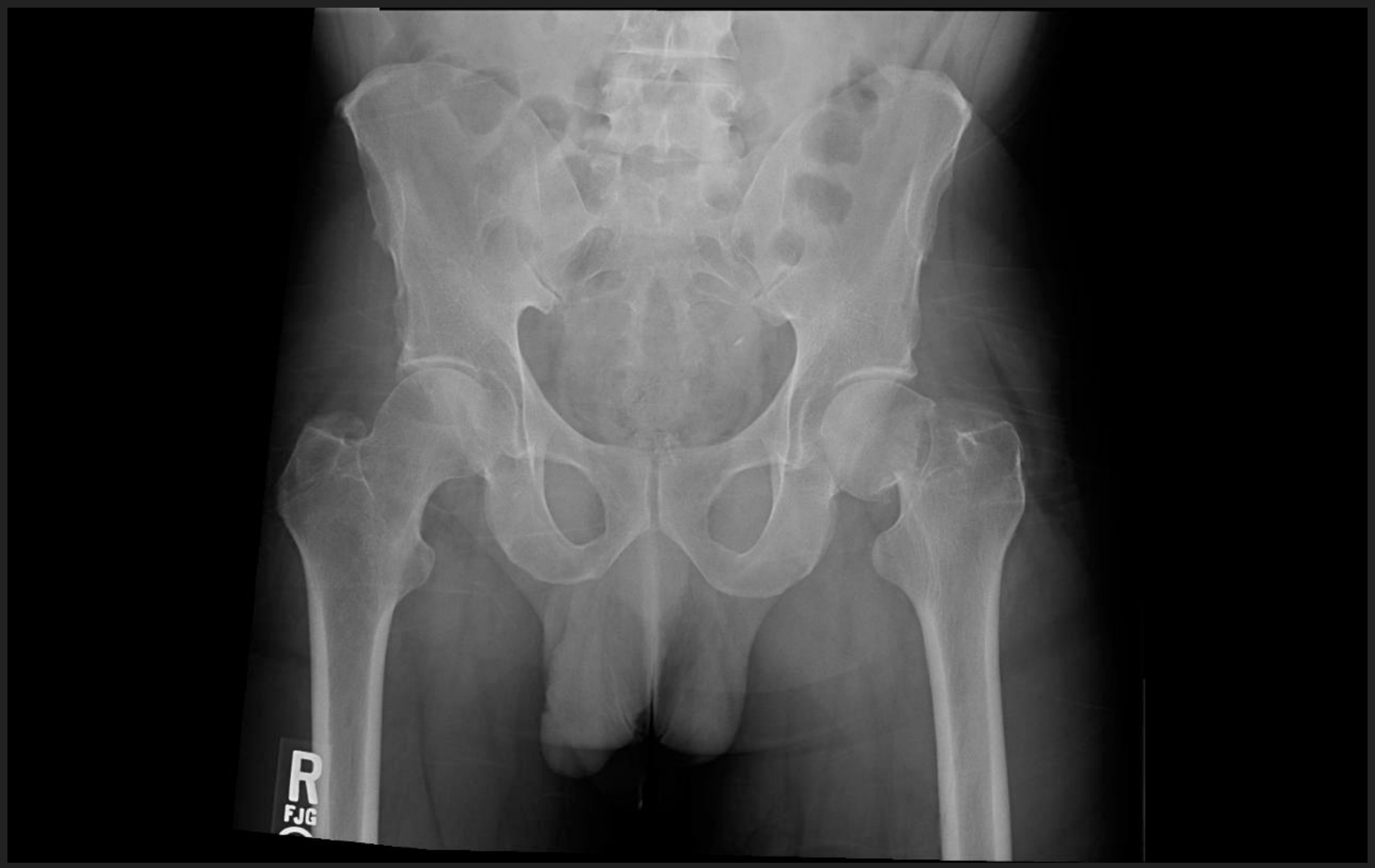
INITIAL ASSESSMENT

- AP Pelvis
  - Hip dislocation
    - Good to get post reduction CT scan



INITIAL ASSESSMENT

- AP Pelvis
- Femoral neck fracture in a person in whom it would be “undesirable to commit arthroplasty”.



