CASE STUDY

Acetabulum

Treatment with the CurvaFix® IM System

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Case Presentation

The patient is a 30-year-old female who was involved in a head on motor vehicle collision. She was mildly obese, but otherwise healthy prior to the accident. She presented as a level 1 trauma activation. She sustained a mild subdural hematoma as well as a right-sided pulmonary contusion.

Diagnosis

From an orthopedic standpoint the patient sustained a right transverse plus posterior wall acetabular fracture with right posterior hip dislocation. Her non-orthopedic injuries were stable, and her right hip was closed reduced.

Implant Preparation

The patient was placed in skeletal traction to maintain the stability of her hip in the immediate setting. She was then taken to the operating room on the following day for open reduction and internal fixation. Preoperative imaging also demonstrated concern for intra-articular fragments. This was confirmed intraoperatively. The hip was dislocated and intra-articular fragments were removed. The hip was then reduced and the posterior column was realigned with pelvic reduction clamps and a reconstruction plate to stabilize the posterior column medially. The posterior wall was then reconstructed anatomically. A spring plate was then placed to compress the wall into place. A posterior wall buttress plate was then placed more lateral to the column plate. Due to the initial displacement of the anterior portion of the transverse fracture line and the significant instability of the hip at time of injury, the anterior column portion was then stabilized with an intramedullary device.

CurvaFix IM Implant

- A 7.5 mm CurvaFiximplant wasintroduced along the anterior column corridor in an antegrade fashion.
- The implant was stopped just lateral to the pubic symphysis and excellent rigid internal fixation was obtained.

Image 1: Right acetabular fracture with hip dislocation.

Image 2: Interop obturator oblique view.

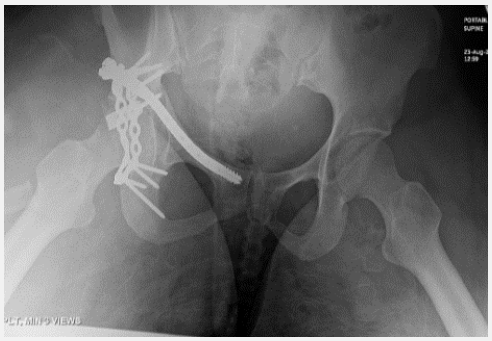

Image 3: Immediate post-op x-ray shows posterior fixation.

Key Points

- The anterior column bony corridor was quite curved and would have been challenging with a rigid, straight implant.

Follow-up

- After fixation was achieved, she was made 30 pounds foot flat weightbearing for 12 weeks.
- In the postoperative setting she was doing well in terms of bony healing and clinical recovery.
- Radiographically she is developing posterior heterotopic ossification in her abductor musculature due to her posterior dislocation and traumatic brain injury.

Discussion

The ability to obtain multi-planar fixation with the CurvaFix Implant makes it an important tool for surgeons to consider when dealing with fractures of the acetabulum and other locations that are poor candidates for straight implants due to the curved nature of the bony corridors.

Surgical benefits to consider are:

- Interosseous fixation within curved spaces: The CurvaFix implant is inserted using a flexible, guidewire that allows you to comply with a complex anatomy through a relatively minimally invasive approach, providing ease in the application of intramedullary fixation. The flexibility of the guidewire, in contrast to rigid guidewires typically used, enables the wire, and the implant that will be guided along it, to easily navigate the curves of the intermedullary space.
- Ability to curve in multiple planes: This case report demonstrates the value of a “curveable” fixation device. In the absence of such a device, placing an anterior column screw can be particularly challenging because of the curved nature of the bone. Images 9 and 11 show the implant is curved in multiple planes. The CurvaFix implant provides an easy to administer solution to what is otherwise difficult to achieve fixation.
- A larger implant provides additional strength and stability: The implant that is inserted along the curved guidewire can have a much larger diameter than the screws typically used in this location. It fills the space within the bone to provide an additional level of strength and stability.

