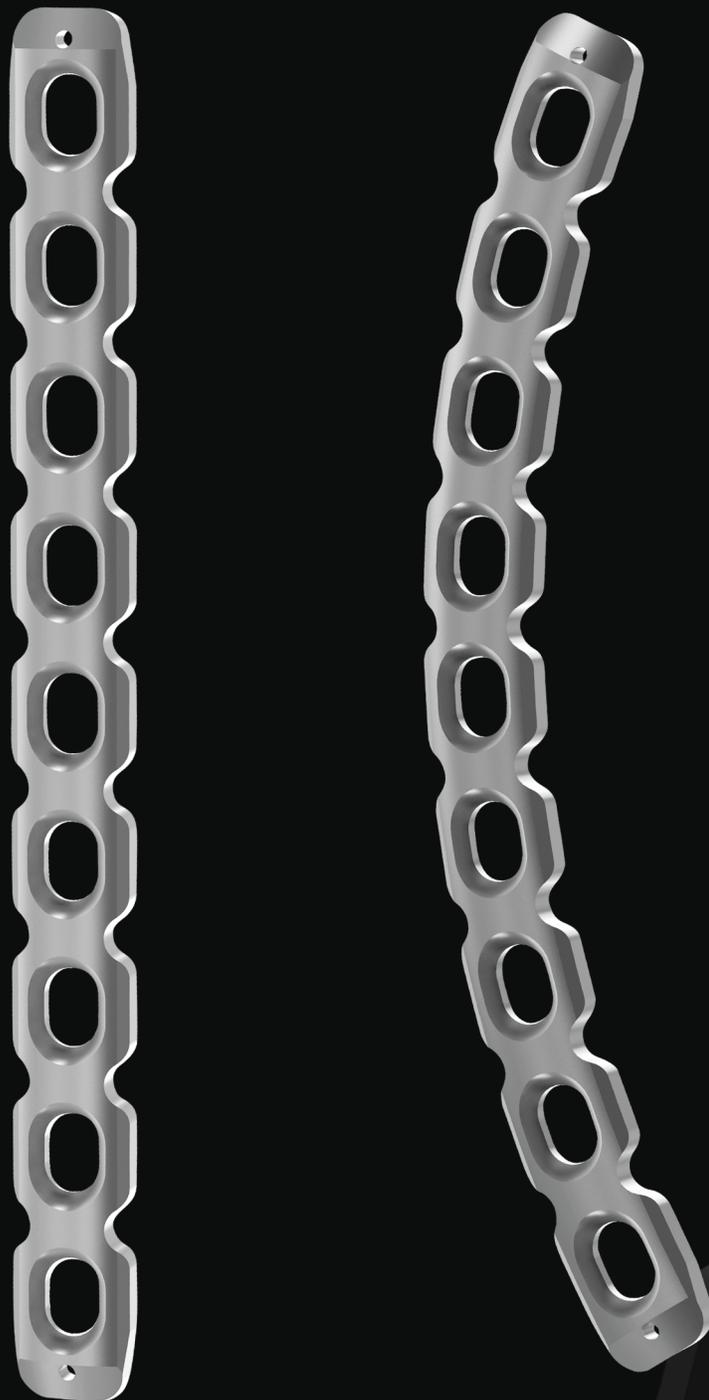


SURGICAL TECHNIQUE

Straight and curved hip reconstruction plates



CONTENT

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5	2. Implant features
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1. INTRODUCTION

This technique is intended to describe the use of TRAUFIX instruments and implants, without seeking to interfere with the expertise and decisions of the orthopedic trauma surgeon, whose extensive clinical and surgical experience enables them to determine the best approach for each individual patient. Therefore, this product description is not sufficient for immediate clinical application. Practical training under the guidance of an experienced surgeon is strongly recommended.

2. IMPLANT FEATURES

2.1 Straight reconstruction plate

- ▶ They are manufactured from 316LS stainless steel with a thickness of 2.5mm.
- ▶ Supplied non-sterile.

HOLES	CODE
4	022.04
5	022.05
6	022.06
7	022.07
8	022.08
9	022.09
10	022.10
12	022.12
14	022.14
16	022.16
18	022.18
20	022.20



2.2 Curved reconstruction plate

- ▶ They are manufactured from 316LS stainless steel with a thickness of 2.5 mm.
- ▶ Supplied non-sterile.

HOLES	CODE
4	205.04
5	205.05
6	205.06
7	205.07
8	205.08
9	205.09
10	205.10
12	205.12
14	205.14
16	205.16
18	205.18
20	205.20



2.3 Cortical Screws

- ▶ They are manufactured from 316LS stainless steel.
- ▶ Supplied non-sterile.
- ▶ Spherical head.
- ▶ Self-tapping.
- ▶ Hexagonal input.

CODE	DESCRIPTION	SIZES
057A	3.5 mm self-tapping cortical screw	From 10 mm to 40 mm in 2 mm increments. From 45 mm to 110 mm in 5 mm increments

3. SURGICAL INDICATIONS

- A. Symphysis fractures.
- B. Fractures of the superior pelvic brim.
- C. Fractures of the iliac wing.
- D. Acetabular fractures.

4. GENERAL CONTRAINDICATIONS

- Systemic inflammatory response syndrome (to be evaluated by the surgeon)
- Sepsis.
- Osteomyelitis.
- Patient unable to comply with postoperative care.
- Hypersensitivity to the material (316LS stainless steel).

According to the selected approach, the corresponding contraindications are identified in each case:

4.1 Stoppa approach

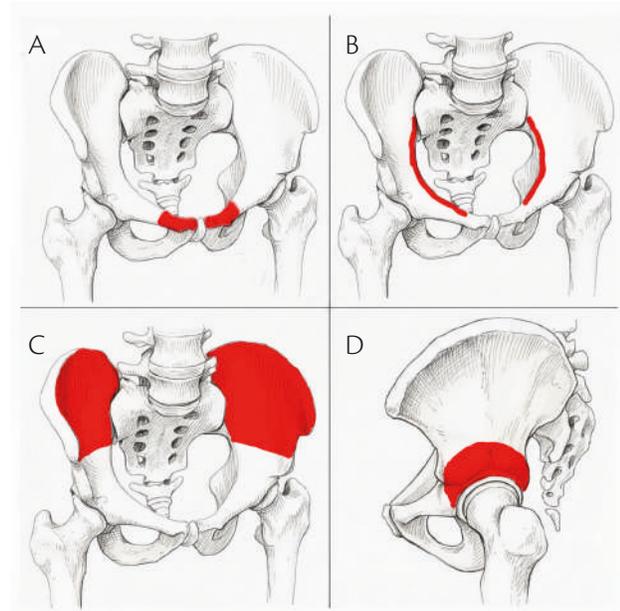
- Fracture age greater than 15 days.
- Suprapubic catheter and abdominal problems.

4.2 Kocher-Lagenbeck approach

- Anterior wall fractures.
- Anterior column fractures.
- Fractures involving both columns, when the anterior wall or column must be reduced under direct visualization.

4.3 Iliinguinal approach

- Posterior wall fractures.
- Posterior column fractures.
- Fractures involving both columns that require direct reduction of the posterior column.
- Fractures requiring direct access to the acetabulum, such as when an intra-articular fragment is present.



5. SURGICAL DESCRIPTION

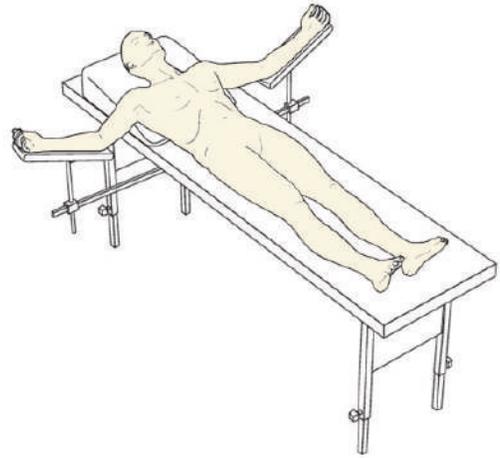
5.1 Plate selection

Perform a prior radiological evaluation to determine the type and length of the plate to be used.

5.2 Stoppa Approach

5.2.1 Patient positioning

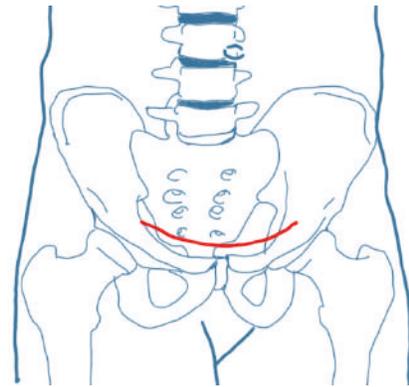
The patient is placed in the supine position on a radiolucent table. The surgeon stands on the side opposite to the fracture, with the surgical team positioned behind him and the image intensifier on the side of the fracture.



