

Surgical Approaches to the Acetabulum: Anterior Intrapelvic & Ilioinguinal

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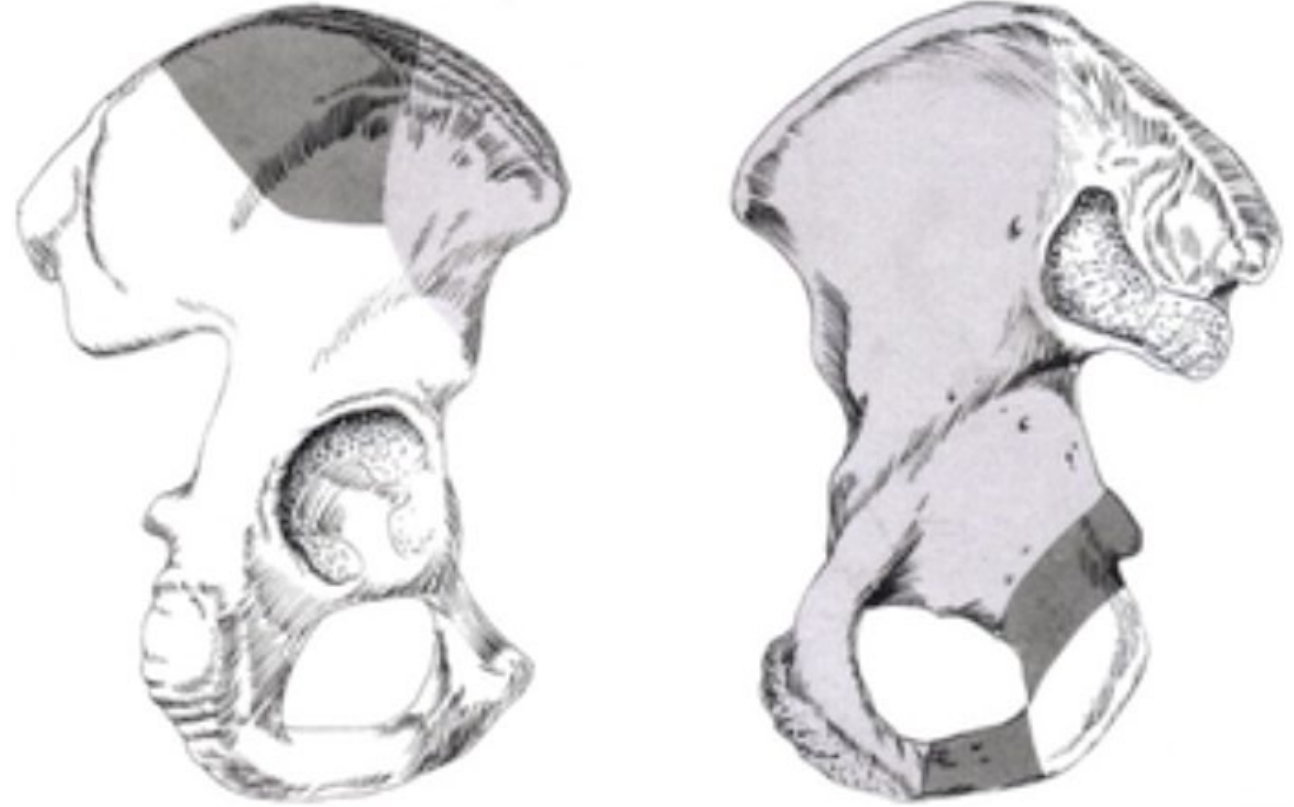


Learning Objectives

- **Appreciate anterior surgical approaches and associated access**
- **Comprehend iliopectineal fascia and implications**
- **Understand fracture patterns**
- **Recognize limitations of anterior surgical approaches**

Ilioinguinal Approach

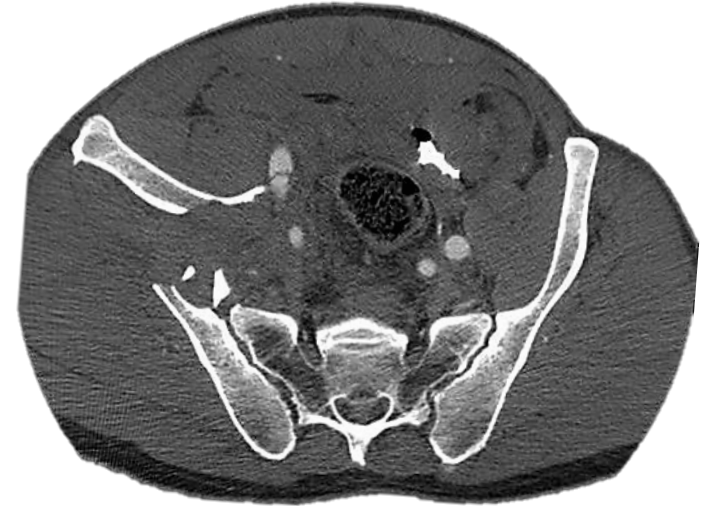
- Originally described by Letournel in 1961
- Several modifications described since
- Standard approach for anteriorly based acetabular fractures
- Primary access to anterior column and quadrilateral plate



Fensky, Florian MD*; Lehmann, Wolfgang MD†; Ruecker, Andreas MD‡; Rueger, Johannes M. MD* Ilioinguinal Approach: Indication and Technique, Journal of Orthopaedic Trauma: August 2018 - Volume 32 - Issue - p S12-S13

Thorough preoperative planning

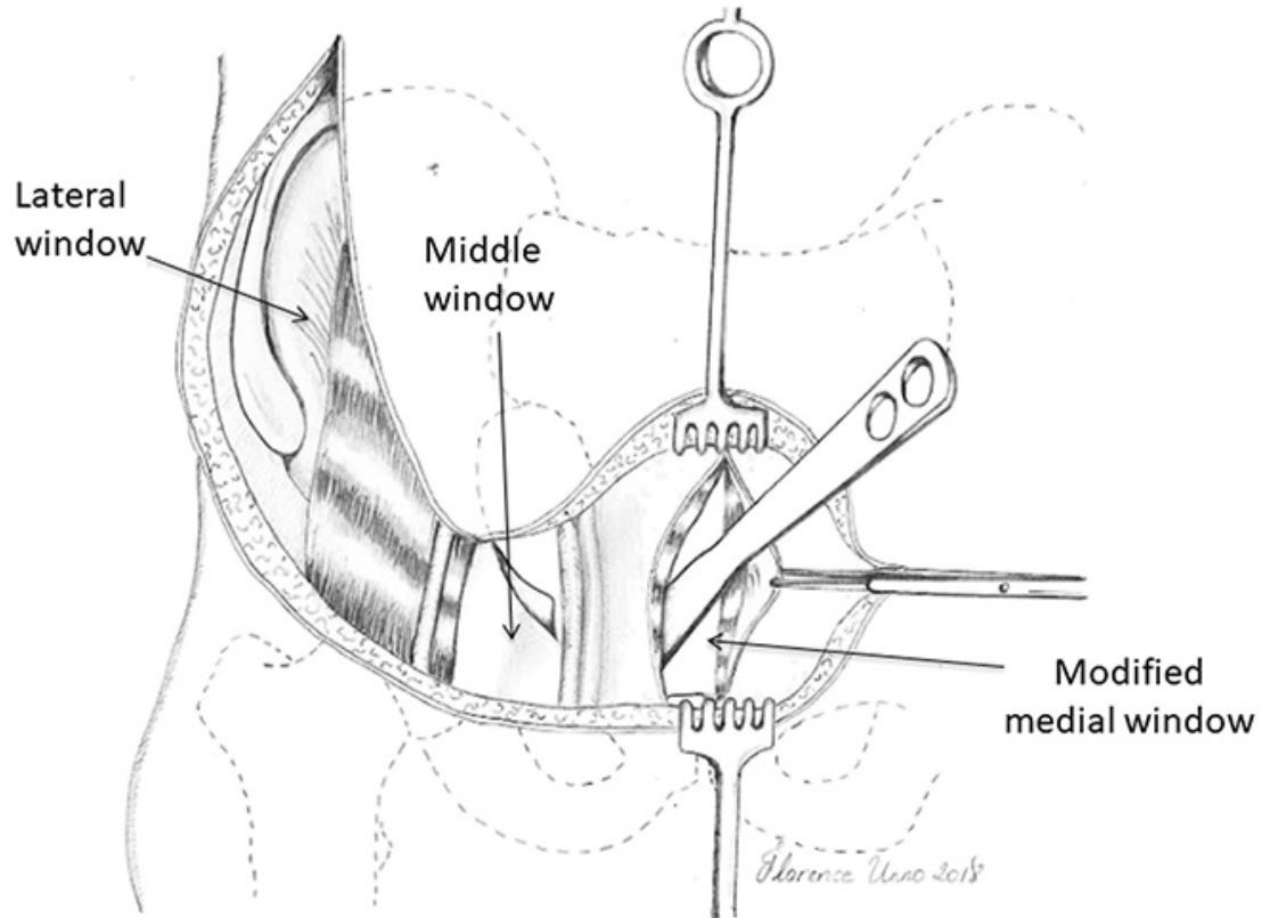
- Need detailed understanding of osseous injury
- Understand normal and disturbed underlying pelvic anatomy
- Role of previous surgeries: ex-lap vs. prior hernia
- Search for non osseous pathology
 - Iliac vein injury
 - Bladder injury
 - Hernias laterally and central/inguinal



Courtesy of Milton L. Chip Rountt, Jr. MD

Ilioinguinal Approach

- Contemporary three separate intervals
 1. Lateral
 2. Middle
 3. Medial



Mayo, Keith MD; Unno, Florence MD The Ilioinguinal Surgical Approach Using a Modified Medial Window: Origin, Evolution, and Applications. A 34-Year Perspective, Journal of Orthopaedic Trauma: February 2019 - Volume 33 - Issue - p S14-S20

Fractures typically addressed through ilioinguinal

- Anterior wall fractures
- Anterior column fractures
- Associated both column fractures
- Anterior column/wall and posterior hemitransverse fractures
- Transverse fracture (with major displacement through anterior column)
- T-shaped fracture (displaced anterior column segment and rarely posterior column)
- Atypical or extended posterior wall fractures

Fractures not typically addressed through ilioinguinal

- Typical posterior wall fractures
- Posterior column fractures
- Posterior column posterior wall fractures
- Transverse posterior wall fractures
- Transverse (with major displacement through posterior column)
- T-shaped (displaced posterior column)

Positioning

- Supine
- Foley necessary
- Flat top radiolucent table or traction table
- Lumbosacral bump
- Leg can be prepped out or in
- Hip flexion to relax iliopsoas
 - Towel bump, bone foam ramp, or table
- Prep to chest cranially and buttock posteriorly



Courtesy of Dr. Routt and Dr. Mark Adams

Superficial Landmarks

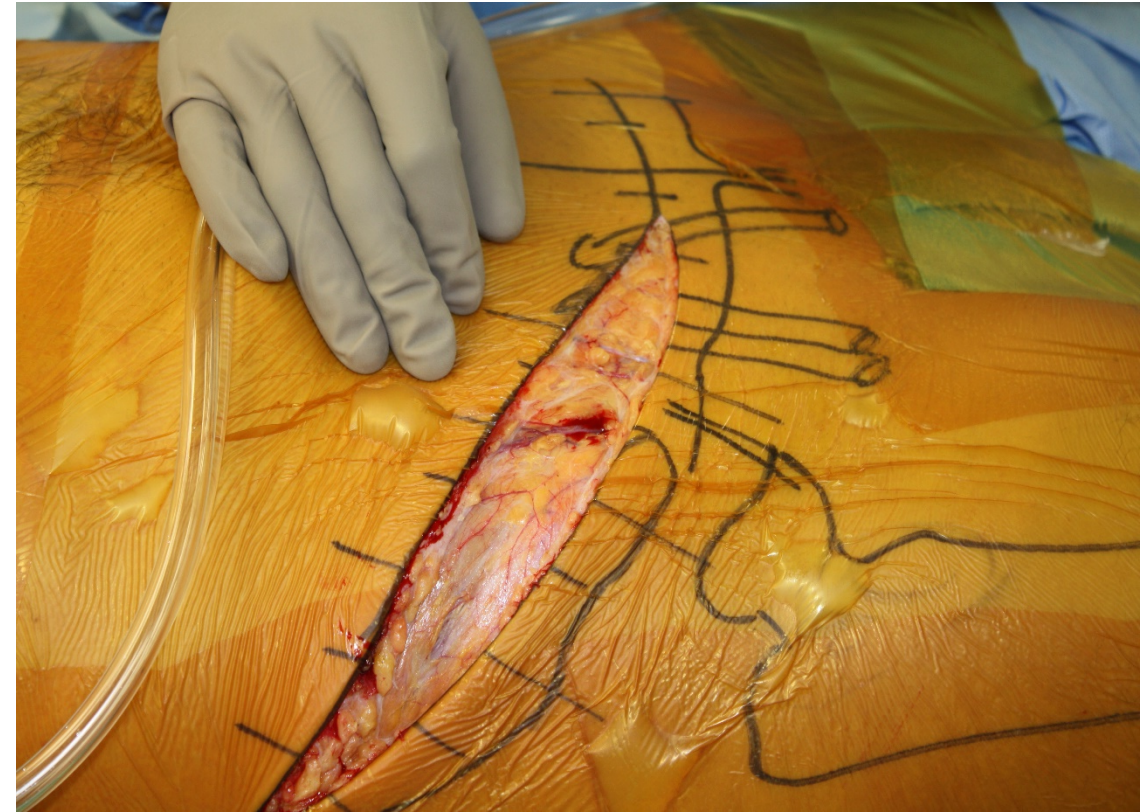
- Iliac crest
- ASIS
- Pubic tubercle
- Pubic symphysis