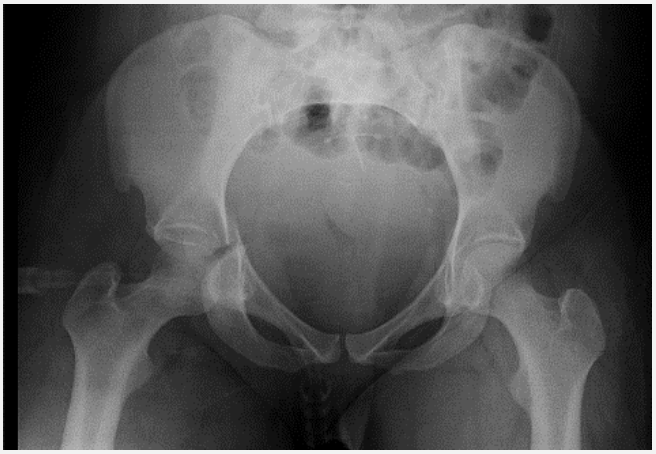

Image 4: Injury pre-op showing reduction of set injury.

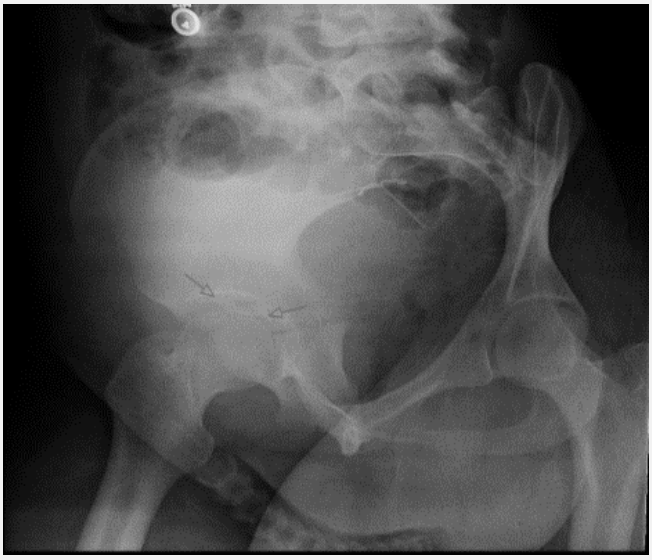

Image 5: Injury pre-op showing bone fragment within joint base.

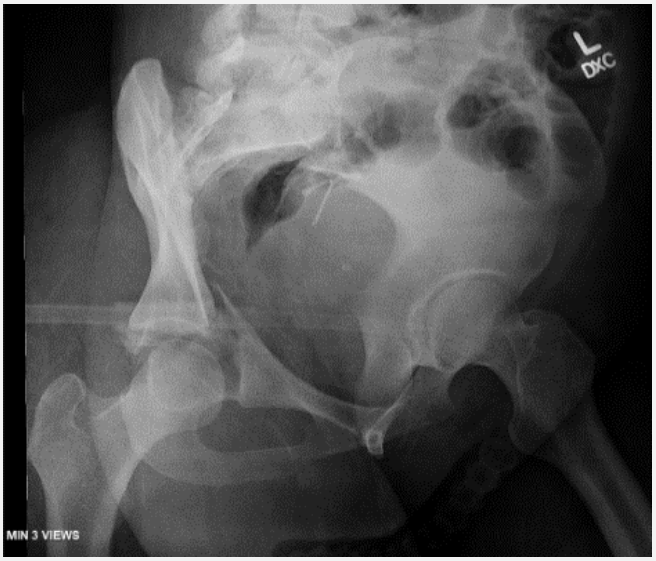

Image 6: Injury pre-op, obturator oblique view.

- The curve of implant provides rotational strength: In addition to the filling aspect of the implant diameter, the actual curve, once fixed in place, provides a significant amount of rotational strength.
- Biomechanical strength advances patient recovery: “I believe that the combination of the large diameter implant and the ability to rigidly lock the anatomic complex curve, provides greater biomechanical strength than what might be achieved using straight plates and screws. Observationally, this has demonstrated earlier ability to weight bear and rehabilitate in my practice.