5.2.2 Skin incision

A Pfannenstiel incision is usually used, placed just above the pubic symphysis, as this allows it to be connected to a lateral window incision similar to that used in the classic ilioinguinal approach.

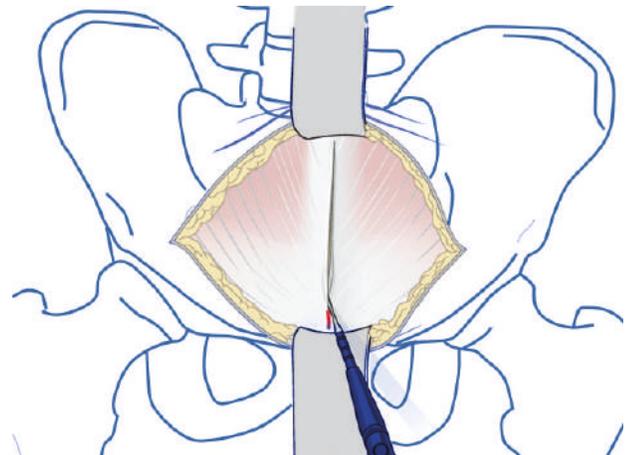
A straight or slightly curved transverse incision is made approximately 2 cm cranial to the symphysis, with a length of about 15 cm.



5.2.3 Deep dissection

Divide the subcutaneous tissues in the line with the skin incision to expose the fascia covering both abdominalis muscles.

The rectus fascia is incised longitudinally along the linea alba.



Both rectus abdominis bellies are gently retracted laterally.

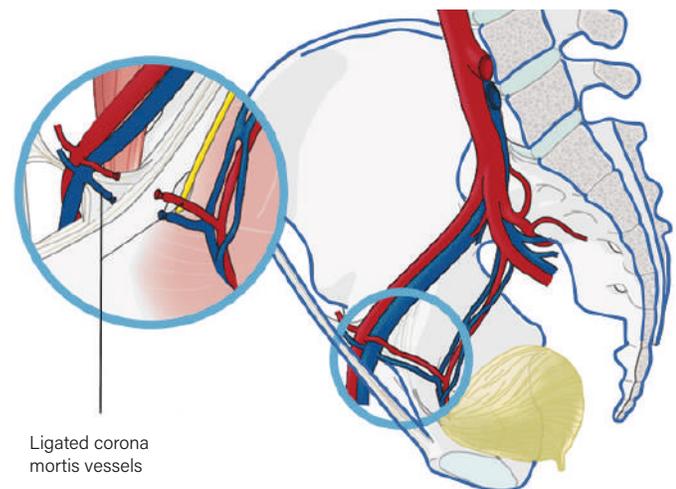
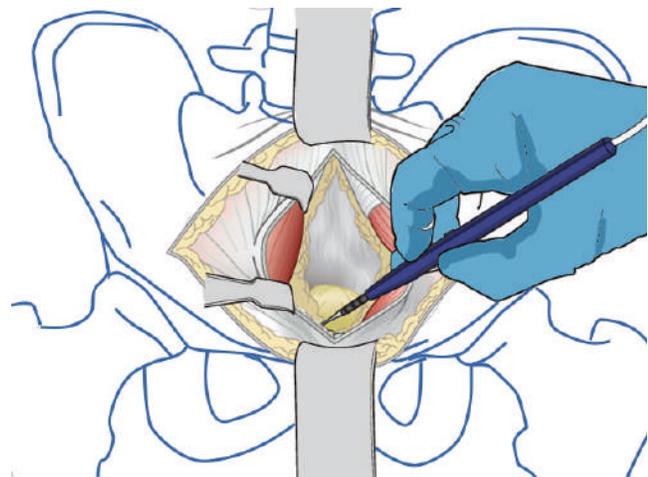
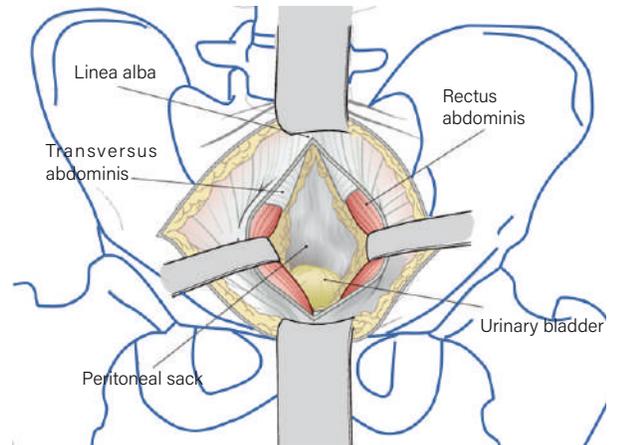
At the proximal part of the incision, care must be taken not to incise the peritoneum.

The entire approach must remain within the preperitoneal space.

The medial portion of the rectus muscle is partially detached from the superior and anterior aspect of the symphysis on the fracture side to allow rectus retraction.

The superior border of the superior pubic ramus (pecten pubis) is identified, and blunt dissection with a finger or swab is carried out laterally along the pelvic brim without yet incising the fascia.

Careful exposure along the medial surface of the superior pubic ramus allows identification of the corona mortis vessels, which are ligated (or clipped) as necessary. They are present in most cases and are usually venous. In some cases, they may be significant. The vessels lie above the fascia and are more easily identified if the fascia is not incised prior to ligation.



Once the corona mortis vessels have been identified and ligated, the thick periosteum of the superior pubic bone is sharply dissected using diathermy, allowing for deeper blunt dissection.

Periosteal dissection is then continued laterally along the superior border of the superior pubic bone toward the pelvic brim, exposing the beginning of the iliopectineal eminence.

At this stage, the beginning of the iliopectineal arch must be dissected from the bone. This allows elevation of the femoral vessels and nerve.

Subperiosteal dissection is then continued more laterally along the superior border of the pelvic brim.

At this point, the entire internal surface of the superior pubic ramus has been exposed.

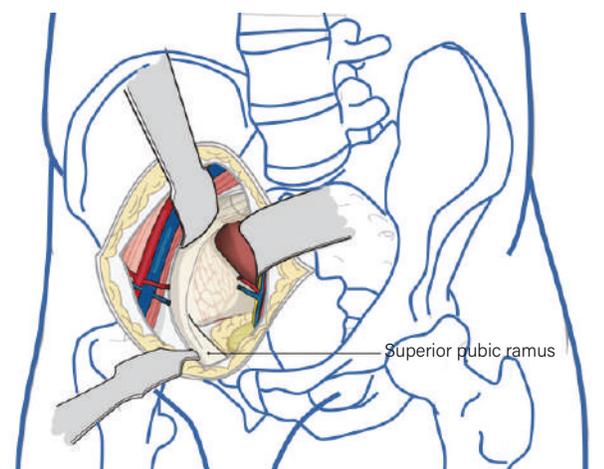
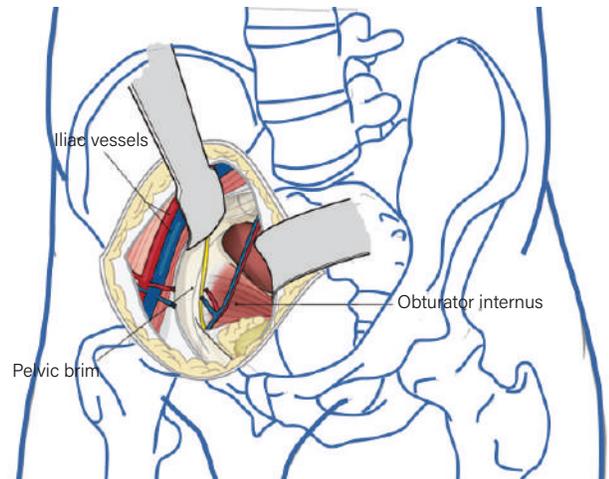
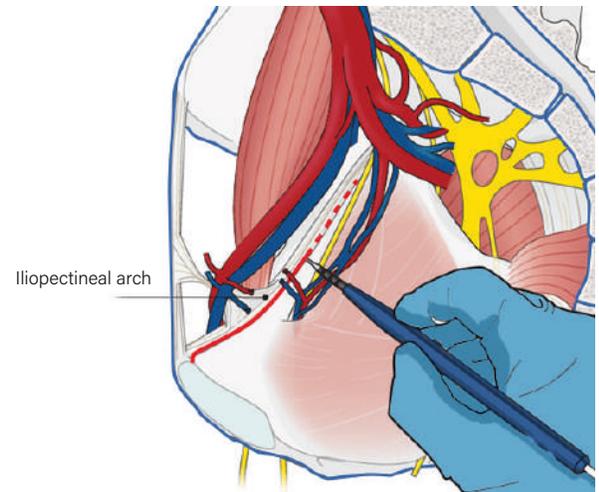
At this level, the obturator neurovascular bundle crosses the quadrilateral surface. In most cases it must be mobilized. A spatula or malleable retractor is used to protect the obturator neurovascular bundle and the pelvic floor.