INITIAL ASSESSMENT

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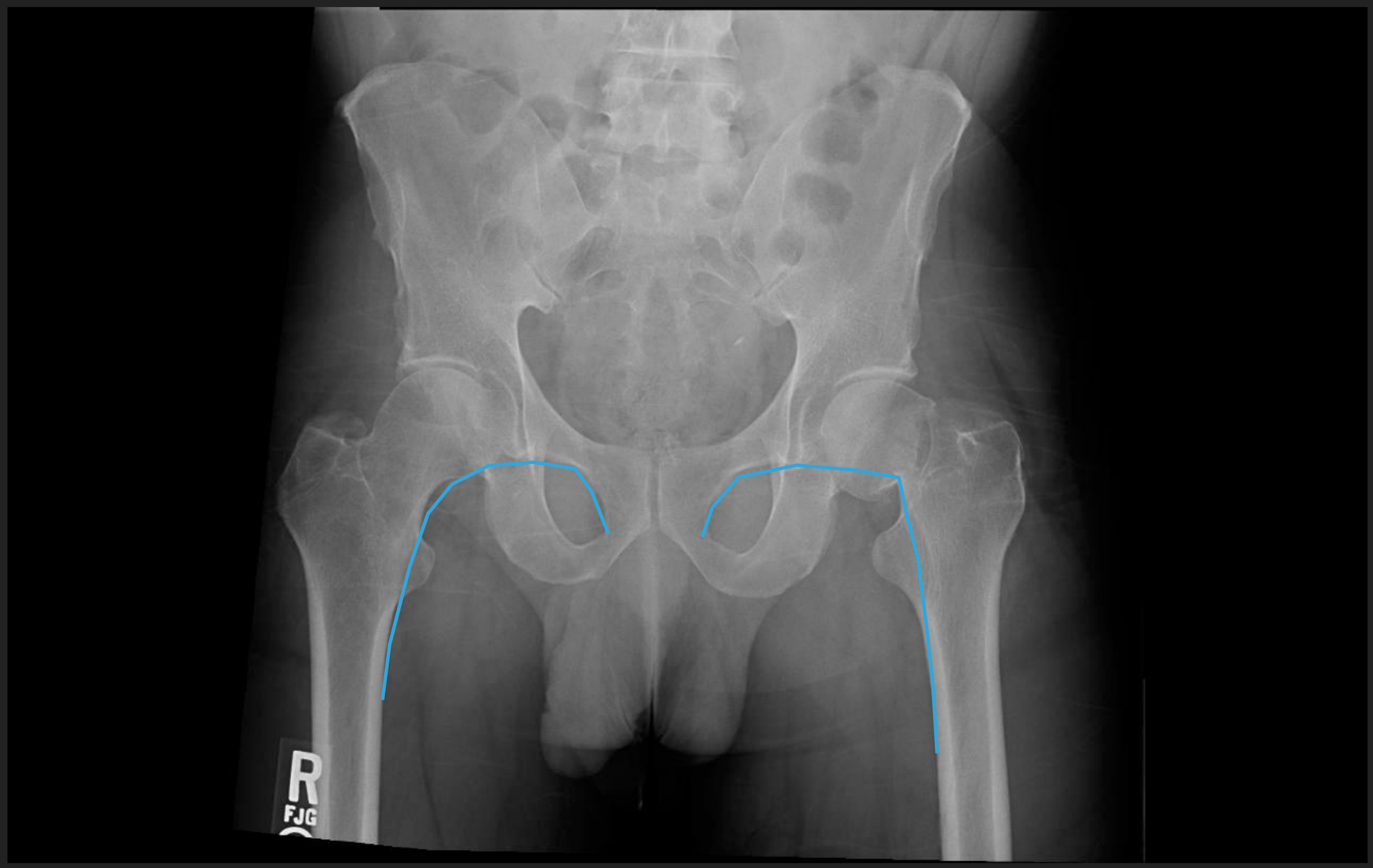


- AP Pelvis
  - Predict 24h transfusion requirements and mortality

    High grade open book = 18 units, 30% mortality

    Vertical shear = 8 units, 25% mortality

    High grade lateral compression = 7 units, 14% mortality

    *These relationships have not been reproduced in more recent studies

    Kregor JOT 2007

    Starr JT 2002

Dalal et al, JT, 1989
Burgess et al, JT, 1990
Whitbeck et al, JOT, 1997
Switzer et al, JOT, 2000

DEFINITIVE CARE

- Dr. Wagg (SJRH) and myself have created a call list to help direct these patients for definitive care.
- NBTP coordinator will have instructions as to who it is best to get in touch with for the patient with a pelvic or acetabular fracture within our province.