Courtesy of Milton L. Chip Routh, Jr. MD and Mark Adams, MD

Superficial Landmarks

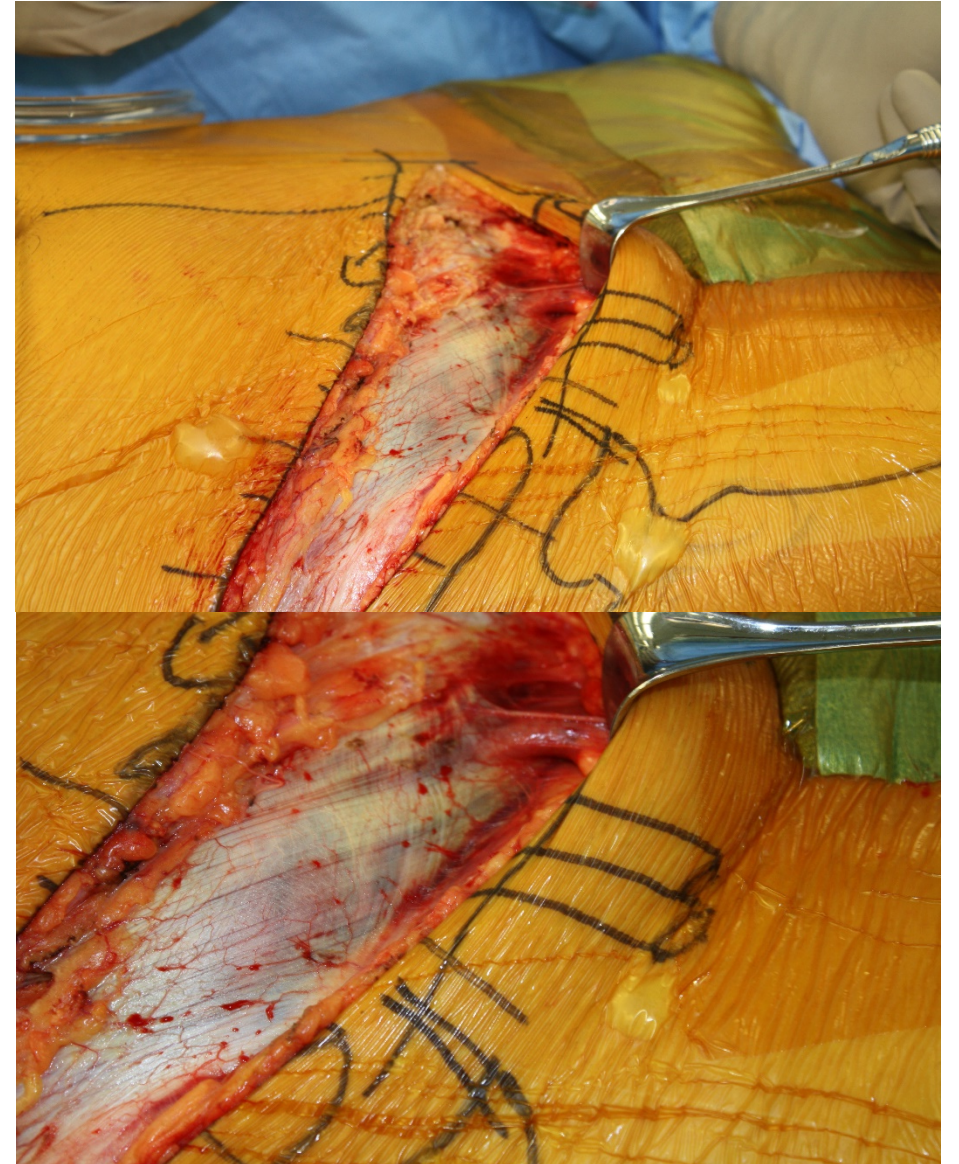
- Incision:
 - 2 cm cranial to symphysis
 - Starting 2 cm on contralateral side
 - Curve to ASIS
 - Continue posterior along iliac crest
 - Cauterize superficial epigastric vessels



Courtesy of Milton L. Chip Routh, Jr. MD and Mark Adams, MD

Superficial Dissection

- Dissect to external oblique fascia throughout
- Palpate ASIS
- Identify:
 - Inguinal ligament
 - Spermatic cord
 - External inguinal ring
 - Linea alba

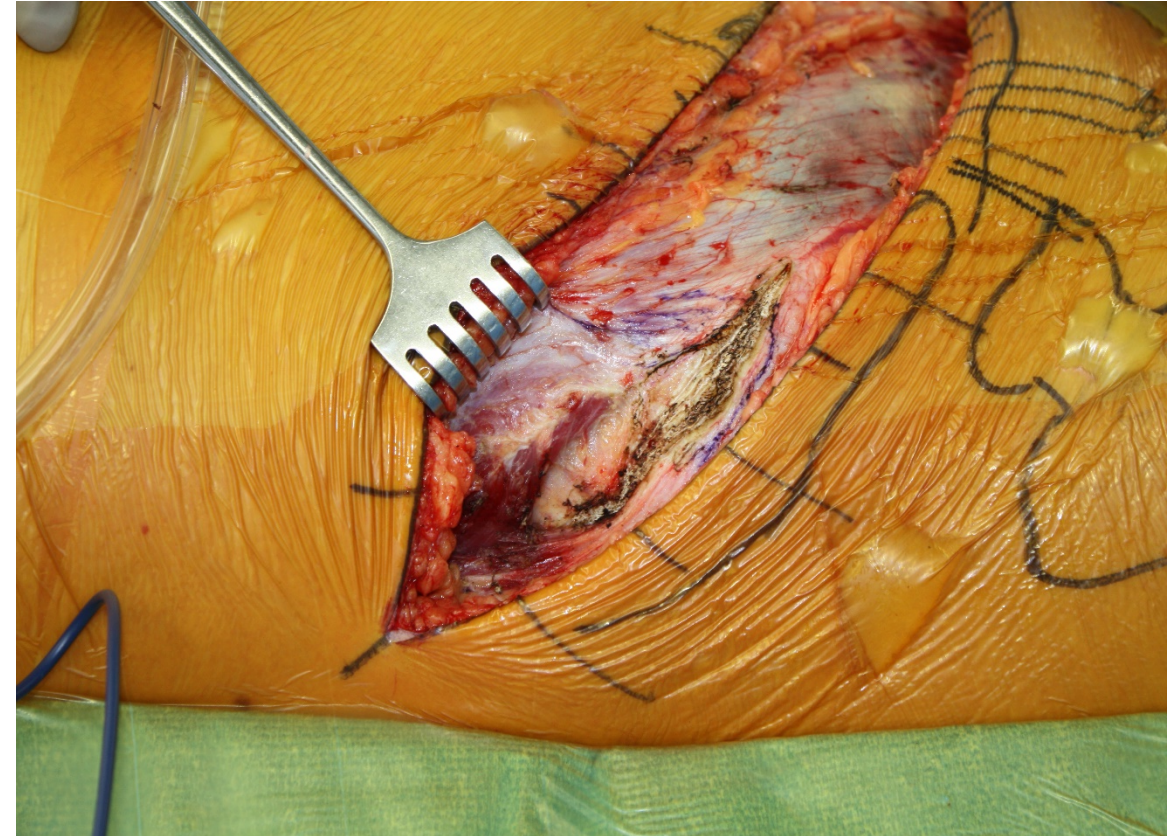


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Core Curriculum V5

Lateral Window

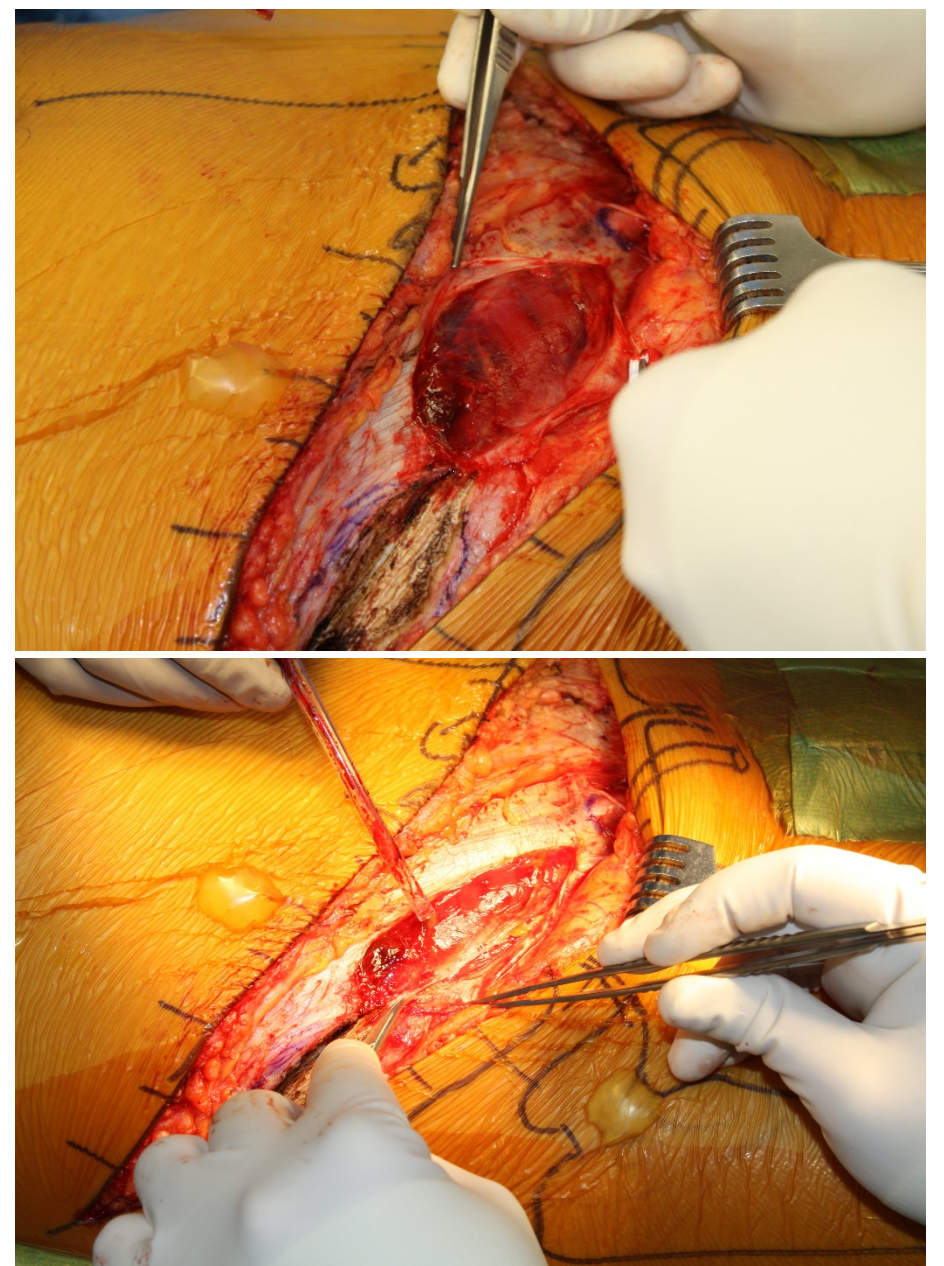
- Delineate external oblique insertion from tensor origin on iliac crest
- Cautery between both on outer iliac crest starting at ASIS
- Stay out of external oblique fascia until at least posterior to medius pillar
- Incise external oblique fascia in line with muscle fibers



Courtesy of Milton L. Chip Routt, Jr. MD and Mark Adams, MD

Middle Window

- Incise 1-2 cm cranial to palpable inguinal ligament and just medial to external inguinal ring up to ASIS
- Care taken to not damage ilioinguinal nerve below fascia
- Mobilize canal contents proximally off inguinal ligament
- Incise floor of ligament/inguinal canal leaving 2 mm cuff for later repair