Using a Cobb elevator, the periosteum and the obturator internus are elevated, allowing sufficient exposure of the quadrilateral surface.

A Hohmann retractor should be placed at the midportion of the superior pubic ramus and another curved Hohmann retractor at the superior posterior aspect of the acetabulum, on the iliac part of the pelvic brim.

Great care must be taken not to injure the external iliac vein, which may lie very close to the elevators.

In rare cases, the internal iliac artery bifurcates very distally, making dissection of the posterior part of the quadrilateral surface hazardous and limiting posterior dissection.

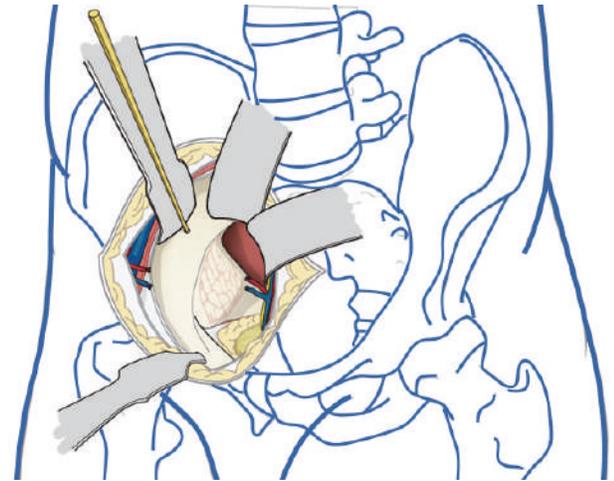


5.2.4 Retractors

Exposure is progressively developed along the margins of the approach. The vessels and the psoas may be retracted laterally. A Kirschner wire is placed in the iliac wing behind which the retractor is positioned, to prevent slipping over the wing.

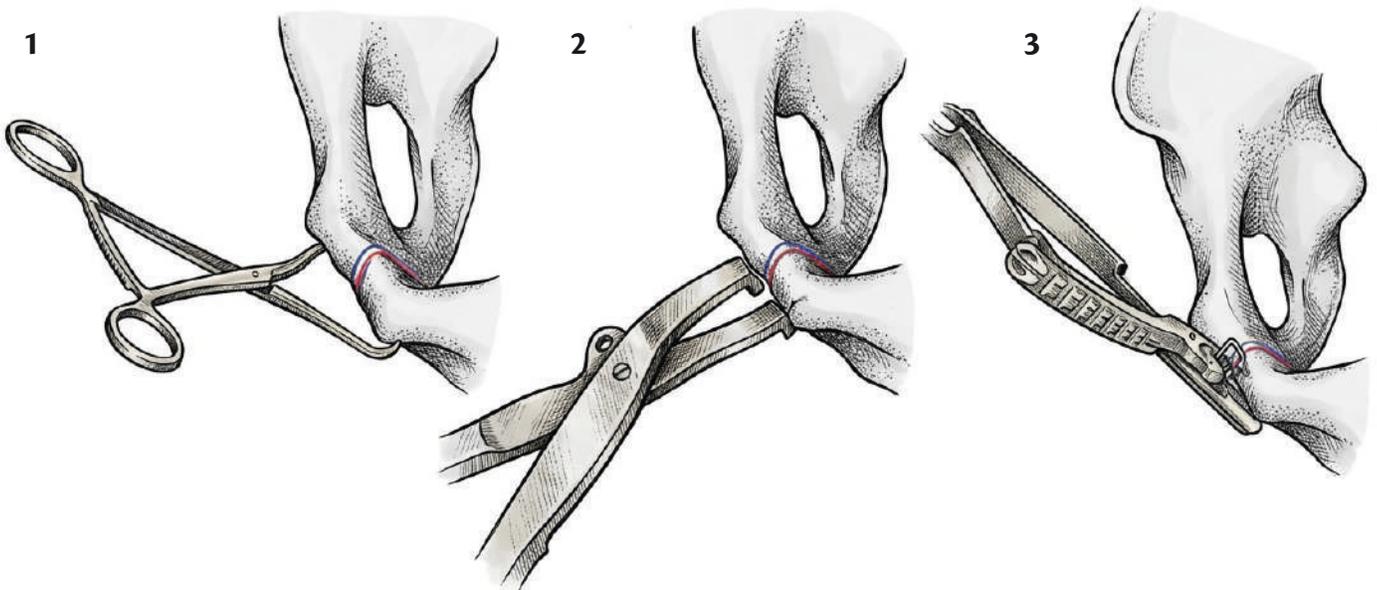
A malleable retractor is placed in the interval between the quadrilateral surface and the obturator bundle. Placement of this retractor may be challenging due to variable tethering of the vessels proximally and distally. Care must be taken to avoid avulsion.

An additional retractor may be carefully placed in front of the sacrum. This may be either a malleable retractor or a blunt-tipped retractor carefully hooked into the sciatic notch, retracting the bladder and deep pelvic contents to allow visualization of the posterior column within the true pelvis.



5.2.5 Pubic symphysis fractures

- A chieve reduction of the pubic symphysis using large pointed reduction forceps. (1)
- Reduction can also be achieved by inserting two anterior screws and using pelvic reduction forceps. (2,3)



5.3 Kocher-Lagenbeck Approach

5.3.1 Patient positioning

The Kocher-Langenbeck approach is a posterior approach to the acetabular structures. It allows direct visualization of the posterior column and the retroacetabular surface. This approach can be useful for ORIF of periprosthetic acetabular and femoral fractures and for revision arthroplasty.

The Kocher-Langenbeck approach can be performed in the prone or lateral position. (The lateral position is preferred for periprosthetic fracture and revision arthroplasty).

Maintaining knee flexion (at 90°) and hip extension throughout the procedure reduces tension on the sciatic nerve.

Scar tissue from previous exposure may obscure the typical landmarks.

5.3.2 Skin Incision

Mark the following bony landmarks with a sterile marker:

1. Posterior superior iliac spine
2. Greater trochanter
3. Femur

Begin the skin incision a few centimeters distal and lateral to the posterior superior iliac spine. A more proximal extension (indicated by the dashed line) may improve exposure in obese or muscular patients.