NB Trauma Program
Programme de traumatologie du NB

Horizon Health Network
Réseau de santé Horizon

Vitalité Health Network
Réseau de santé Vitalité

Ambulance NB

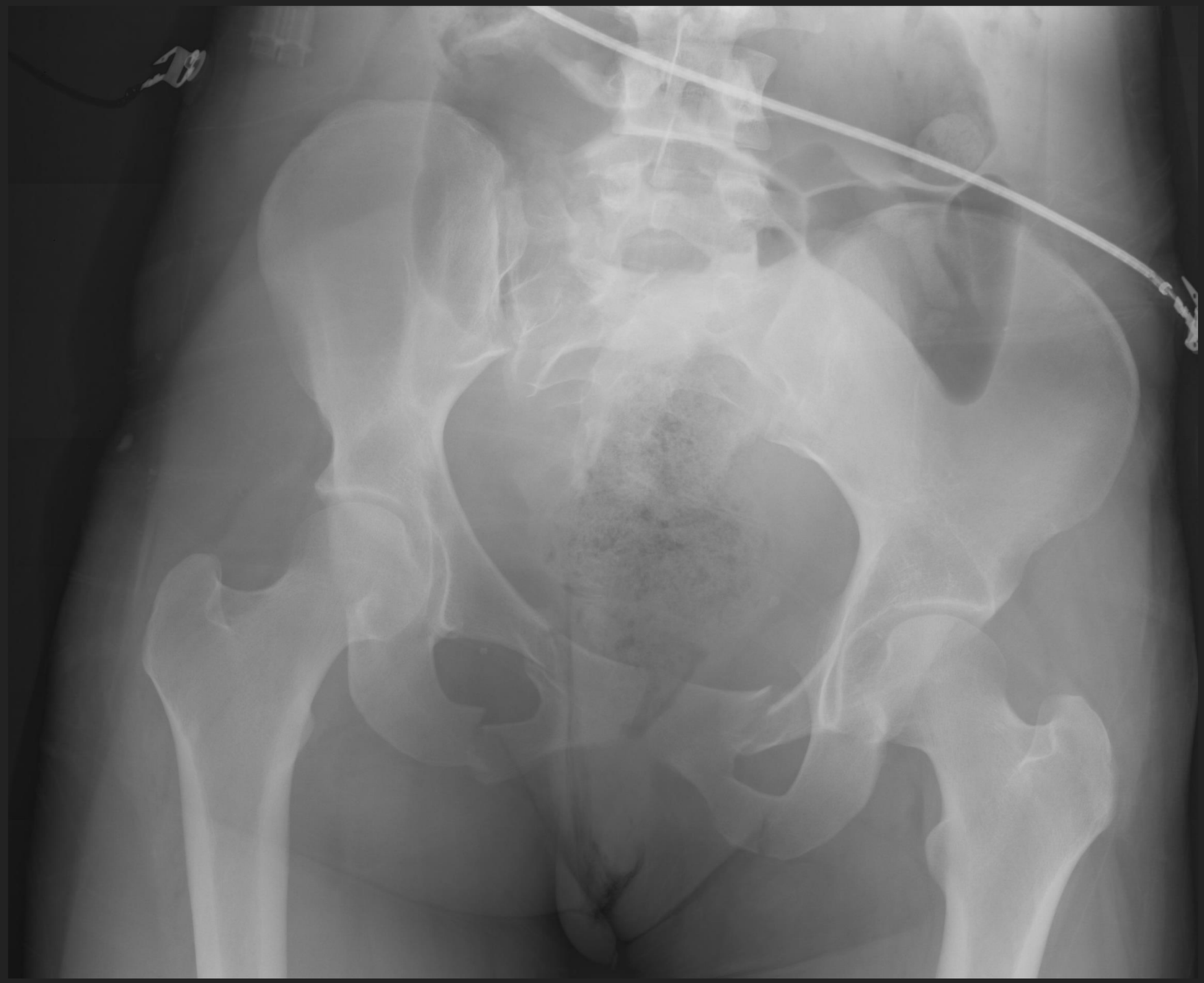
New Brunswick Department of Health
Ministère de la santé du Nouveau-Brunswick