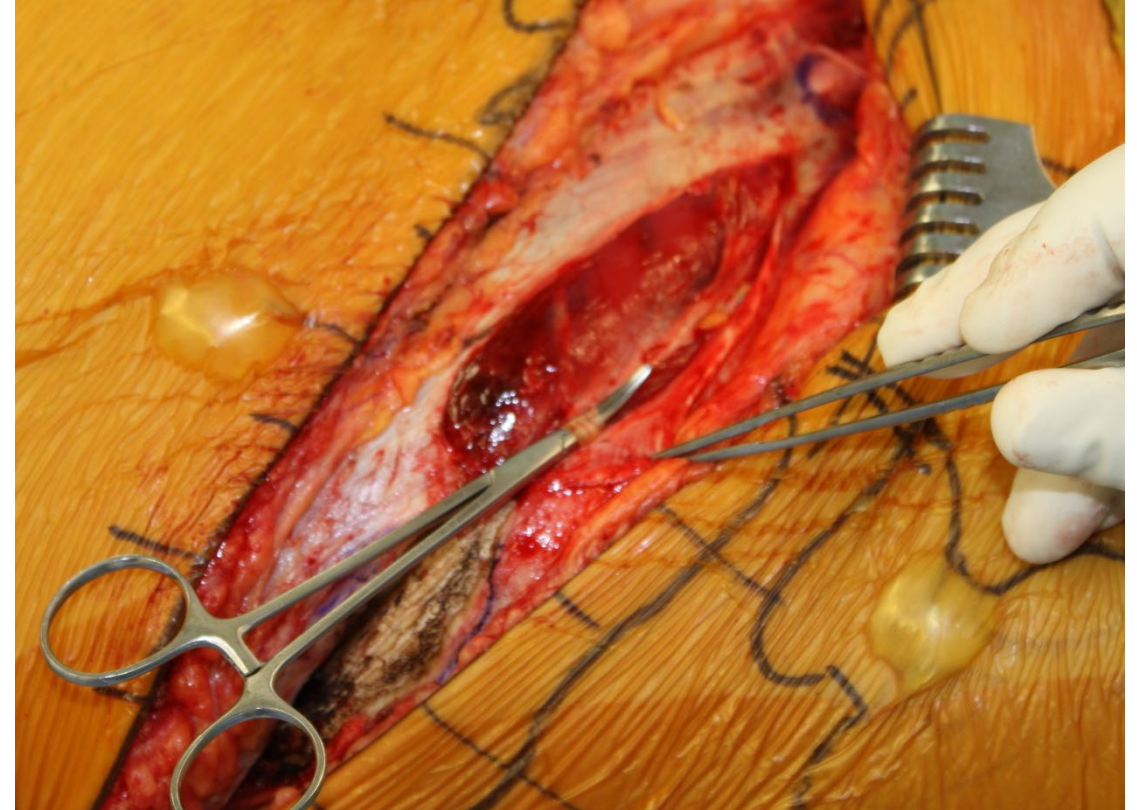


Courtesy of Milton L. Chip Rountt, Jr. MD and Mark Adams, MD

Core Curriculum V5

Middle Window

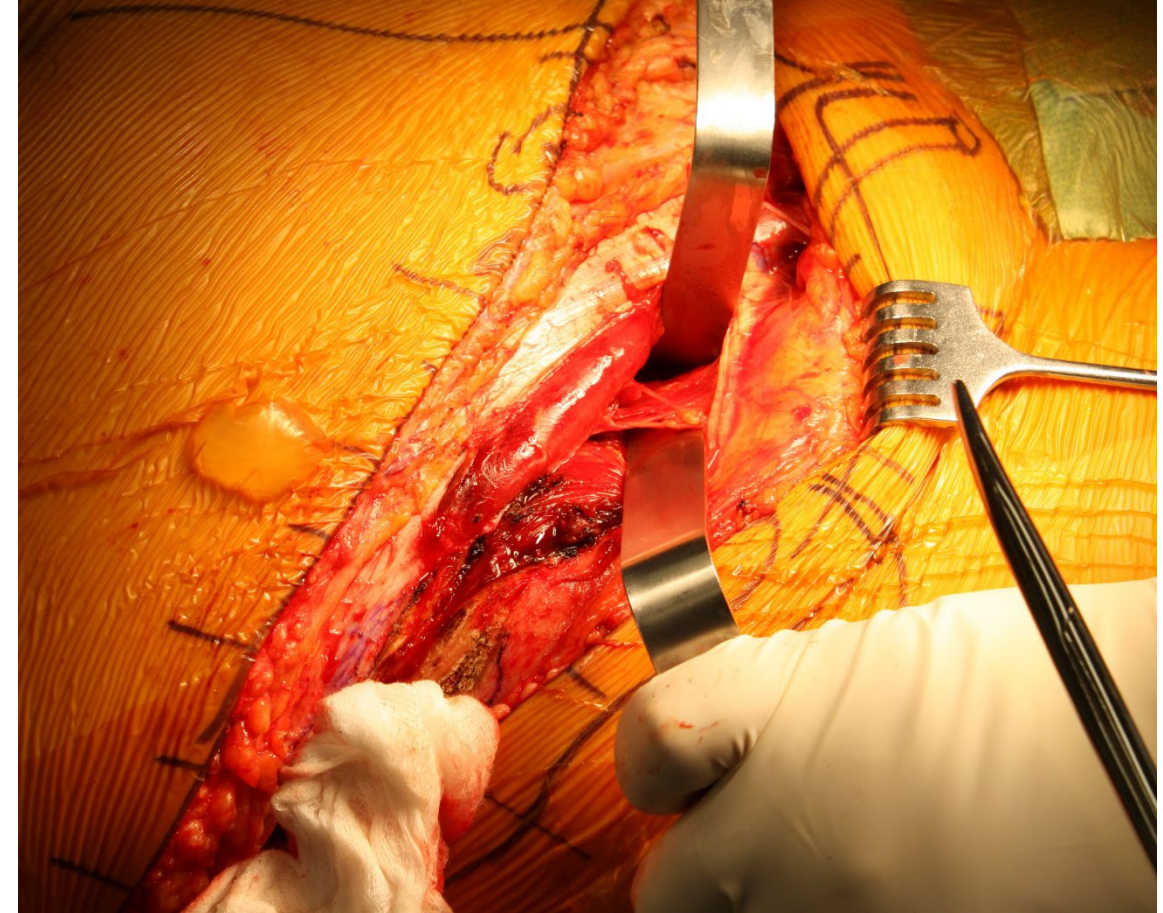
- Identify lateral femoral cutaneous nerve medial to ASIS
- Can do 2 cm segmental excision to minimize neuroma or mobilize



Courtesy of Milton L. Chip Routt, Jr. MD and Mark Adams, MD

Middle Window

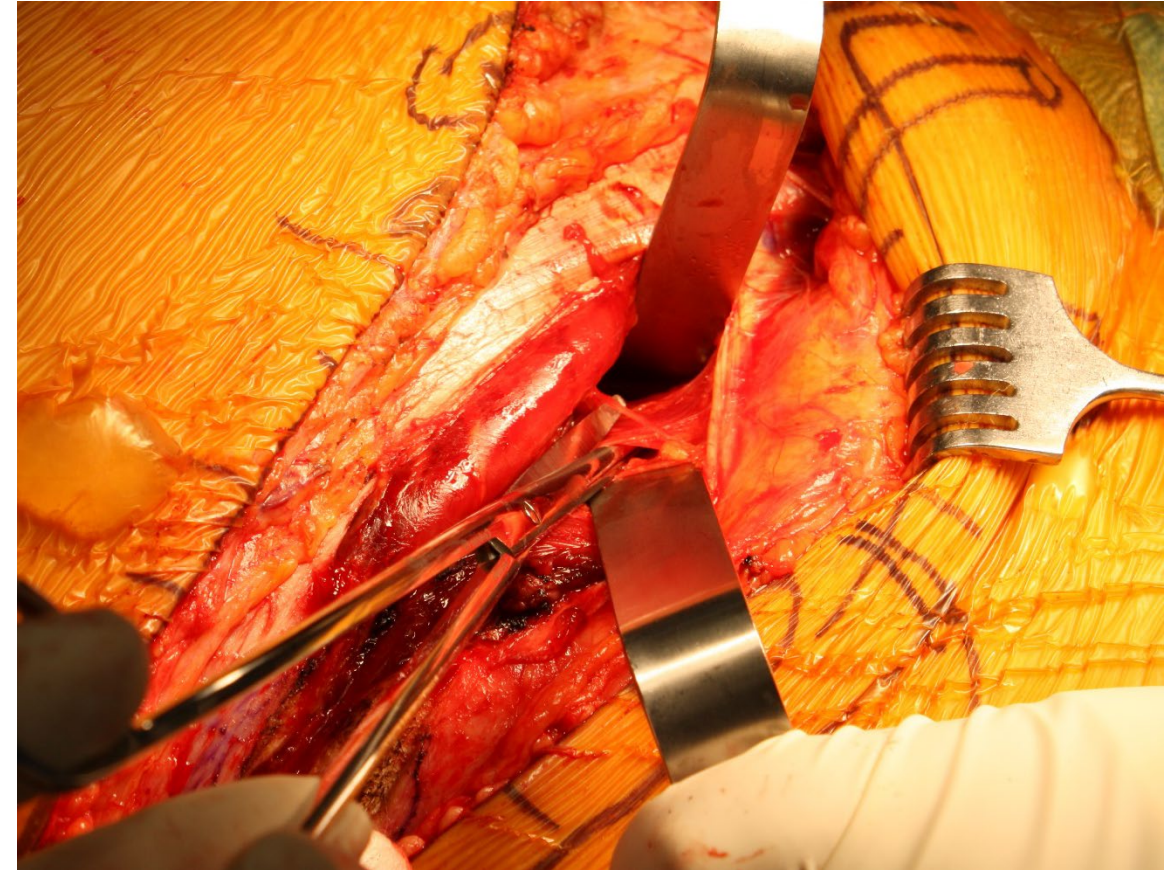
- Identify iliopectineal fascia overlying iliopsoas and palpate femoral vessels medially
- Bluntly dissect onto and just lateral to femoral artery.
- Mobilize artery medial and retract iliopsoas and femoral nerve laterally



Courtesy of Milton L. Chip Routh, Jr. MD and Mark Adams, MD

Middle Window

- Incise iliopectineal fascia down to pelvic brim
- Cautious for perforating vessel within fascia
- Release down to pelvic brim
- Continue releasing anteriorly over ramus and posteriorly into true pelvis



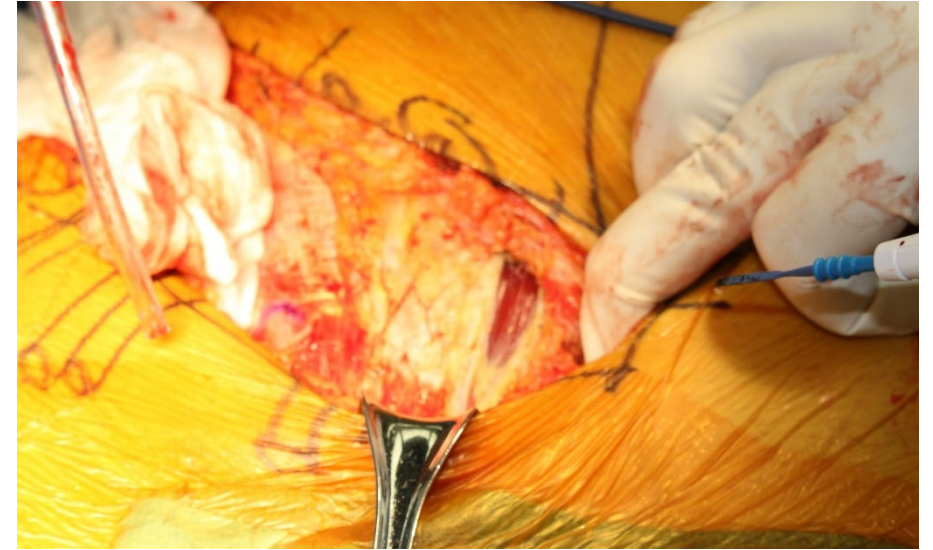
Courtesy of Milton L. Chip Routt, Jr. MD and Mark Adams, MD

Medial Window/Anterior Intrapelvic Approach

- Original Stoppa approach used for inguinal hernia repair with mesh
- Cole and Hirvensalo described use for acetabular surgery in early 1990s
- Depending on the fracture pattern, this interval can be used in isolation, along with lateral window, or as the medial window of ilioinguinal

Medial Window/Anterior Intrapelvic Approach

- Incise linea alba and extend 10 cm proximal to symphysis
- Split rectus and carefully incise posterior rectus sheath
- Use finger to free bladder off posterior rectus sheath and expose perisosteum of posterosuperior superior ramus surface