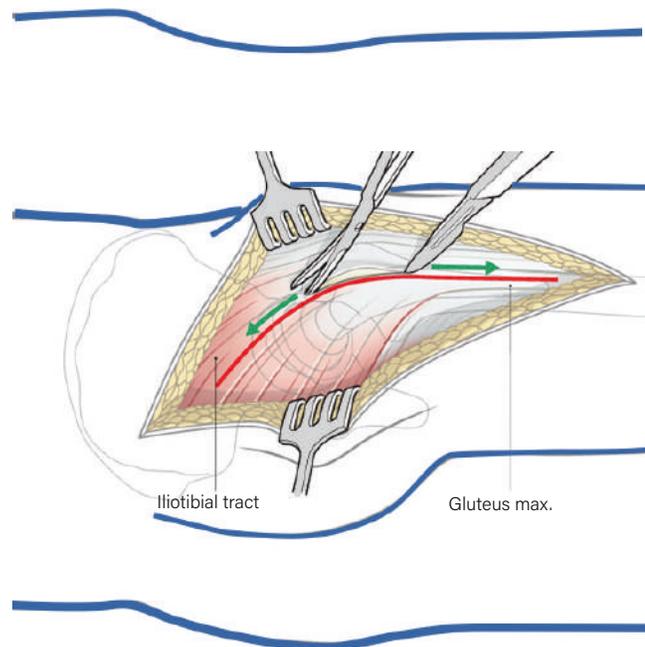
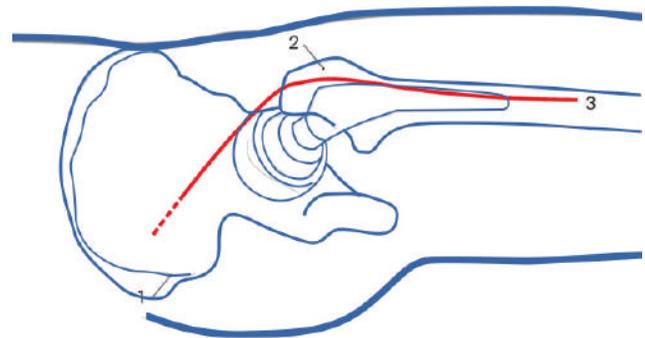
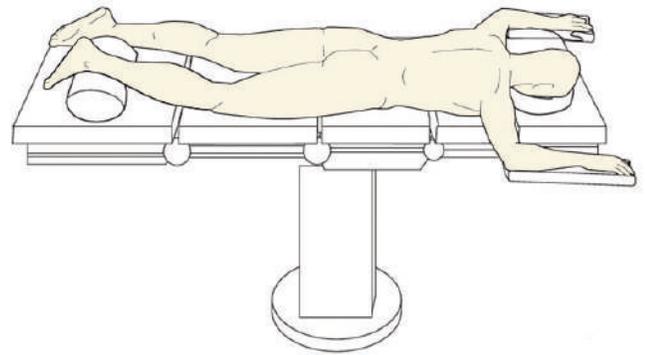
Continue the incision anteriorly over the greater trochanter. Curve it distally along the tip of the greater trochanter toward the lateral surface of the femoral shaft. End the incision at the mid-thigh (just distal to the insertion of the gluteus maximus tendon).

5.3.3 Superficial surgical dissection

Fascial incision

After dividing the subcutaneous tissues, make a sharp incision along the subcutaneous plane:

- The gluteus maximus muscle (with scissors).
- The iliotibial tract (with scalpel).



Separation of the gluteus maximus and incision of the iliotibial tract

Split the gluteus maximus in line with its fibers, beginning at the greater trochanter and proceeding proximally to the crossing of the first neurovascular bundle.

This creates a posterior muscle belly (inferior gluteal artery) and an anterior belly (superior gluteal artery), which includes one-third of the gluteus maximus and the tensor fasciae latae muscle.

In the distal half, incise the iliotibial tract in line with its fibers down to the mid-thigh.

5.3.4 Deep dissection

Release the fat layer covering the short external rotators, exposing the insertion of the piriformis tendon, the gemellus, and the obturator internus muscle.

The sciatic nerve (see illustration) lies posterior to the gemellus and obturator internus muscles, and anterior to the piriformis muscle, between the greater trochanter and the ischial tuberosity.

Carefully visualize the sciatic nerve.

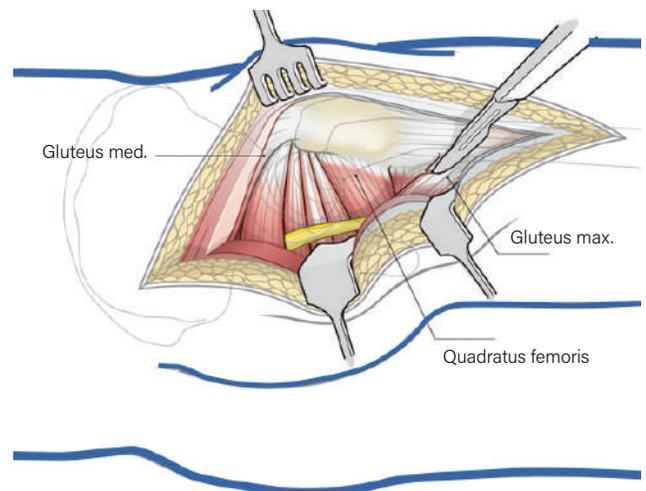
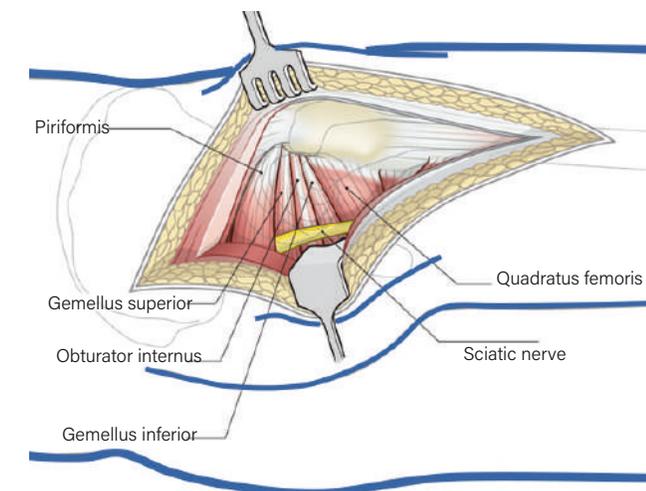
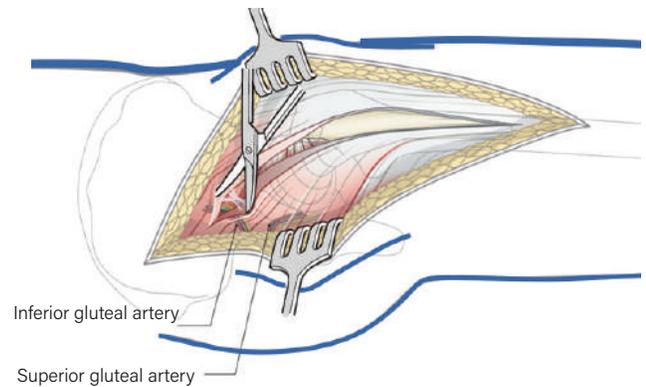
Ensure at all times that no direct pressure or stretching is applied to the nerve.

Option: detach the gluteus maximus muscle

Detach the gluteus maximus 1 cm from its insertion at the gluteal tuberosity of the femur.

The detachment may be performed partially or completely.

This allows reduced tension and easier mobilization of the gluteus maximus muscle.



Detachment of the short external rotators

Before dividing the tendons, place thick, non-absorbable stay sutures for retraction and subsequent repair. One suture may be placed in the piriformis tendon and another in the conjoint tendons of the obturator internus and gemellus. Reflection of the short external rotators exposes the hip capsule.

Reflect the piriformis belly laterally to expose the retroacetabular surface up to the greater sciatic notch.

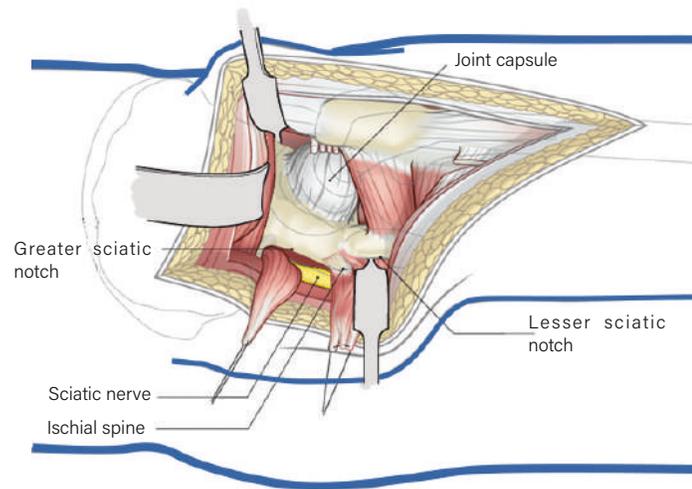
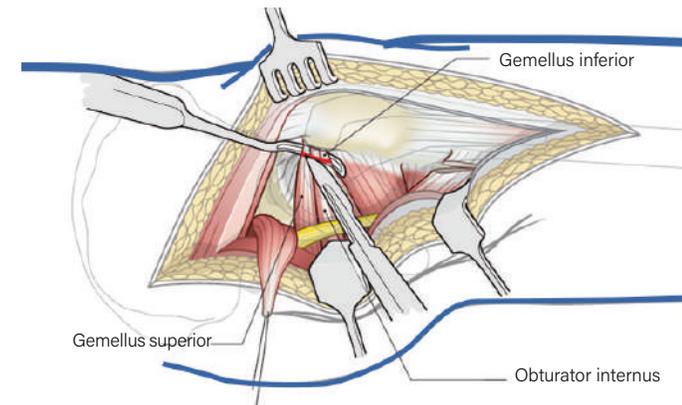
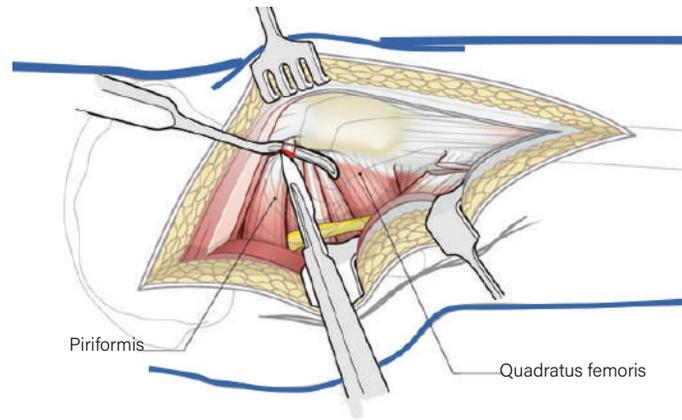
Reflect laterally the muscle bellies of the three conjoint muscles to gain access to the lesser sciatic notch.