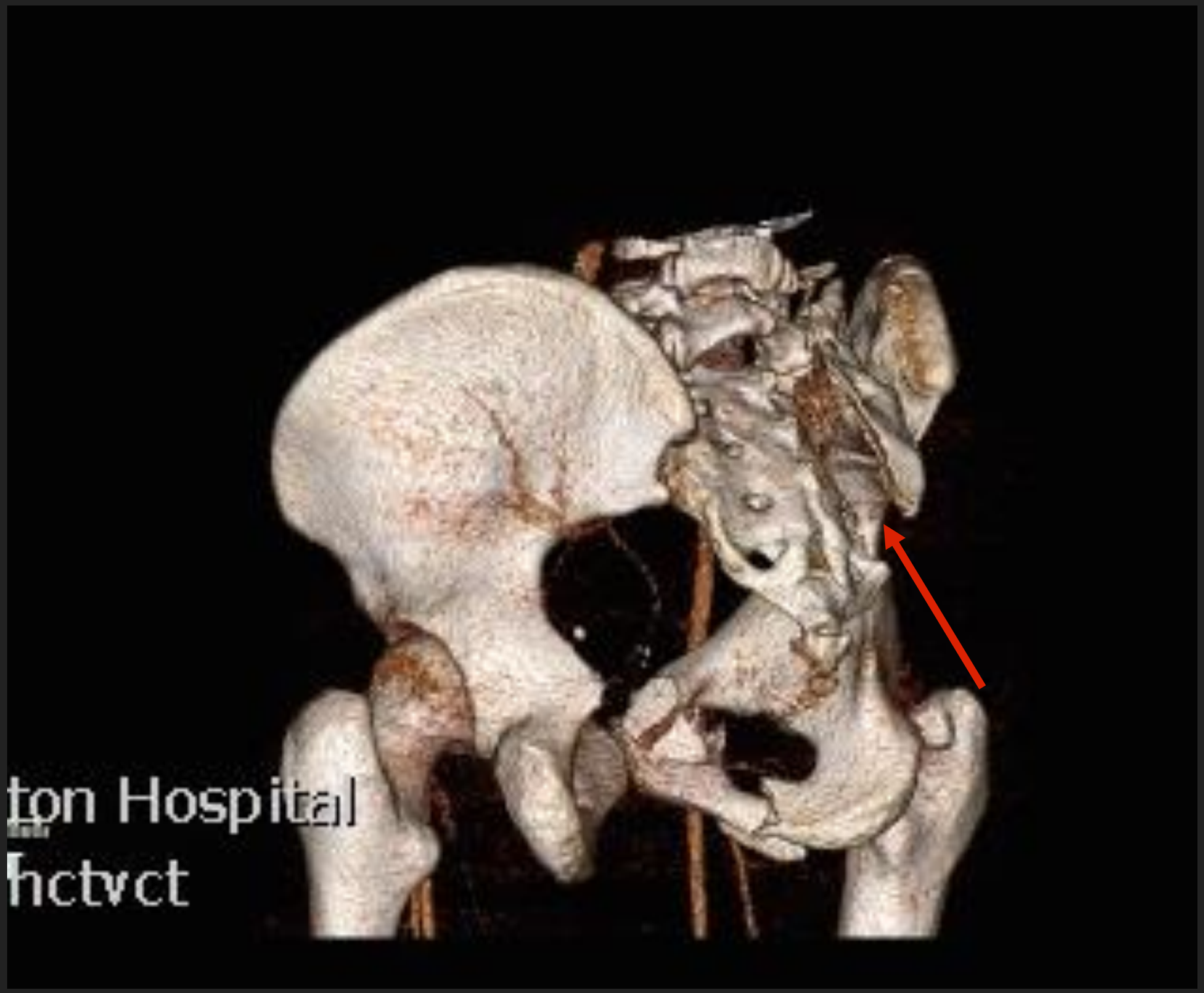
Trauma Control
Physician Resources

All trauma related communications must be conducted through