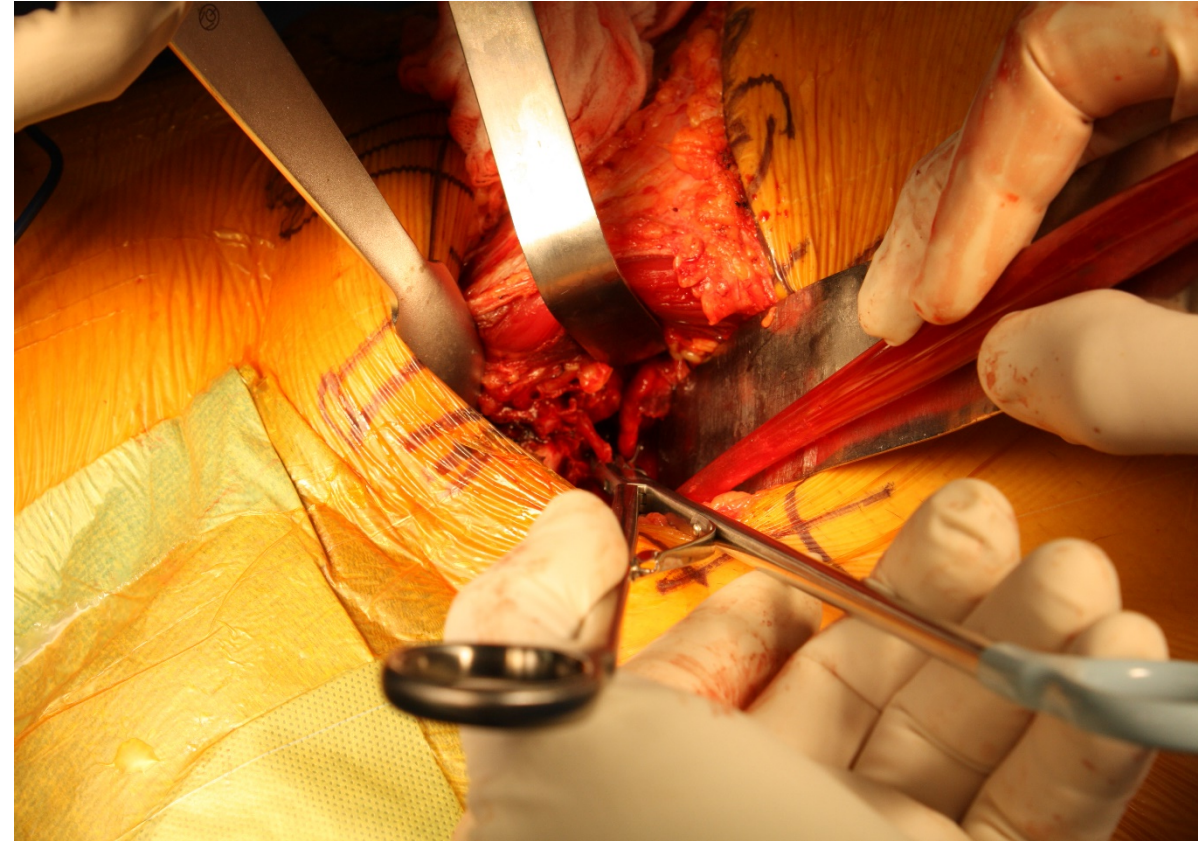


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Core Curriculum V5

Medial Window/Anterior Intrapelvic Approach

- Insert malleable retractor to mobilize bladder posteriorly
- Release superior rectus insertion working laterally
- Continue releasing iliopectineal fascia working laterally
- Identify and ligate/cauterize/clip vascular anastomosis between iliac and obturator systems

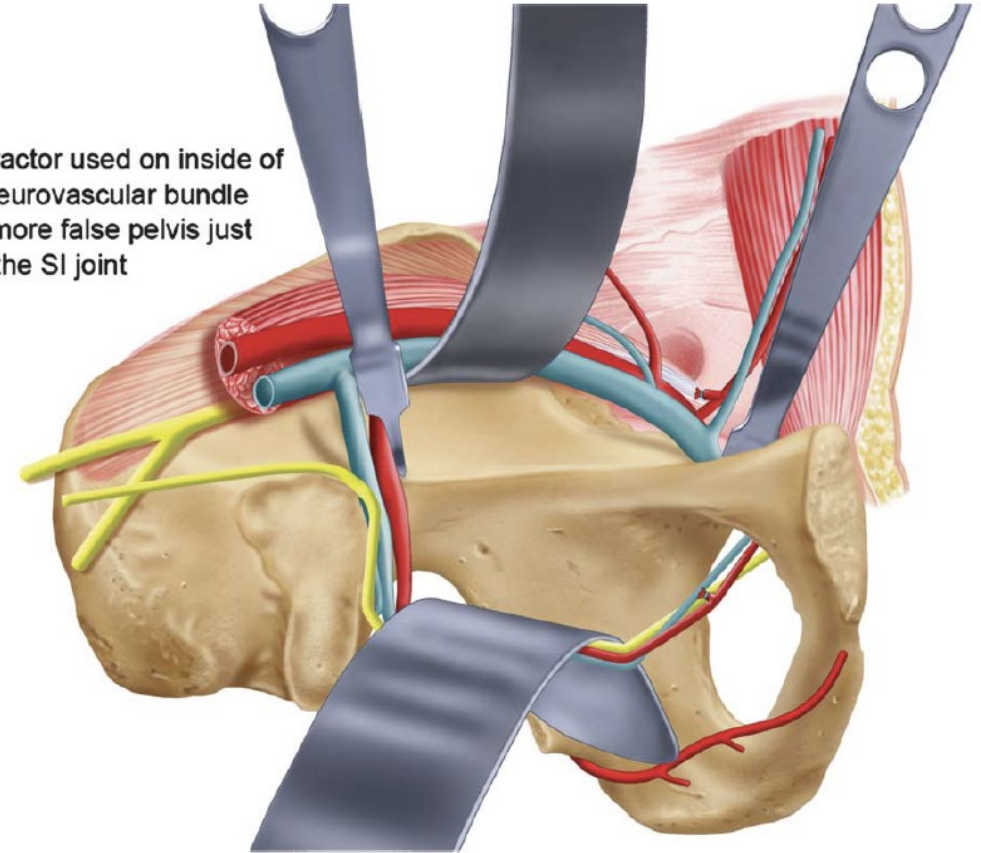


Courtesy of Milton L. Chip Routt, Jr. MD and Mark Adams, MD

Medial Window/Anterior Intrapelvic Approach

- Mobilize obturator neurovascular bundle
- Can retract caudally and work superior to the bundle
- Can also dissect caudal side of bundle, retract obturator bundle superiorly and work inferiorly
- Release iliopectineal fascia back to sacroiliac joint and further expose internal iliac fossa

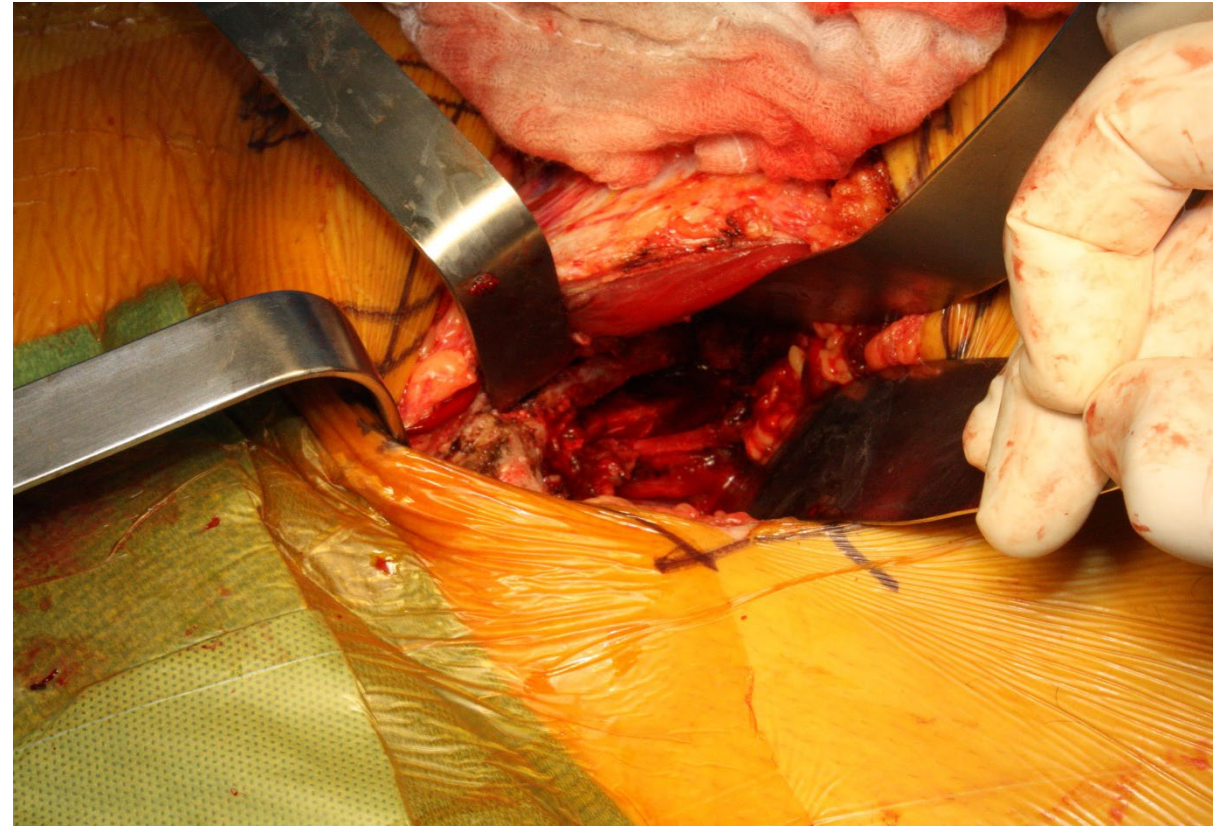
Homan retractor used on inside of obturator neurovascular bundle to expose more false pelvis just anterior to the SI joint



Sagi HC, Afsari A, Dziadosz D. The anterior intra-pelvic (modified rives-stoppa) approach for fixation of acetabular fractures. J Orthop Trauma. 2010 May;24(5):263-270

Medial Window/Anterior Intrapelvic Approach

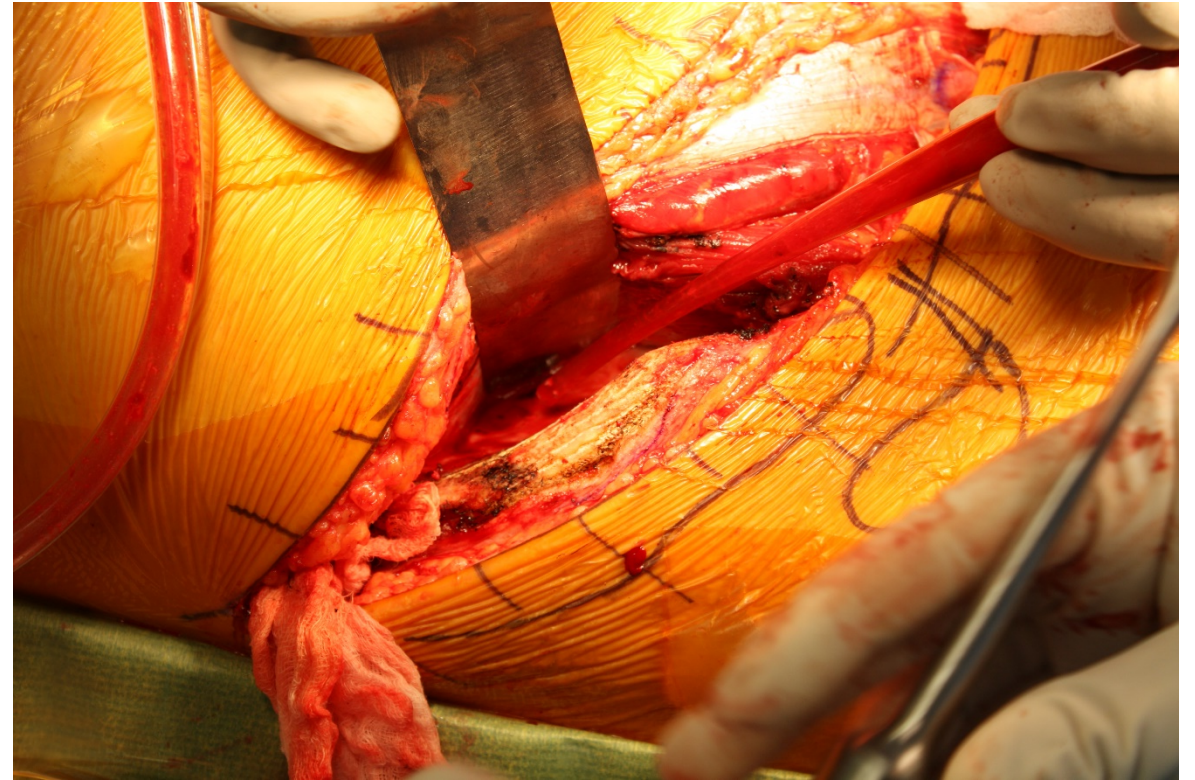
- Release obturator internus muscle to expose quadrilateral plate and posterior column