  - Robert J. Wetzel, MD

About CurvaFix Technology

The CurvaFix IM Implant is the first of its kind designed to follow and fill the curved pathways of the pelvic ring, enabling the implantation of a longer, wider fixation device. The CurvaFix procedure is minimally invasive and performed using standard fluoroscopy. The flexible implant has four internal cables and a patented bead design allowing it to be flexible as it follows and fills the path created by a curved, ball-tipped guide-wire and reamer. When the implant is in the desired location, the patented lock feature on the head of the device is activated, securing the cables in place at different lengths to maintaining the curvature as well as making it rigid.

The CurvaFix device is designed to stuff the bony corridor, achieve more points of fixation than traditional straight implants, and distribute forces evenly throughout pelvic ring to deliver strong pelvic and acetabular fracture fixation. The procedure can be completed in as little as 20 minutes.

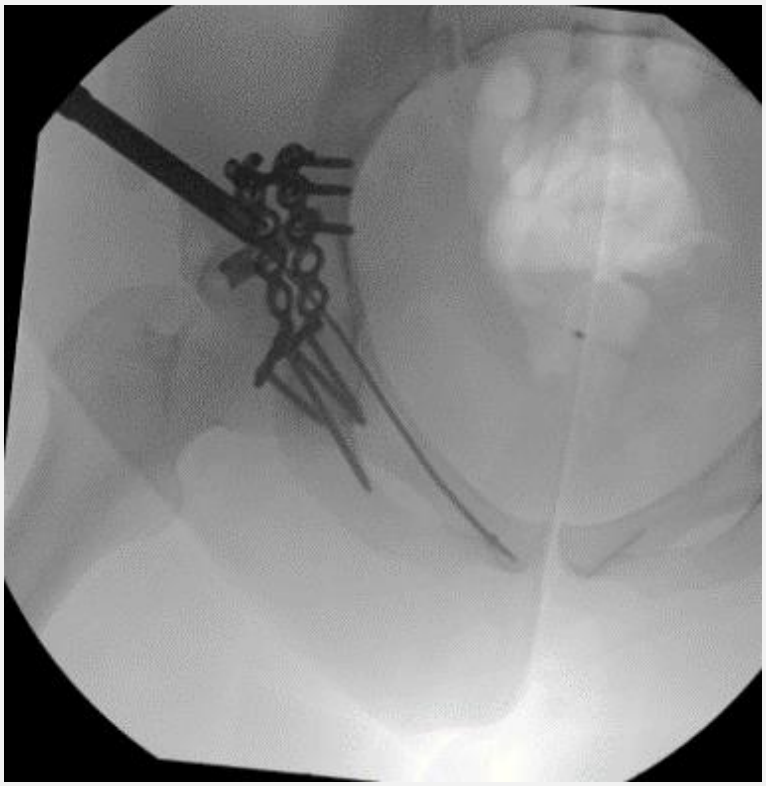

Image 7: Intra-op image showing guidewire fully within the superior pubic ramus.