5.3.5 Exposure of the posterior wall and column

Expose the greater sciatic notch, the ischial spine, and the lesser sciatic notch.

Insert one retractor into the lesser sciatic notch and another antero-superiorly toward the anterior inferior spine. The posterior column is now visible in its entirety.

Protect the sciatic nerve, which lies behind the retractor, with abdominal pads. Use the short external rotators as a cushion.

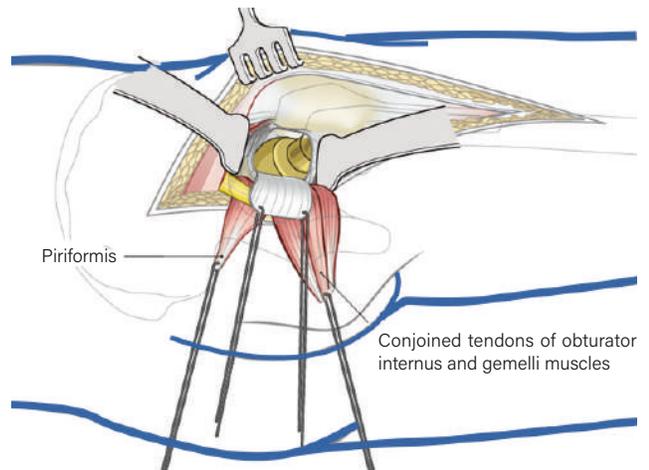
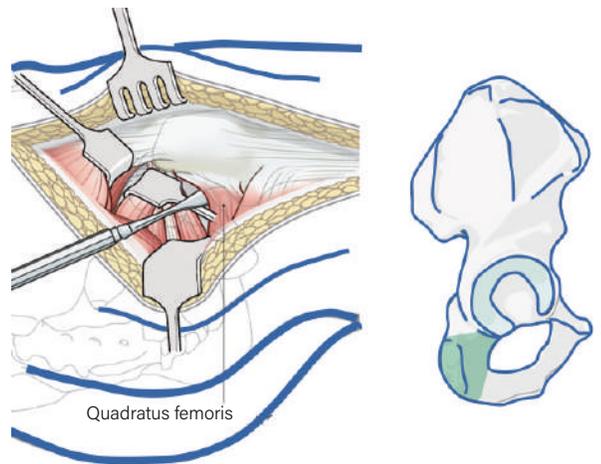


5.3.6 Elevation of the quadratus femoris for additional caudal exposure

The quadratus femoris can be elevated from its origin to expose the distal extension of the posterior column, as illustrated in green.

5.3.7 Hip exposure

Expose the hip joint by creating and raising a broad-based, full-thickness flap through the posterior hip capsule. Thick, non-absorbable sutures (e.g., No. 2) may be used to tag the capsule, facilitating retraction and subsequent repair.

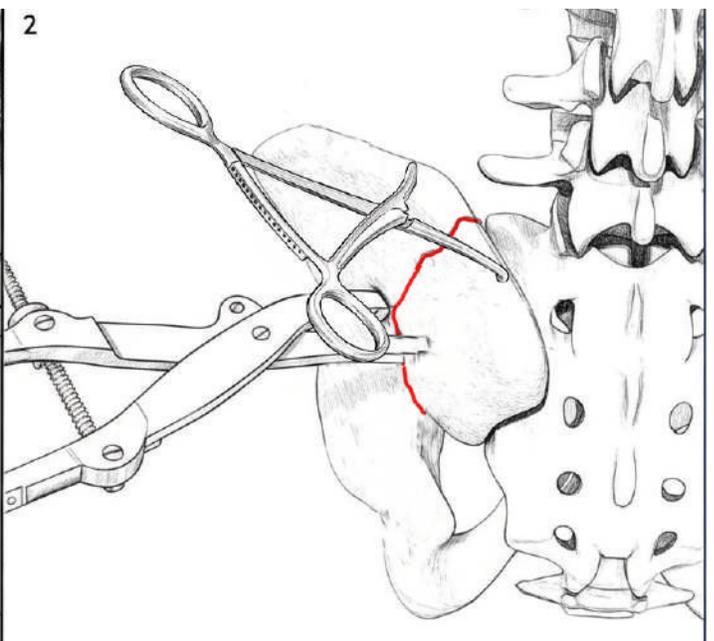
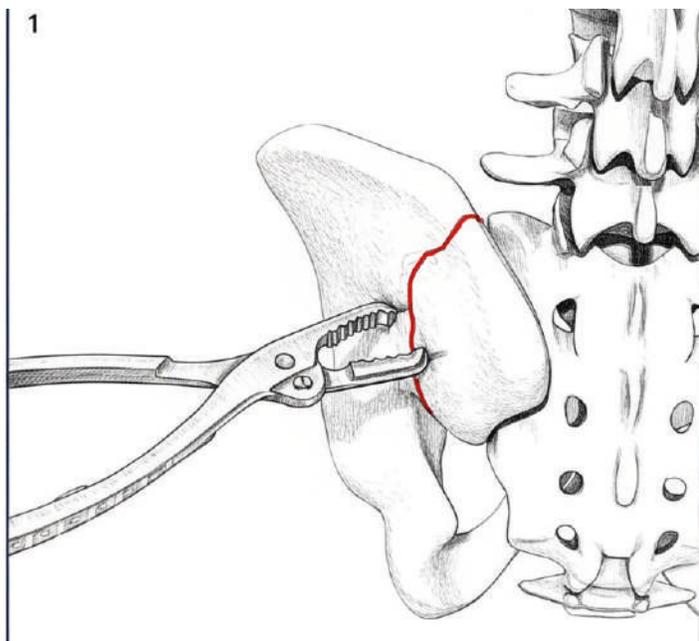
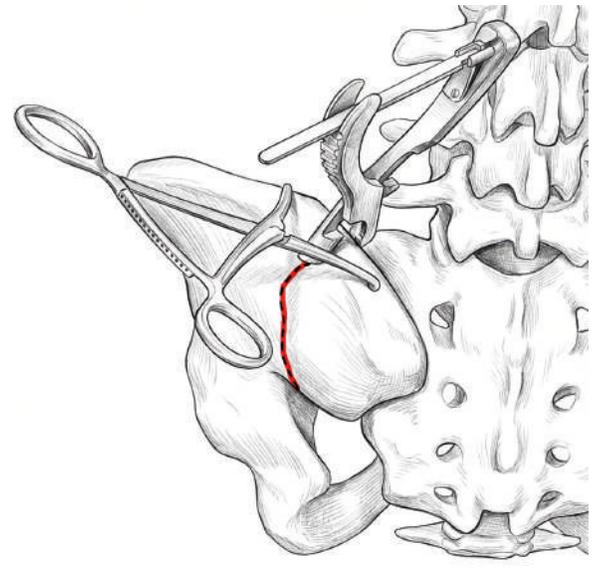
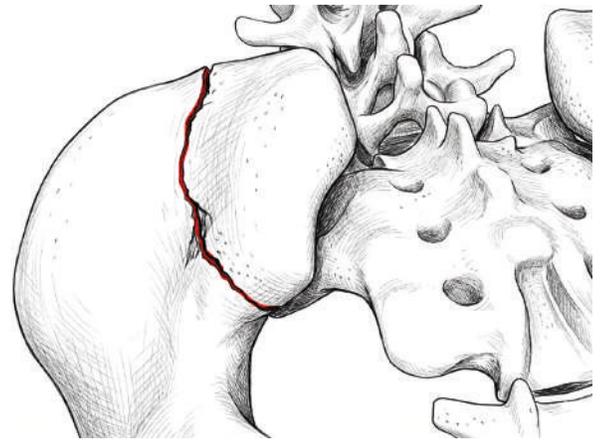


5.3.8 Iliac fractures

Use either an anterior or posterior approach, depending on the type of fracture. The following example of an iliac fracture demonstrates a possible treatment using a posterior approach (Kocher-Langenbeck).