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Lateral Window

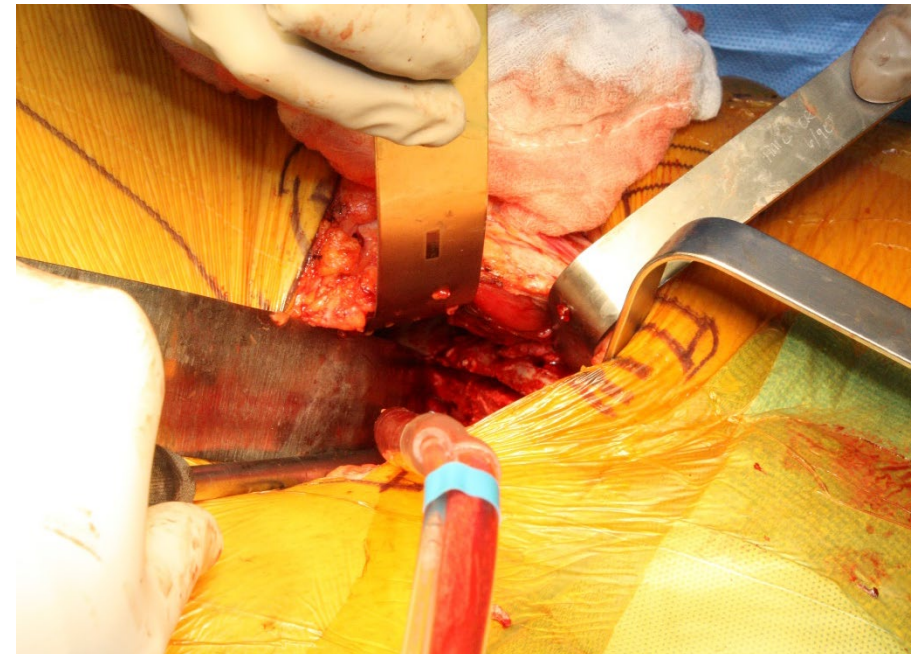
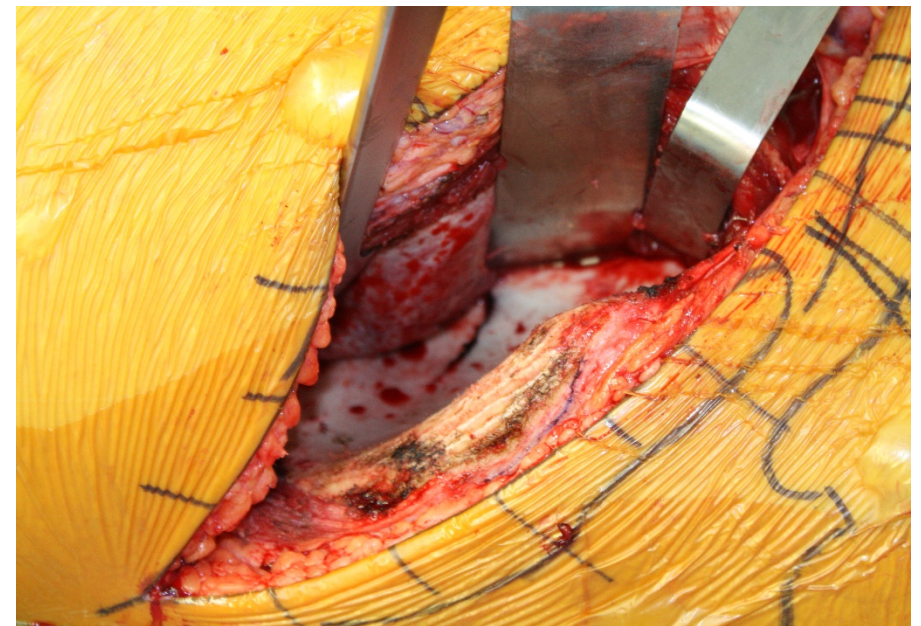
- If not already done, back to iliac crest and fully release obliques and then iliacus in subperiosteal fashion
- Malleable or other retractor over brim or towards PSIS helps expose internal iliac fossa



Courtesy of Milton L. Chip Routt, Jr. MD and Mark Adams, MD

Fracture Exposure

- Until now the fracture hematoma and tissue interposed in fracture has been left untouched
- This minimizes creating new and ongoing bleeding while still exposing
- Work through all intervals as needed to clean and irrigate fracture appropriately

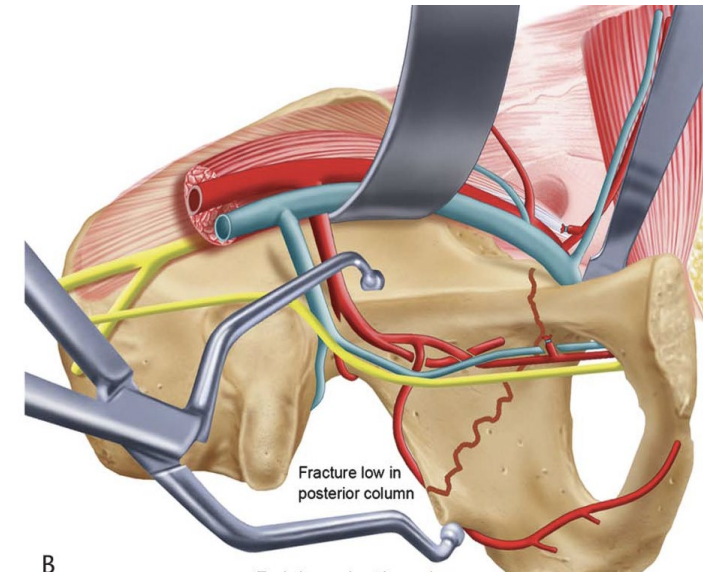


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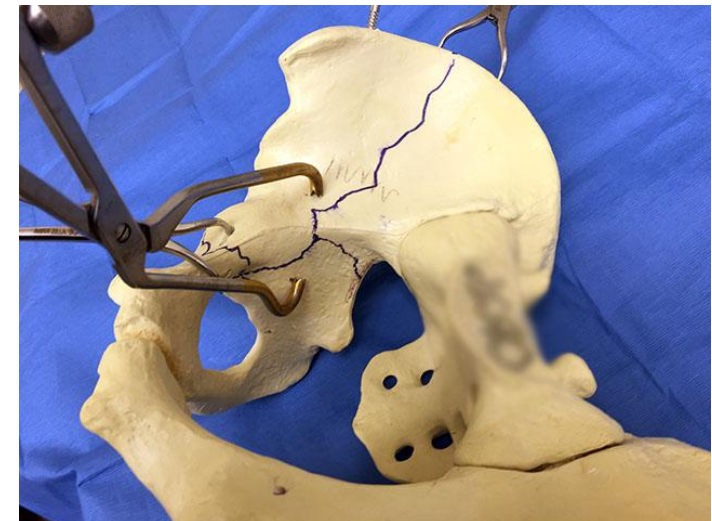
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Fracture Reduction

- Based off injury pattern and displacement
- Shantz pin in medius pillar
- Ball spike pusher with foot plate
- Numerous clamp types and positions possible
- Undercontoured plate can also help achieve reduction



Sagi HC, Afsari A, Dziadosz D. The anterior intra-pelvic (modified rives-stoppa) approach for fixation of acetabular fractures. *J Orthop Trauma*. 2010 May;24(5):263-270



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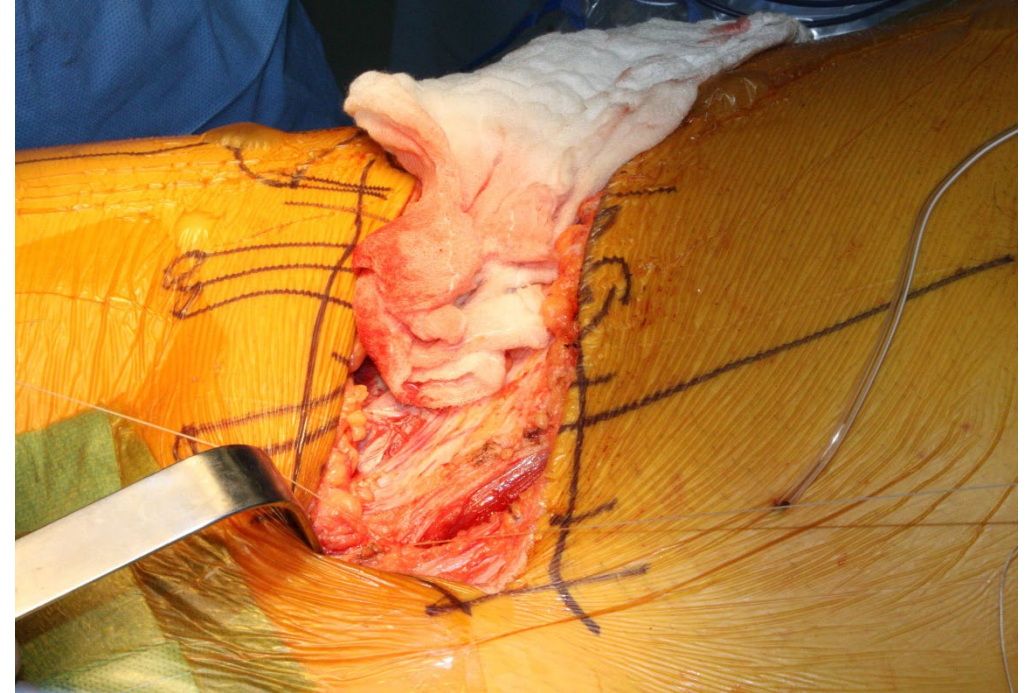
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Fracture Fixation

- Based off injury pattern, fracture morphology, displacement
- Common plating surfaces include:
 - Superiorly on the pelvic brim and superior ramus
 - intrapelvic along the quadrilateral plate
- Sequencing and placement of implants important and varies between injuries
- Independent screws possible but care taken to ensure appropriate location as they can complicate plate contour and plate-bone opposition

Wound Care and Closure

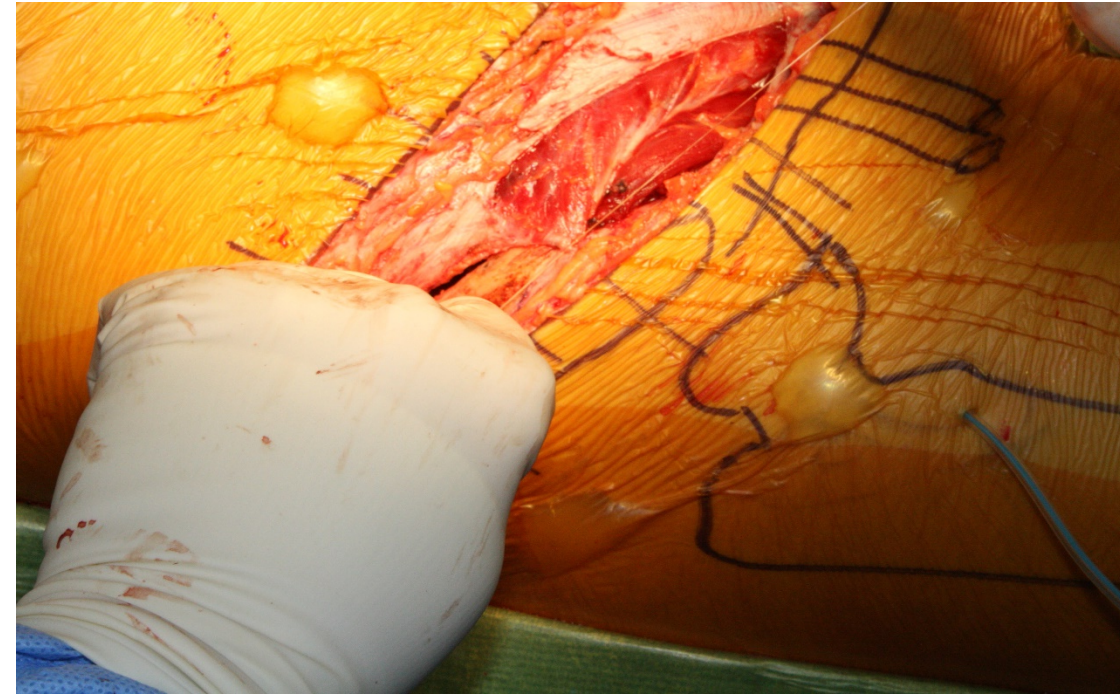
- After fixation completed, copious irrigation performed
- Surgical drains typically placed in Space of Retzius and internal iliac fossa to prevent deep hematoma formation
- Closure of rectus insertion deep and linea alba with interrupted 0 or 2-0 vicryl