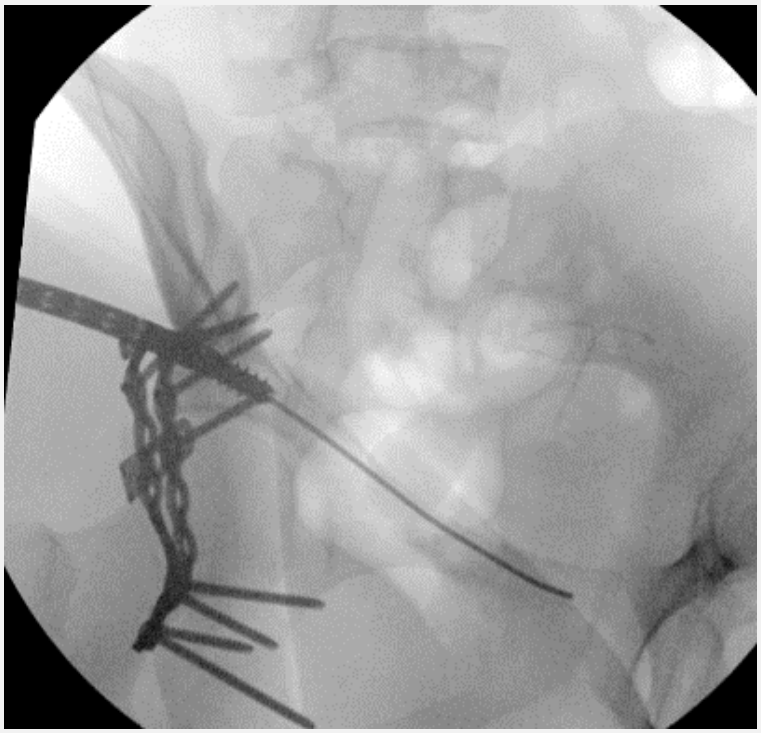

Image 8: Intra-op obturator outlet view of implant following along guidewire within its pre-reamed channel.

Image 9: Intra-op obturator outlet view of fully seated CurvaFix implant.

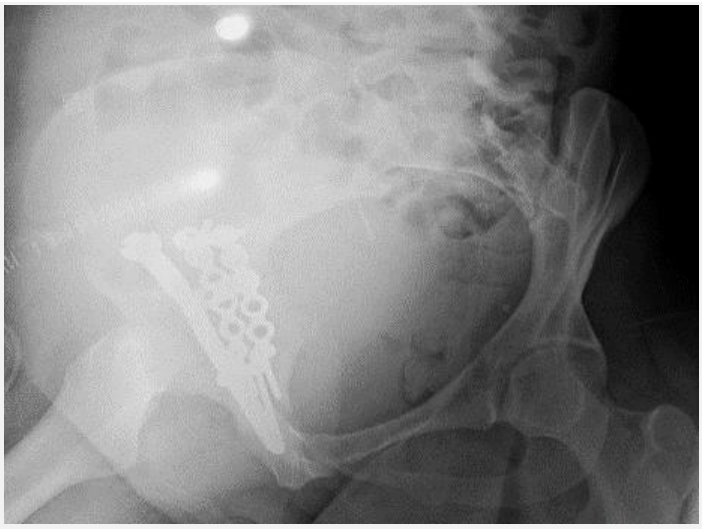

Image 10: Post-op iliac oblique view shows posterior column fixation and CurvaFix implant within anterior column.

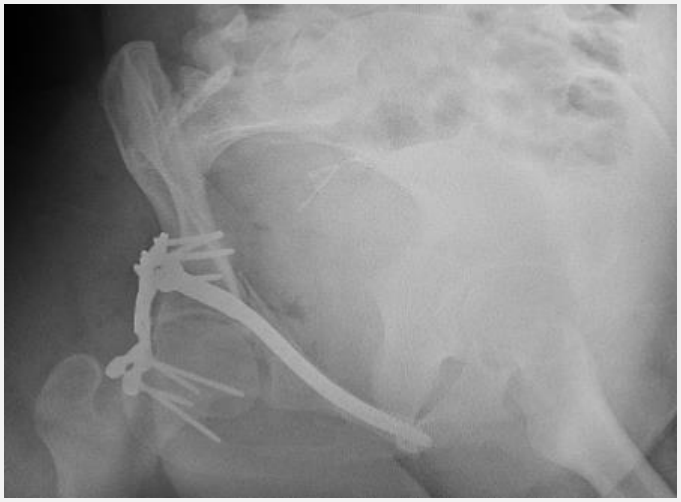

Image 11: 3 weeks post-op obturator oblique view shows joint congruent to the hip and reduced.