1-877-872-6247

DEFINITIVE CARE

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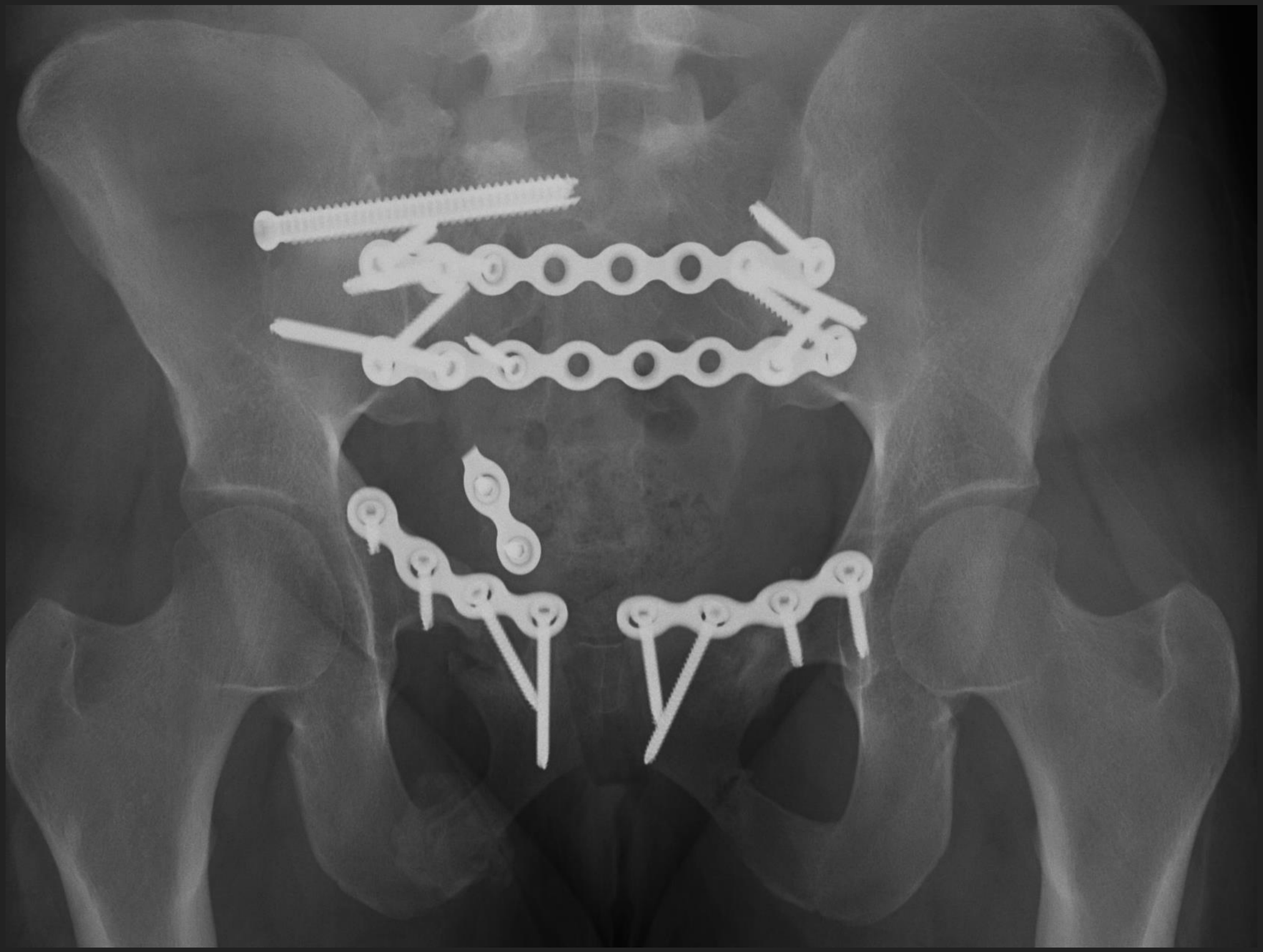