Courtesy of Milton L. Chip Routt, Jr. MD and Mark Adams, MD

Lateral Window Closure

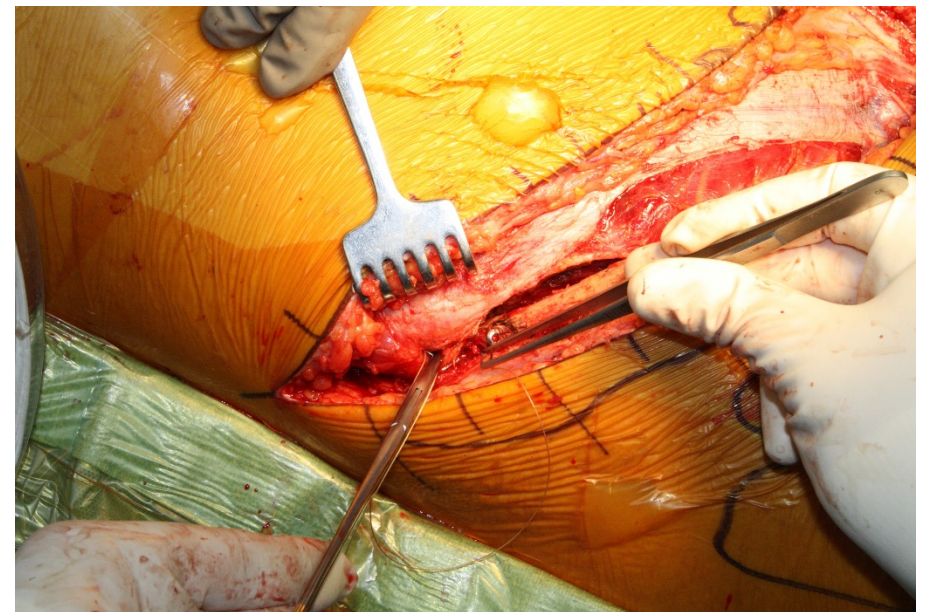
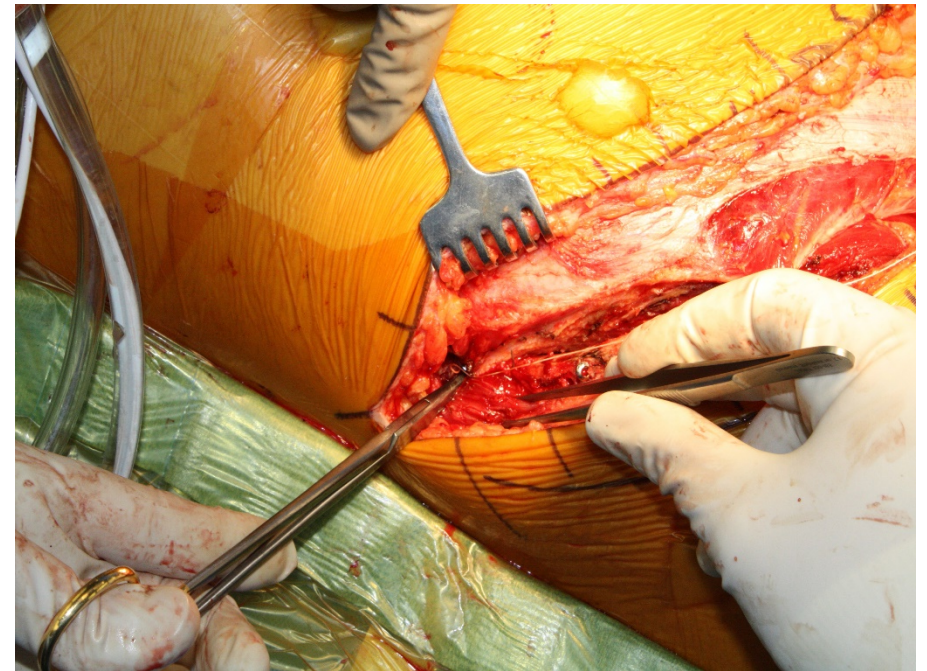
- Initial 0 or 2-0 vicryl stitch to origin of inguinal ligament on ASIS
- Sets ligament orientation and allows tension free repair of floor and roof of inguinal ligament



Courtesy of Milton L. Chip Routh, Jr. MD and Mark Adams, MD

Lateral Window Closure

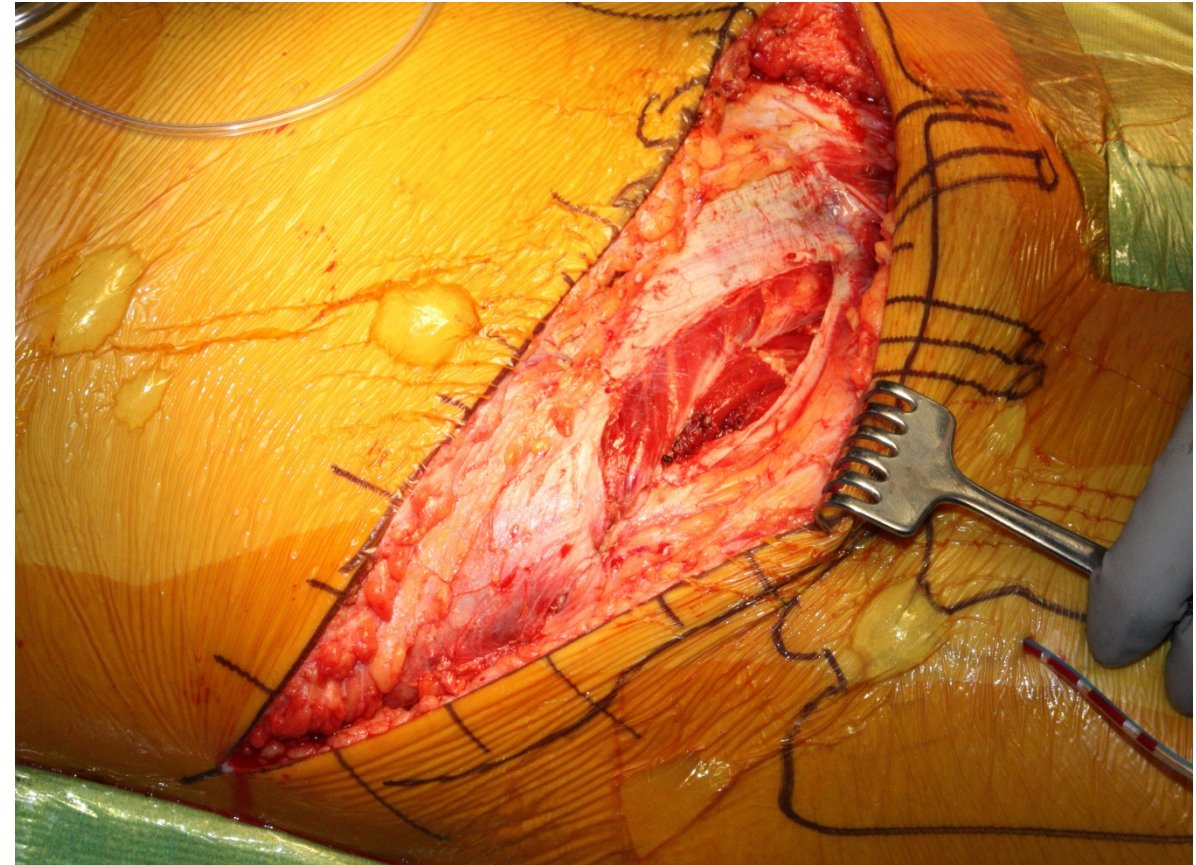
- Layered closure with 0 or 2-0 vicryl
- Internal oblique first deep to external oblique split.
 - Key to prevent potential hernia
- External oblique fascia to crest and abductory fascia second



Courtesy of Milton L. Chip Rountt, Jr. MD and Mark Adams, MD
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Lateral Window Closure

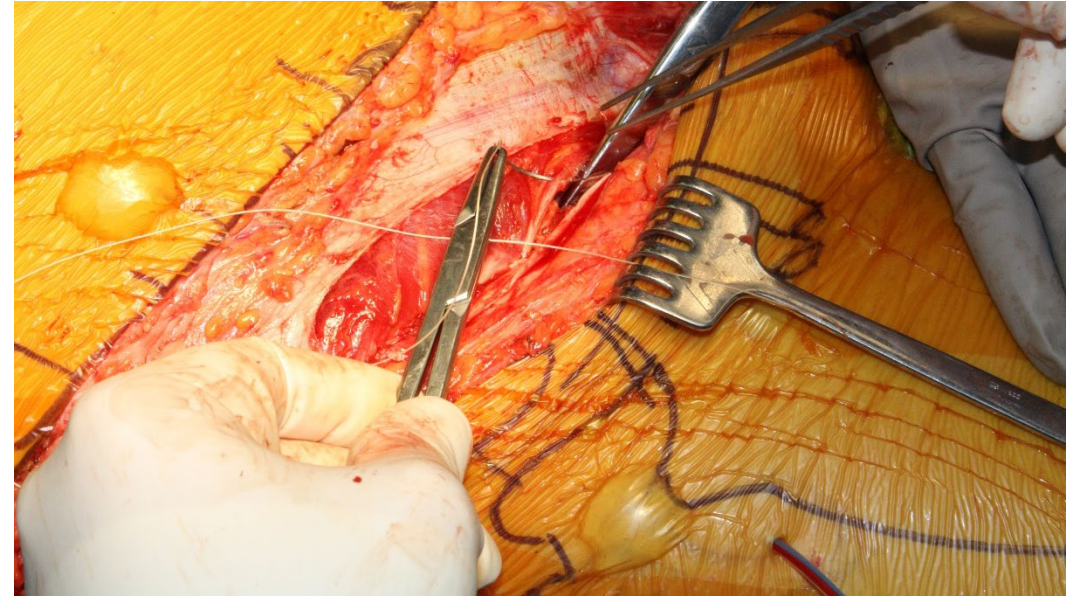
- Final appearance of two layer lateral window closure



Courtesy of Milton L. Chip Routh, Jr. MD and Mark Adams, MD

Middle Window Closure

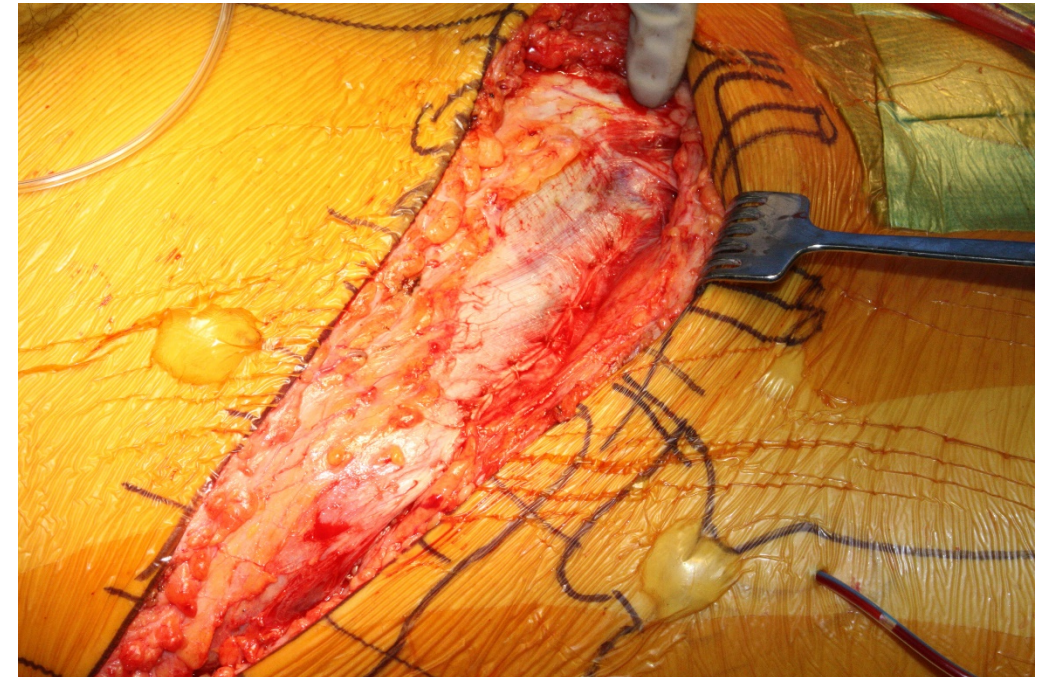
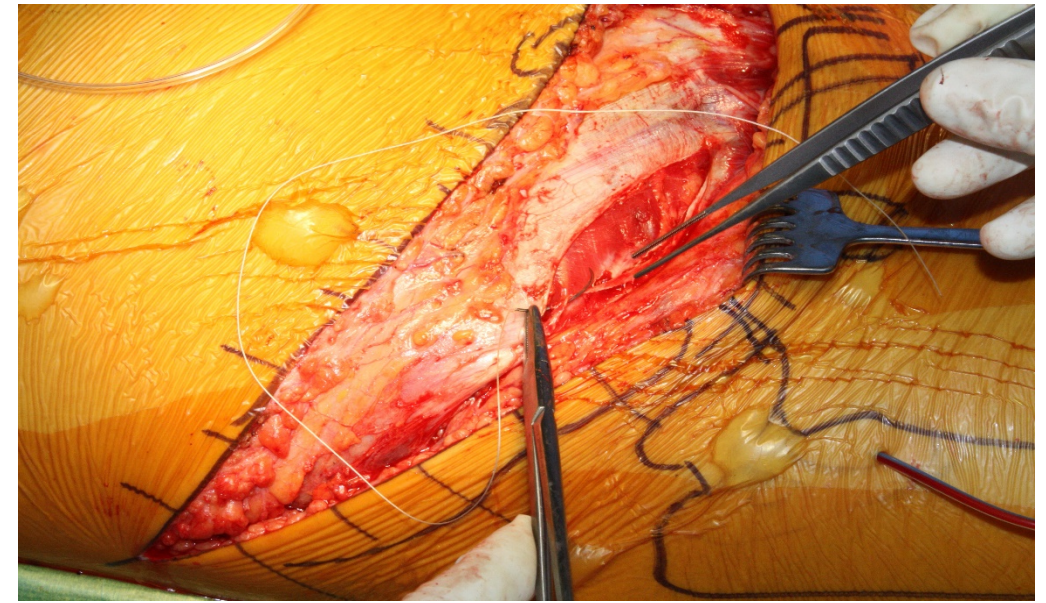
- Repair floor of inguinal canal/inguinal ligament first with 2-0 vicryl
- Care taken to reapproximate prior 2 mm cuff of ligament and avoid tearing