By digital palpation, confirm the anatomic reduction of the anterior surface of the iliac wing. To reduce the iliac bone, use reduction forceps on the iliac crest and the posterior wing of the ilium.

Two provisional cortical screws may also be inserted on either side of the fracture line, and compression achieved using pelvic reduction forceps: Farabeuf (1) or Jungbluth (2)



5.4 Ilioinguinal Approach

5.4.1 Patient positioning

The patient is placed in the supine position on a radiolucent table. A pillow is placed under the knees.

Slight flexion of the knee/hip allows relaxation of the psoas muscle, facilitating the approach.

5.4.2 Skin incision

Make an arched incision beginning at the posterior aspect of the middle gluteal pillar and extending beyond the midline, 2 cm proximal to the symphysis.

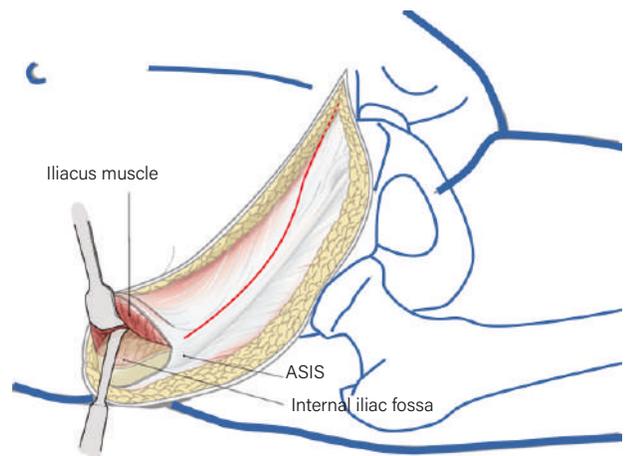
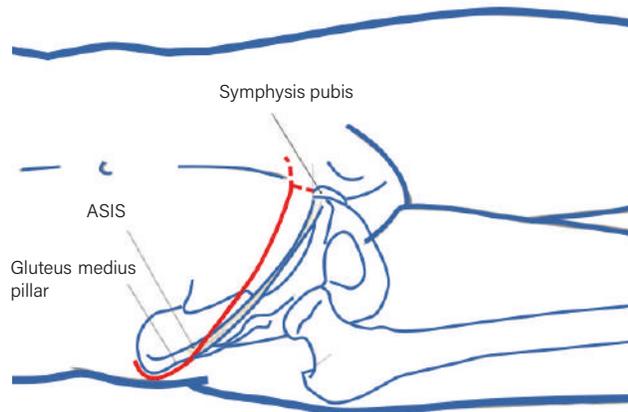
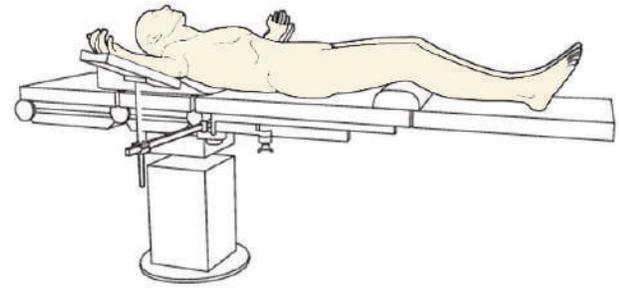
In thin patients, placing the lateral end of the incision distal to the iliac crest may help avoid a sensitive scar.

5.4.3 Exposure of the internal iliac fossa

Begin by exposing the internal iliac fossa. Release the insertion of the external oblique from the iliac crest, taking care to leave a thick fascial/periosteal cuff to facilitate repair. Initially, leave the tissues attached to the anterior superior iliac spine (ASIS).

Continuing with this release, expose the internal iliac fossa subperiosteally by mobilizing the iliacus muscle. Pack the fossa with a sponge.

Next, incise the external oblique aponeurosis from the ASIS to the lateral border of the rectus sheath, passing cranial to the external inguinal ring.



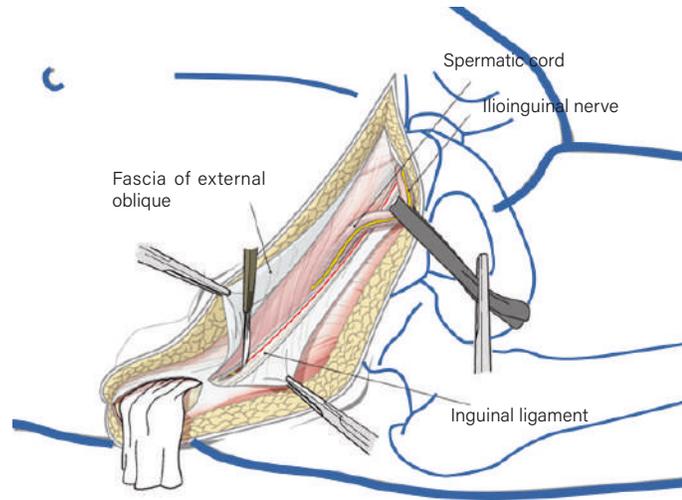
5.4.4 Release of the muscular junction from the inguinal ligament

The spermatic cord (or round ligament) is mobilized on the medial side of the wound.

Medially, the transversus abdominis is released from the inguinal ligament, usually taking 1–2 mm of the ligament with the tendon.

This release begins at the ASIS and proceeds medially to the conjoint tendon of the internal oblique and the pubic tubercle.

Care must be taken to protect the ilioinguinal nerve, which is usually found just proximal to the inguinal ligament after penetrating the abdominal wall.

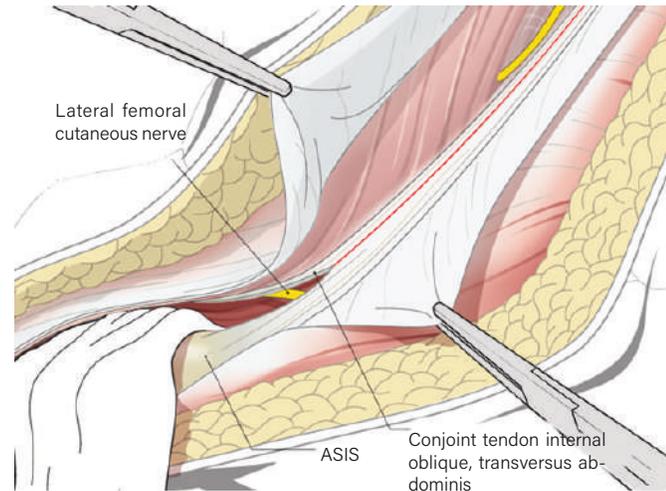


5.4.5 Securing the lateral femoral cutaneous nerve

The lateral femoral cutaneous nerve is usually found just deep to the conjoint tendon (of the internal oblique and transversus abdominis), approximately 1–2 cm medial to the ASIS.

In most cases, this nerve can be preserved if mobilized, as it exits the abdominal wall and penetrates the thigh fascia.

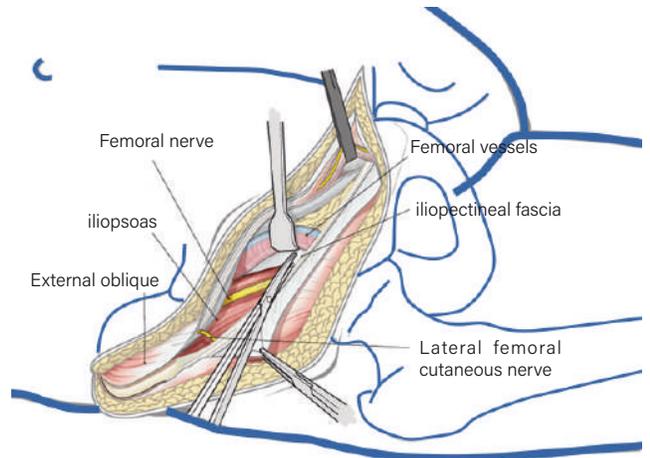
The anterior surface of the iliopsoas muscle is thus exposed in the lateral portion of the wound, with the femoral nerve located on its anteromedial surface.



5.4.6 Development of the iliopectineal fascia

The iliopectineal fascia is outlined by carefully retracting the femoral vessels medially and the femoral nerve and iliopsoas laterally.