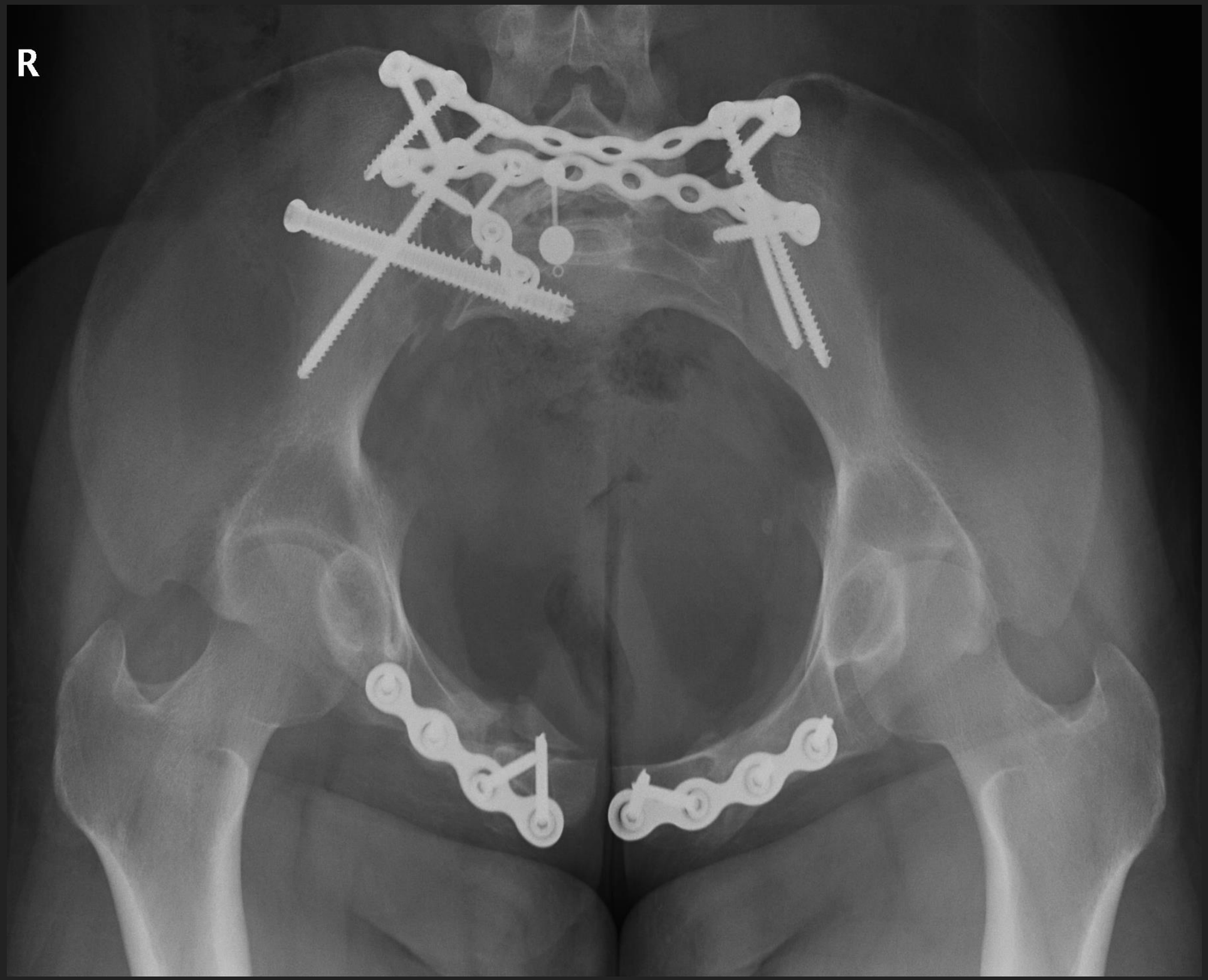
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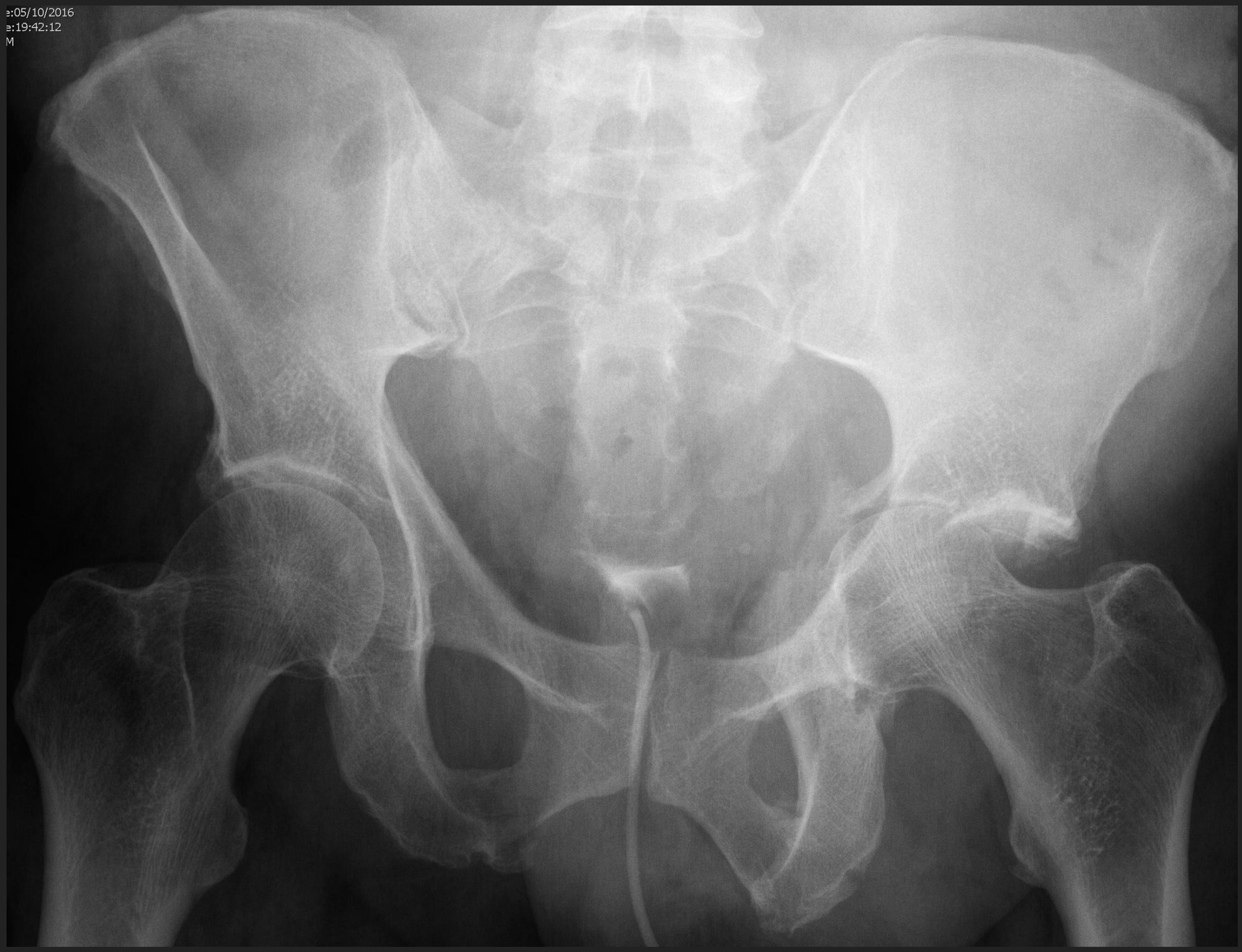
DEFINITIVE CARE