Courtesy of Milton L. Chip Routt, Jr. MD and Mark Adams, MD

Middle Window Closure

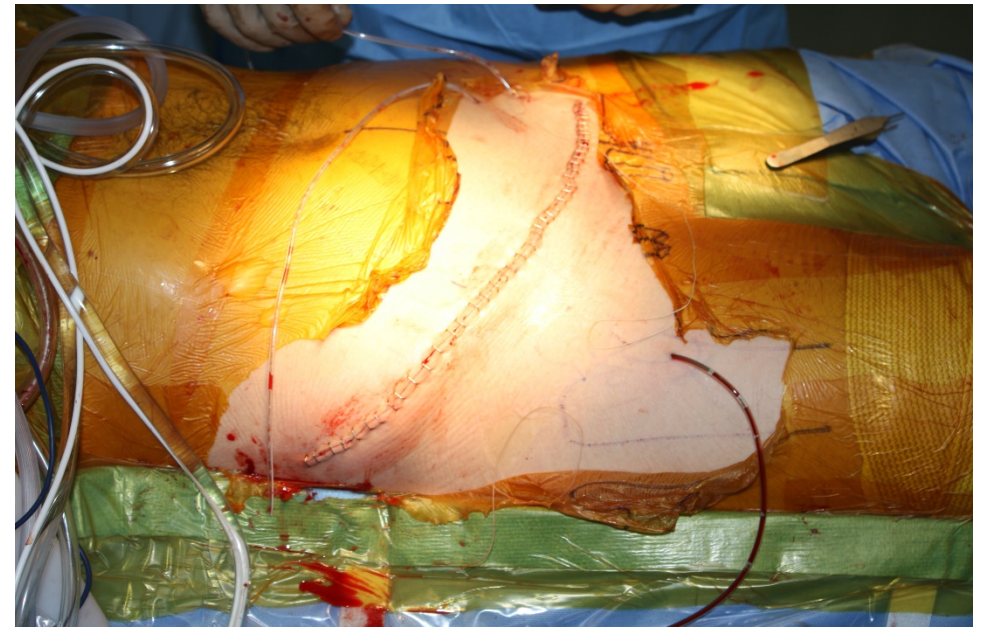
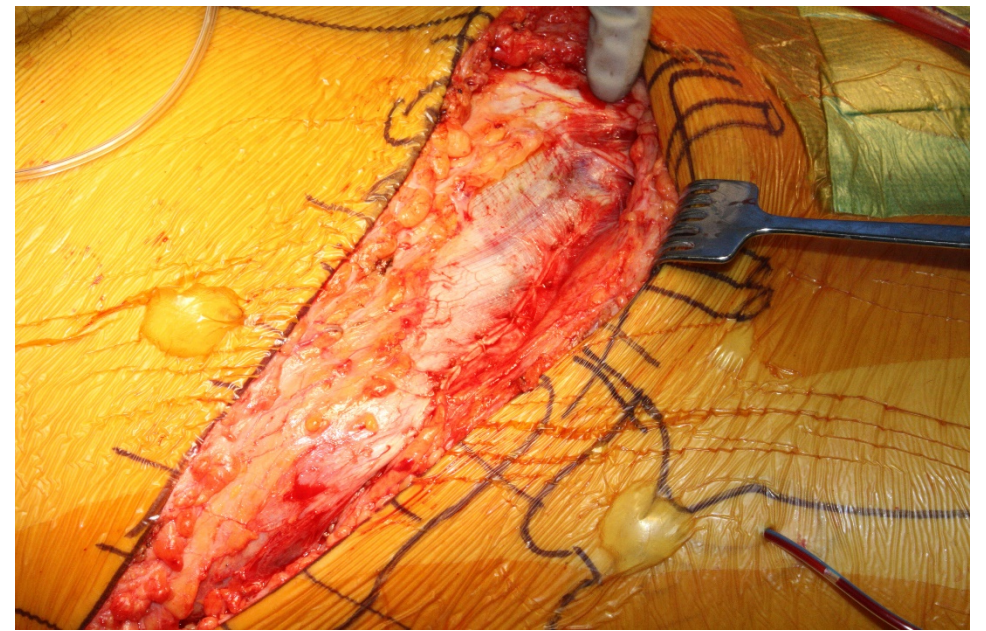
- Repair roof of canal/external oblique fascia with 0 or 2-0 vicryl
- Take care to avoid ilioinguinal nerve on superior fascial limb
- Complete fascial closure back to ASIS



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Wound Closure

- Once all deep layers closed, irrigate superficial layer
- Consider reattaching subcutaneous tissue back down to fascia to minimize dead space
- Superficial drain if desired
- Skin reapproximation with 2-0 vicryl
- Skin closure



Courtesy of Milton L. Chip Routh, Jr. MD and Mark Adams, MD

References

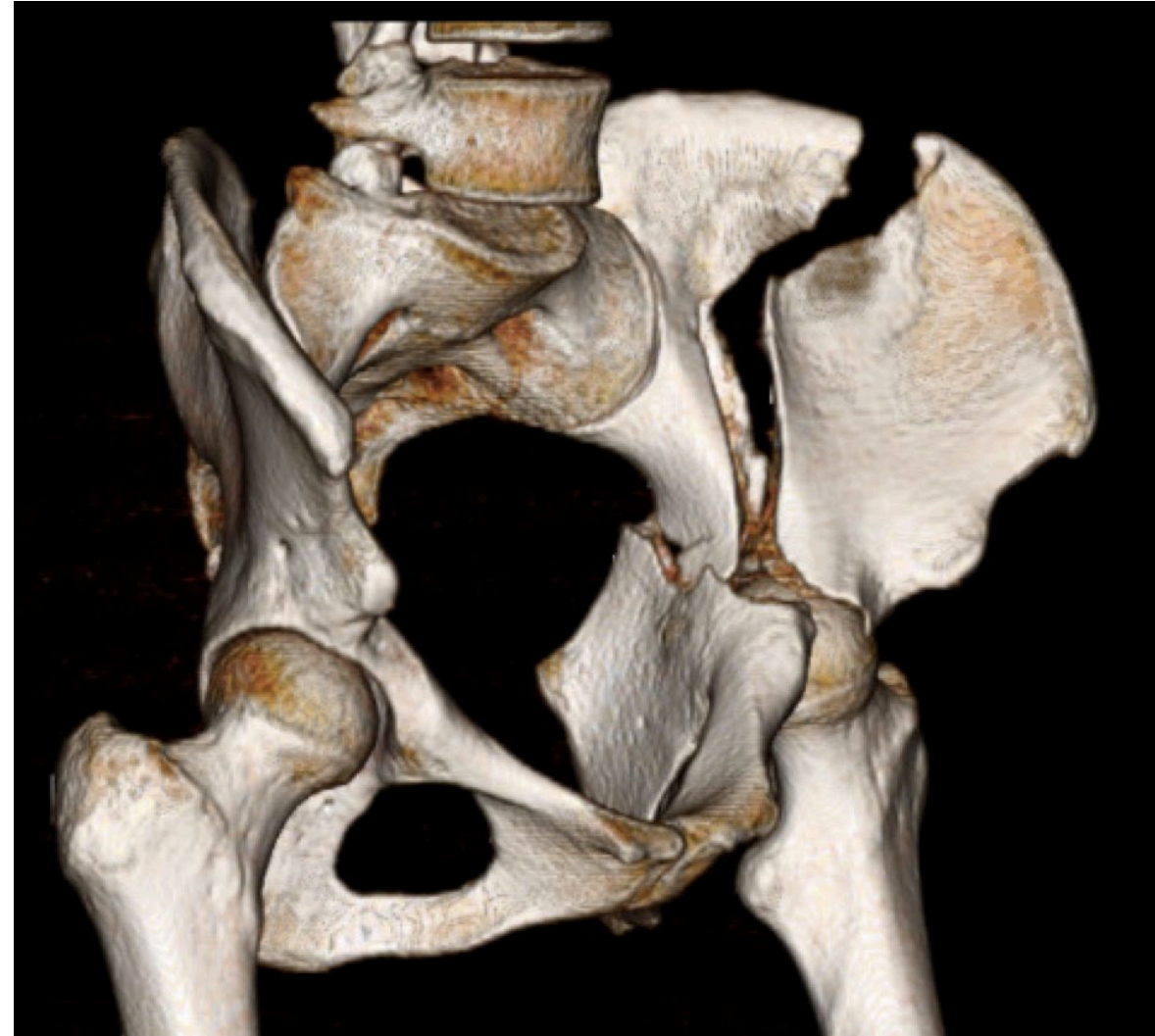
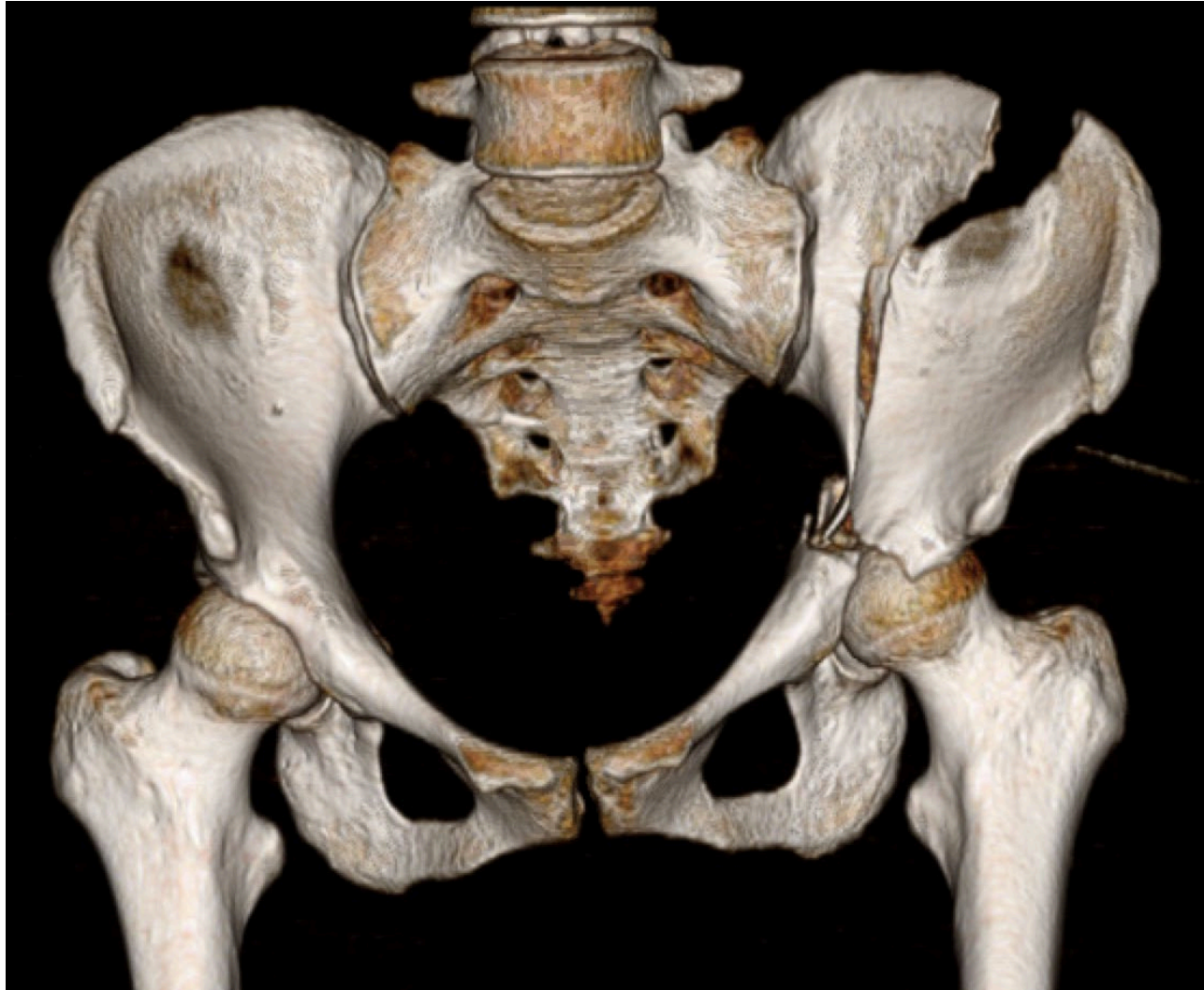
- 1) Discussion and observation with Dr. Milton L. Chip Routt, Jr. 2011 – Present
- 2) Cutrera NJ, Pinkas D, Toro JB. Surgical Approaches to the Acetabulum and Modifications in Technique. J Am Acad Orthop Surg. 2015 Oct;23(10):592-603.
- 3) Tosounidis TH, Giannoudis VP, Kanakris et al. The Ilioinguinal Approach: State of the Art. JBJS Essent Surg Tech. 2018 Jun 27;8(2):e19
- 4) Fensky F, Lehmann W, Ruecker A, et al. Ilioinguinal Approach: Indication and Technique. J Orthop Trauma. 2018 Aug;32 Suppl 1:S12-S13
- 5) Sagi HC, Afsari A, Dziadosz D. The anterior intra-pelvic (modified rives-stoppa) approach for fixation of acetabular fractures. J Orthop Trauma. 2010 May;24(5):263-270
- 6) Hagen JE, Weatherford BM, Nascone JW, et al. Anterior intrapelvic modification of the ilioinguinal approach. J Orthop Trauma. 2015 Feb;29 Suppl2:S10-3.
- 7) Karunakar MA, Le TT, Bosse MJ. The modified ilioinguinal approach. J Orthop Trauma. 2004 Jul;18(6)379-83