It is then divided distally, under direct visualization, down to the pubic root.



5.4.7 Release of the iliopectineal fascia

The iliopsoas is then retracted laterally, exposing the fascial junction at the pelvic brim, which can be safely divided.

Once the iliopectineal fascia is released, the true pelvis can be accessed from the internal iliac fossa.

Dissection around the iliac vessels should be minimized. This reduces the risk of vascular injury and also preserves the course of the primary lymphatic trunk to the lower limb, which passes medial to the vein.

5.4.8 First window

The three windows of the ilioinguinal approach can now be fully utilized.

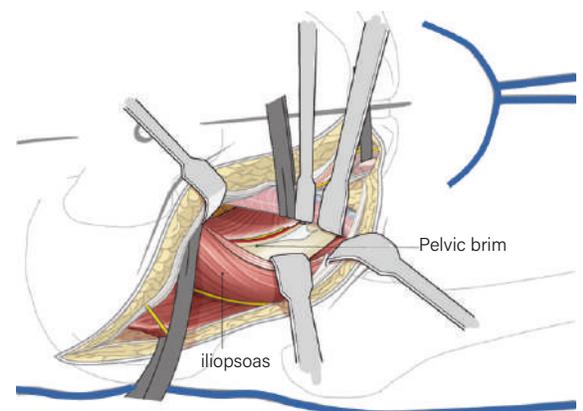
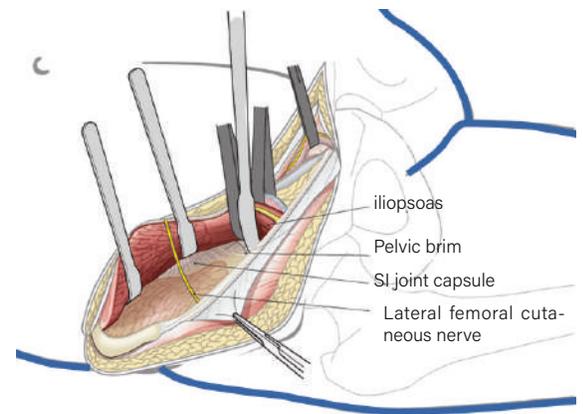
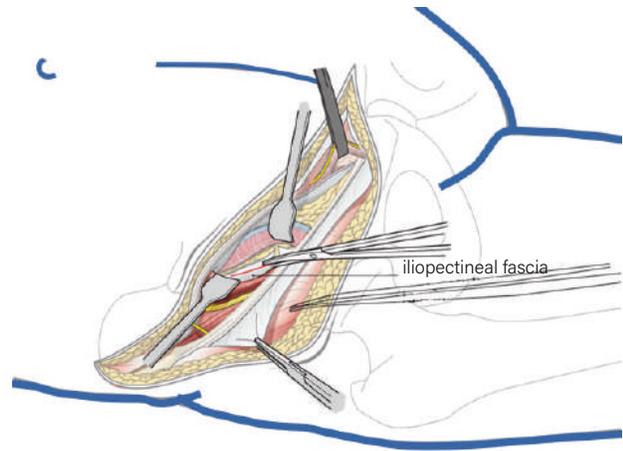
The first window encompasses the entire internal iliac fossa, from the SI joint posteriorly to the iliopectineal eminence anteriorly.

This window is optimized by hip flexion, which relaxes the iliopsoas.

Medial retraction usually requires placement of retractors on the quadrilateral surface.

5.4.9 Second window

The second window provides access to the pelvic brim and the quadrilateral surface, from the sacroiliac joint to the lateral third of the superior pubic ramus. Medial retraction of the femoral vessels must be gentle and carefully monitored.



5.4.10 Third window

The third window can be developed in different ways.

Regardless of the method, the bladder must be protected. This can be achieved by packing the space of Retzius with a sponge after identifying the bladder by palpating the bulb of the urinary catheter.

The most limited of these methods leaves the ipsilateral rectus insertion intact and provides visualization between the rectus and the spermatic cord (or round ligament).

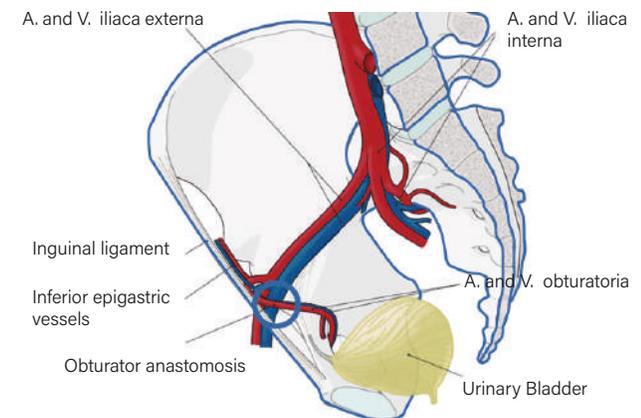
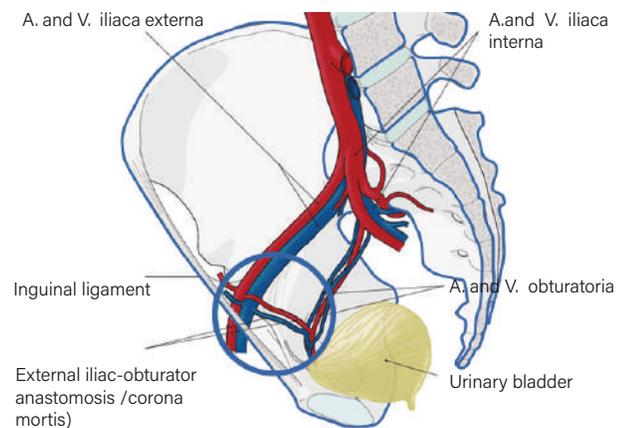
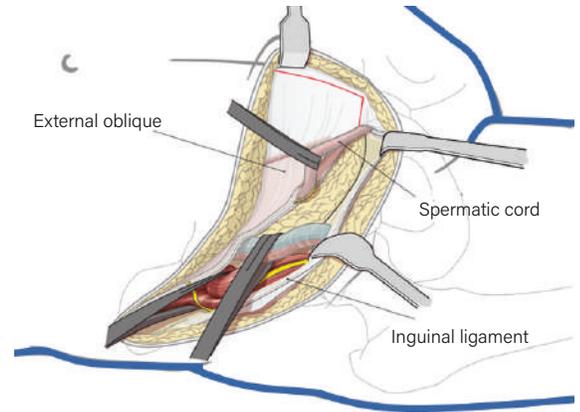
Alternatively, if the fracture pattern requires, the entire medial portion of the superior pubic ramus and the symphysis can be visualized by releasing the ipsilateral rectus insertion.

The same visualization can be achieved by leaving the rectus attached and dividing the rectus heads at the midline. With the rectus still attached, retraction is performed behind the rectus using a Hohmann retractor placed along the superior ramus.

5.4.11 Retropubic vascular anastomoses

From the contralateral side of the patient, it is easier to visualize any retropubic vascular communication between the obturator vessels and the inferior epigastric vessels (corona mortis) or the external iliac vessels. These retropubic anastomoses, present in 40% or more of patients, are at risk of tearing. They may require ligation and division to allow mobilization of the iliac vessels.

This illustration shows obturator vessels arising from the external iliac rather than the internal iliac vessels.