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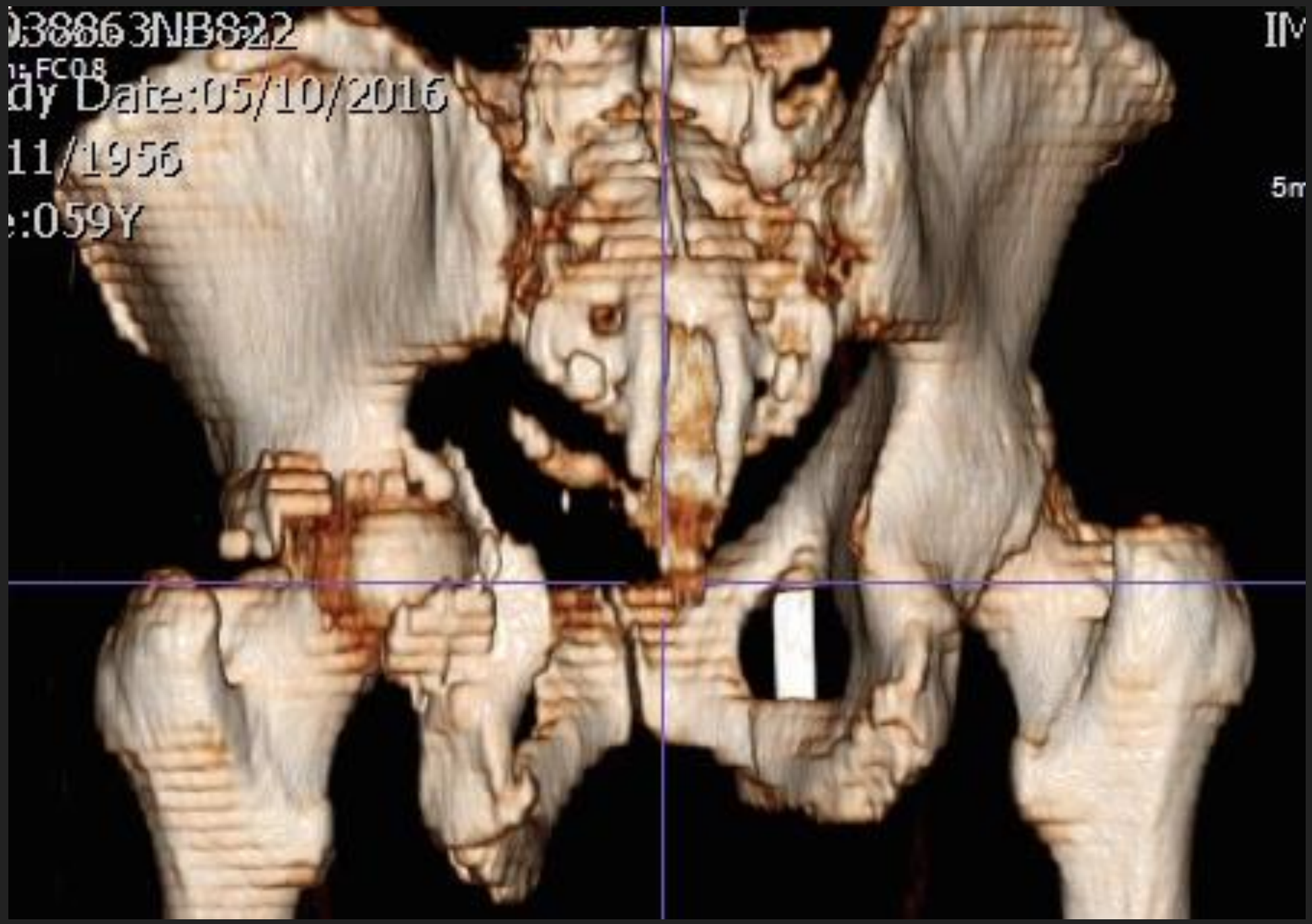
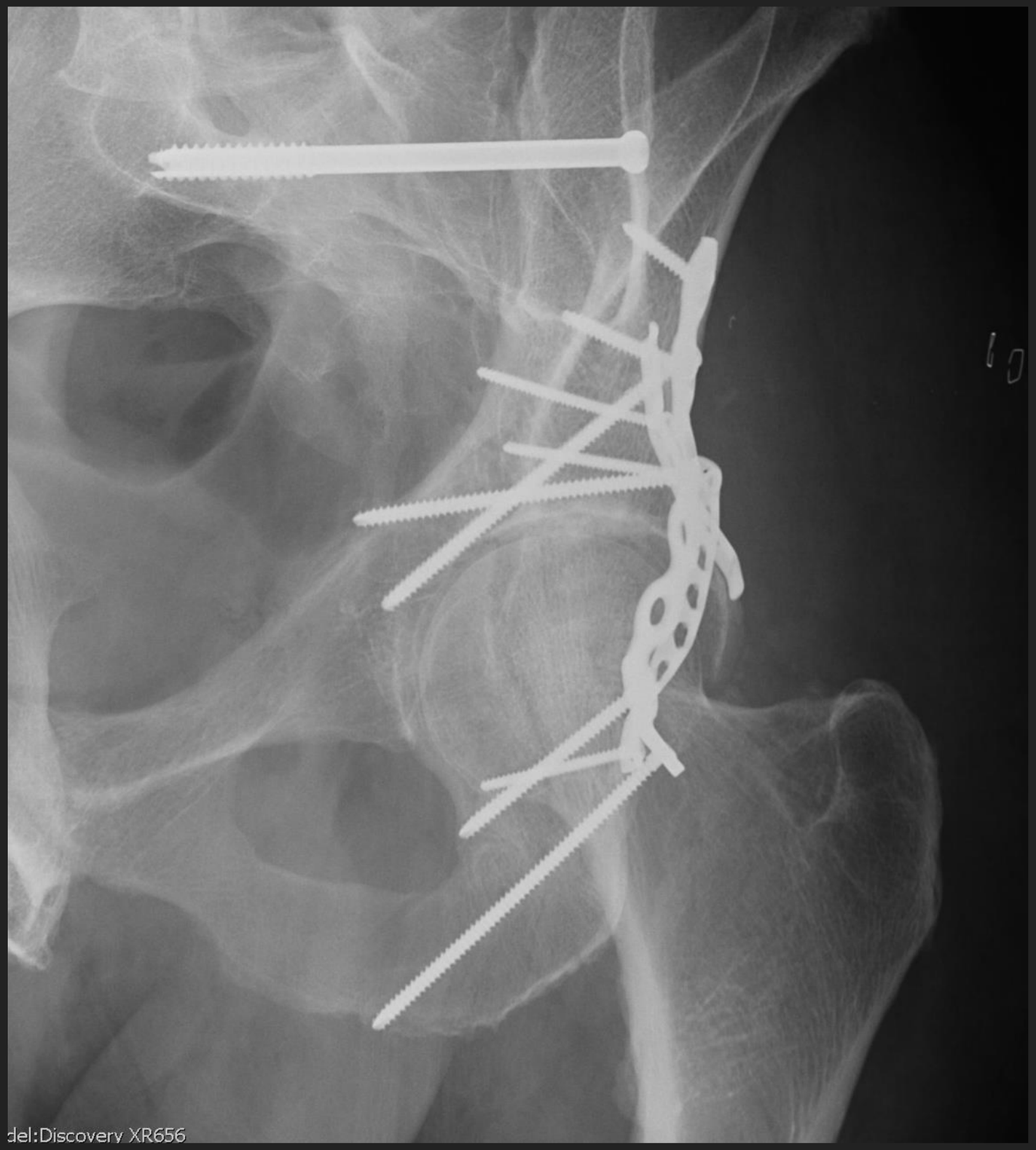


DEFINITIVE CARE



IN SUMMARY - THE 5% YOU SHOULD REMEMBER

- Manage hypovolemic shock aggressively.
- Check for associated injuries (perineum).
- Spend time looking at the AP pelvis and identify embolizable # patterns.
- Reduce any non-concentric hip that doesn't have an associated femoral neck fracture.
- These patients require the input and effort of a large multidisciplinary team.

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