Patient Example

- 28 yo female
- MVC
- L hip pain
- HD stable
- NVI L LE



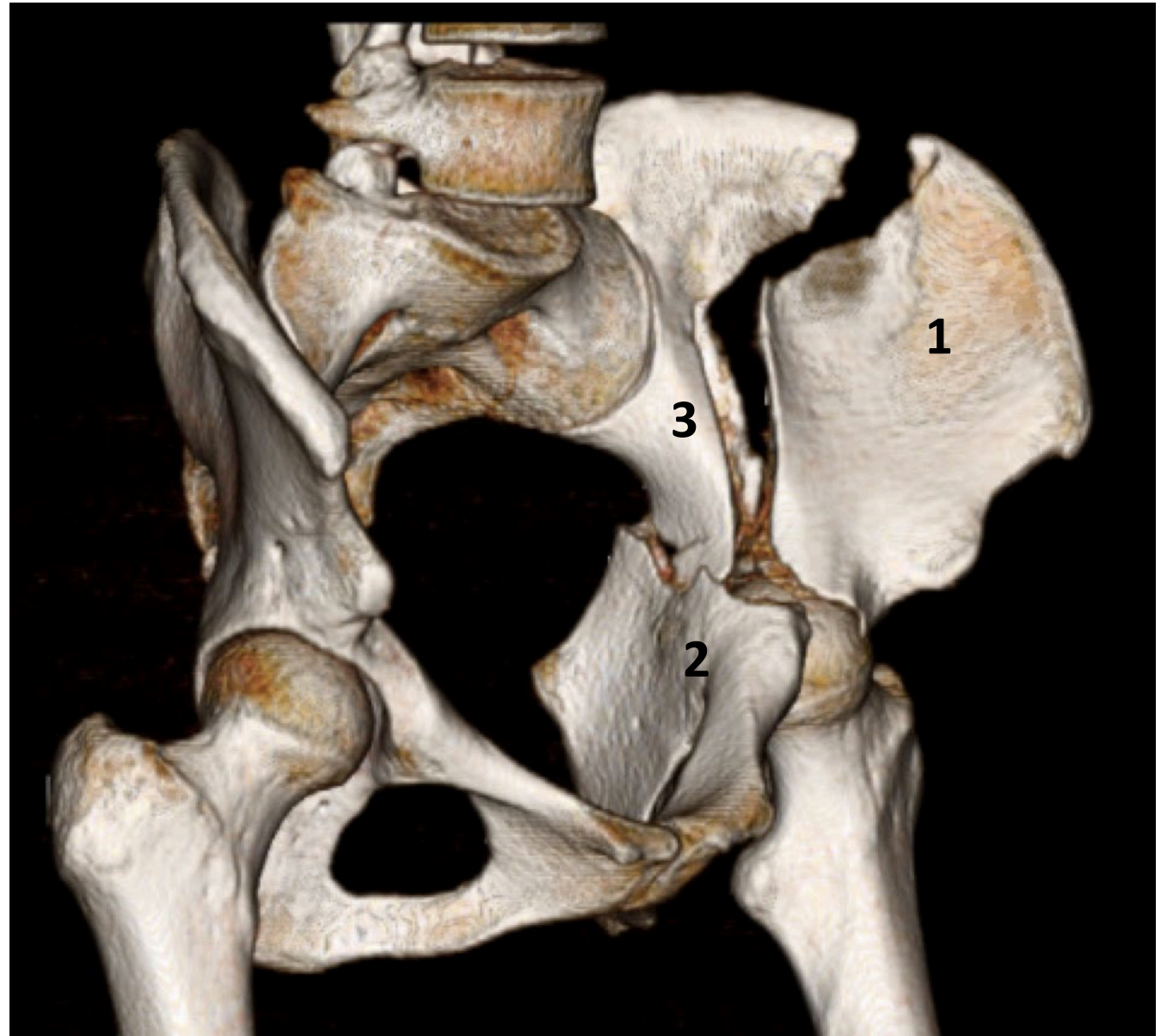




Diagnosis?

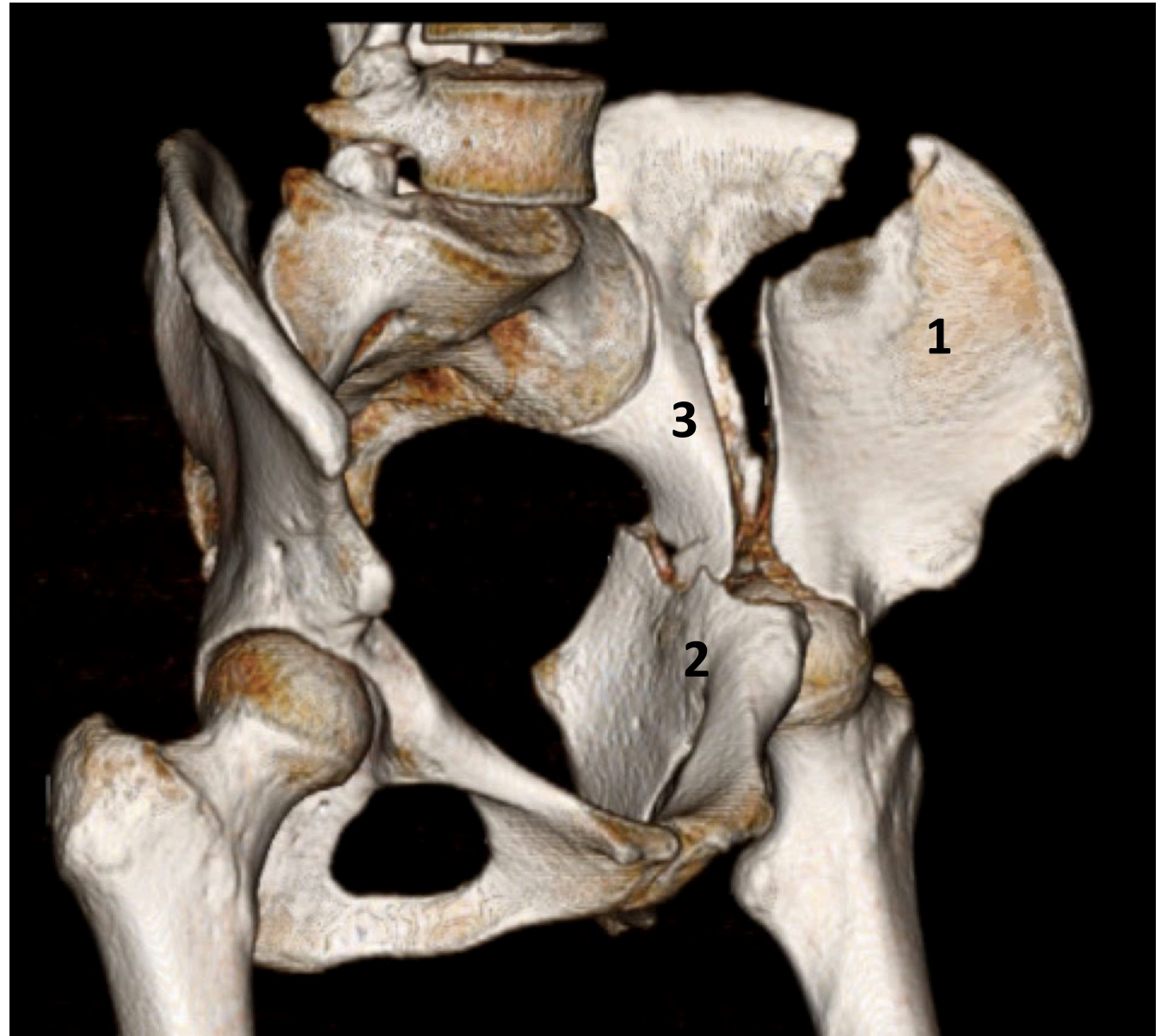
Associated Both Column

- Anterior column fragment (1)
- Posterior column fragment (2)
- Intact ilium (3)
- Both the anterior column and posterior column fragments are separate from the intact ilium



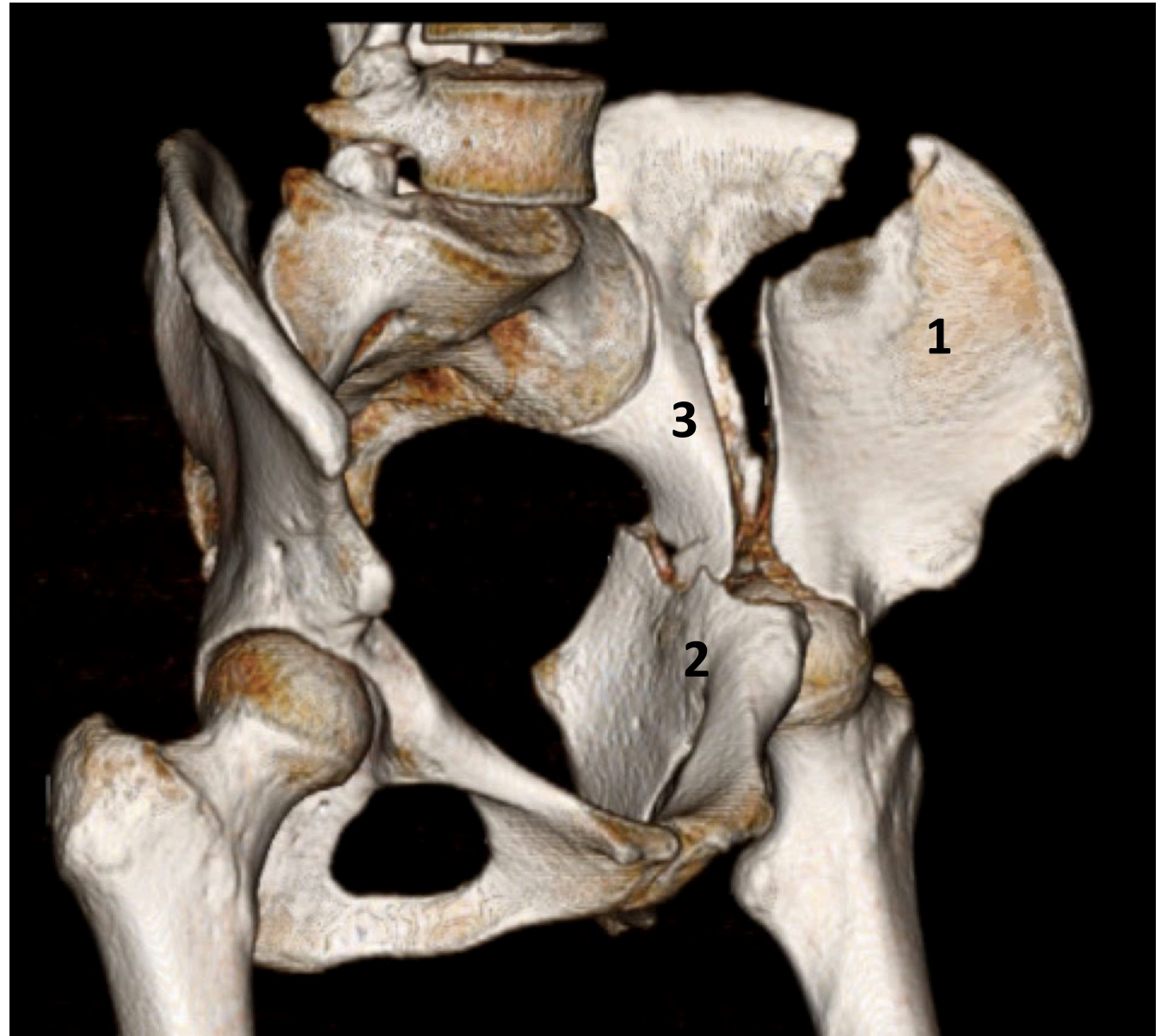
Operative Plan?

- Ilioinguinal exposure:
 - Allows exposure of all fractures and is necessary for cleaning, reducing, and implant placement.
- Reduce anterior column (1) to intact ilium (3)
- Place pelvic brim plate and crest screw to buttress column and link anterior column to intact ilium
- Reduce posterior column (2) to intact ilium (3) and anterior column (1)
- Place screws from pelvic brim into posterior column and intrapelvic plate to buttress



Operative Plan?

- Ilioinguinal exposure:
 - Allows exposure of all fractures and is necessary for cleaning, reduction, and implant placement



Reduction and fixation sequence:

- Reduce anterior column (1) to intact ilium (3)
- Place pelvic brim plate and crest screw to buttress column and connect anterior column to intact ilium
- Now it is a two part fracture
- Reduce posterior column (2) onto the intact ilium (3) and anterior column (1)
- Place screws from pelvic brim down into posterior column
- Place intrapelvic plate maintain reduction and buttress posterior column (2) to intact ilium (3) reduction