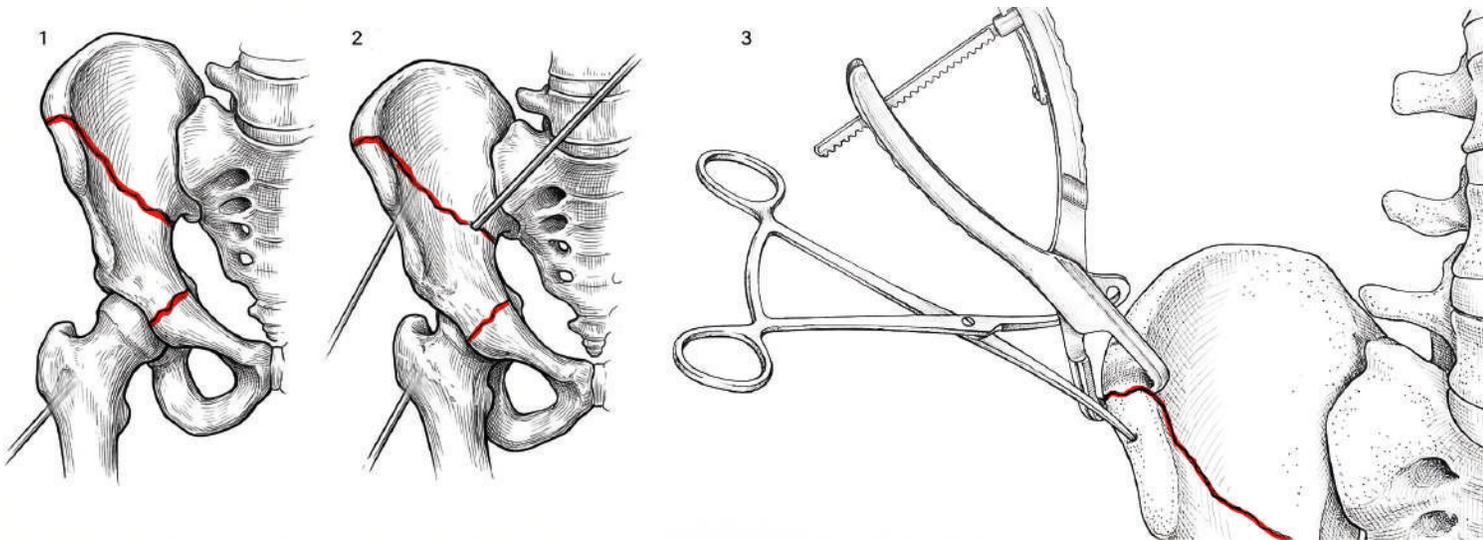


5.4.12 Bi-column acetabular fractures

Insert a Schanz screw into the proximal femur to allow intraoperative manual traction. (1)

Confirm the anatomic reduction of the different fracture fragments. The fragments can be provisionally fixed with Kirschner wires. (2).

To achieve proper reduction, different reduction instruments may be useful (e.g., reduction punch, reduction forceps). (2,3)



5.5 Implant removal

The decision to remove the implant lies with the treating physician. Implant removal is recommended once the consolidation process has been completed, provided it is feasible and appropriate for the patient.

To remove the screws, first clear the screw head by eliminating any tissue that may have penetrated the hexagonal recess, ensuring proper engagement of the screwdriver and reducing the risk of damage that could prevent removal. Unscrew all screws and remove them, followed by extraction of the plate.

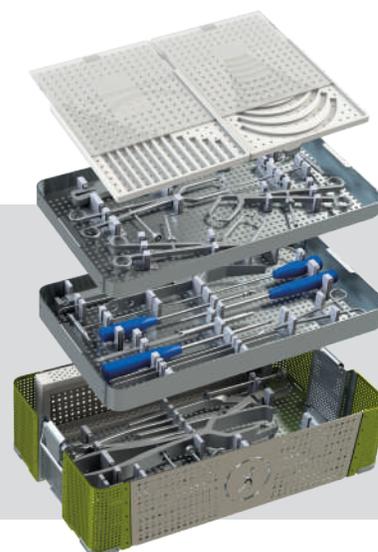
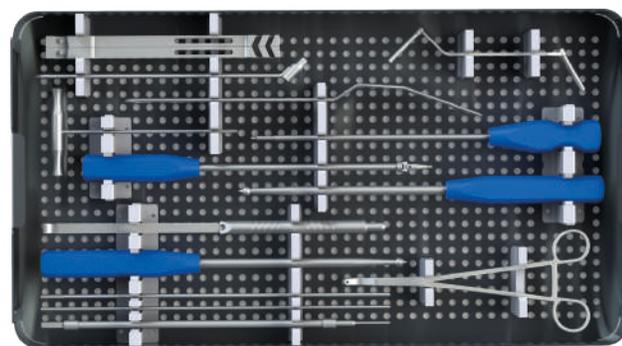
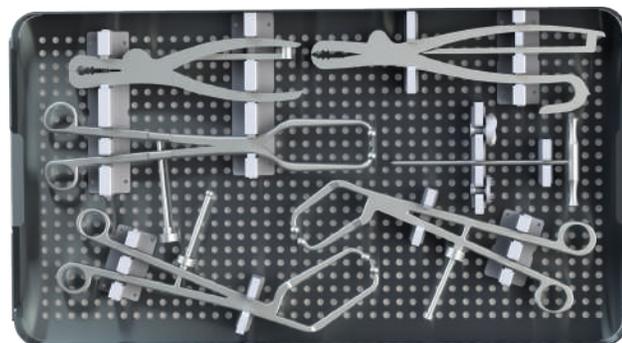
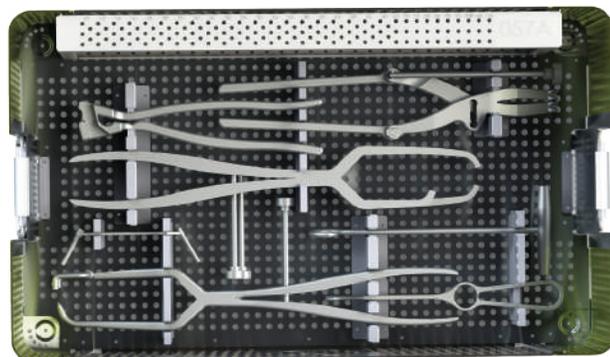
6. INSTRUMENTS

The instruments required are those necessary for plate implantation; any additional instruments are at the discretion of the surgeon.

PELVIS AND ACETABULUM EQUIPMENT

QTY. EQUIPMENT

- 1 Spiked Disc, Round Curved
- 1 Spiked Disc, Round Flat
- 1 Tap with T handle, cancellous 4.0mm
- 1 Pelvic reduction forceps, angled, with pointed ball tips 6.5mm, length 240mm
- 1 Pelvic reduction forceps, angled, with pointed ball tips 6.5mm, length 200mm
- 1 Pelvic reduction forceps with pointed ball tips 6.5mm, length 250mm
- 1 Pelvic reduction forceps, small, length 190mm, for use with cortex screws 3.5 and 4.5mm
- 1 Pelvic reduction forceps, medium, length 250mm, for use with cortex screws 3.5 and 4.5mm
- 2 Ball Spike, straight, with pointed ball tips, length 300mm
- 1 Pelvic retractor, blunt
- 1 Double drill guide 2.5/3.5
- 1 Flexible drill bit 3.2
- 1 Drill guide Ø2.5 mm for flexible drill bit
- 1 Depth gauge 0-110mm
- 1 Tap with T handle, cortical 3.5
- 2 Bending iron for reconstruction plates 3.5 and 4.5, length 190mm
- 1 Screwdriver hexagonal, 2.5mm with screw holding sleeve, length 300mm
- 1 Screw holding sleeve Forceps 3.5 Ø2.5 mm
- 1 Screwdriver with universal joint, hexagonal, 2.5mm, length 300mm
- 5 Drill bit 2.5mm, length 250mm
- 2 Drill bit 3.0mm, length 250mm
- 1 Bending Iron forceps
- 1 Pelvic reduction forceps, asymmetric, with pointed ball tips 6.5mm
- 1 Universal drill guide 3.0/4.0
- 1 Bone hook, sharp, medium, length 230mm
- 1 Bone hook, sharp, large, length 200mm
- 1 Pelvic reduction forceps with pointed ball tips 6.5mm, length 400mm
- 1 Pelvic reduction forceps with 3 pointed ball tips 6.5mm, length 400mm
- 1 Pelvic reduction forceps, large, adjustable, speed lock, length 300mm
- 1 Bending template 3.5 reconstruction plates, straight
- 1 Bending template 3.5 reconstruction plates, curved
- 1 Bending pliers for reconstruction plates 3.5



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PLATES AND INSTRUMENTS IN ONE KIT | EASY & COMFORTABLE

7. Bibliography

Rüedi, Thomas P., Murphy, William M. Principios de la AO en el tratamiento de las fracturas Ed. Masson 2002.

Tannast, M., & Siebenrock, K. (2010). Tratamiento quirúrgico de la fractura acetabular en T mediante luxación quirúrgica de la cadera o abordaje de Stoppa. *Técnicas Quirúrgicas en Ortopedia y Traumatología*, 19(03), 112-130.

Rommens, P. M. (2002). Abordaje ilioinguinal para el tratamiento de fracturas acetabulares. *Técnicas Quirúrgicas En Ortopedia y Traumatología*, 12(1), 11-21.

Rommens, P. M. (2004). Abordaje de Kocher-Langenbeck para el tratamiento de las fracturas acetabulares. *Técnicas Quirúrgicas en Ortopedia y Traumatología*, 13(3), 120-131.



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