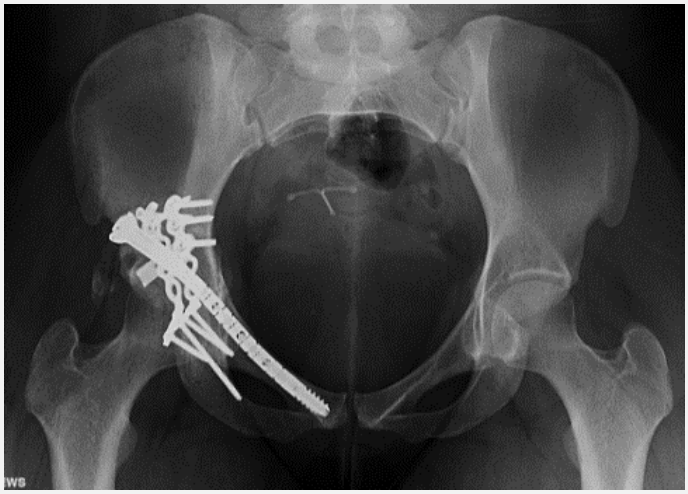

Image 12: 3 weeks post-op shows heterotopic ossification forming just lateral to the hip.

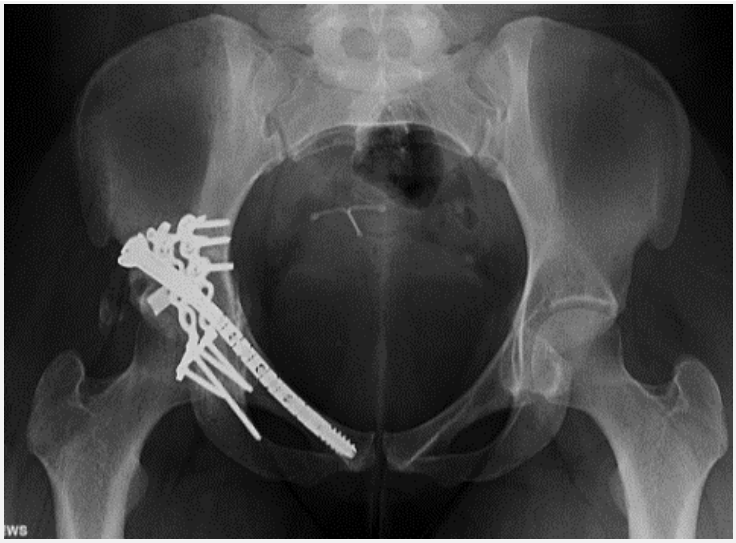

Image 13: 4 months post-op, anterior column shows progressive healing.

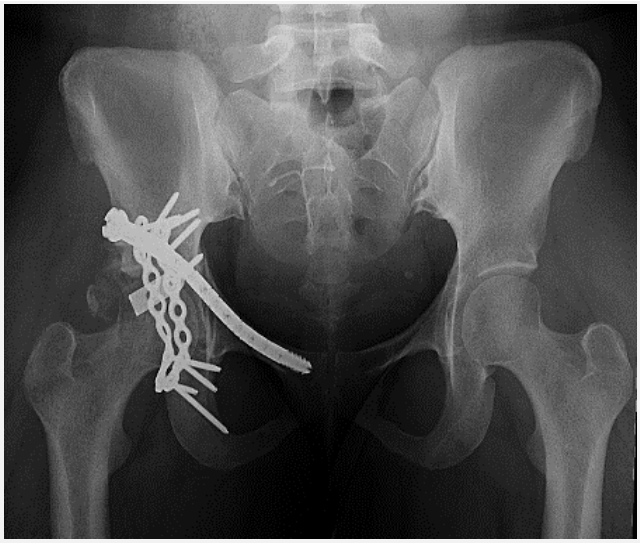

Image 14: 4 months post-op, outlet view demonstrates the curve of the implant.

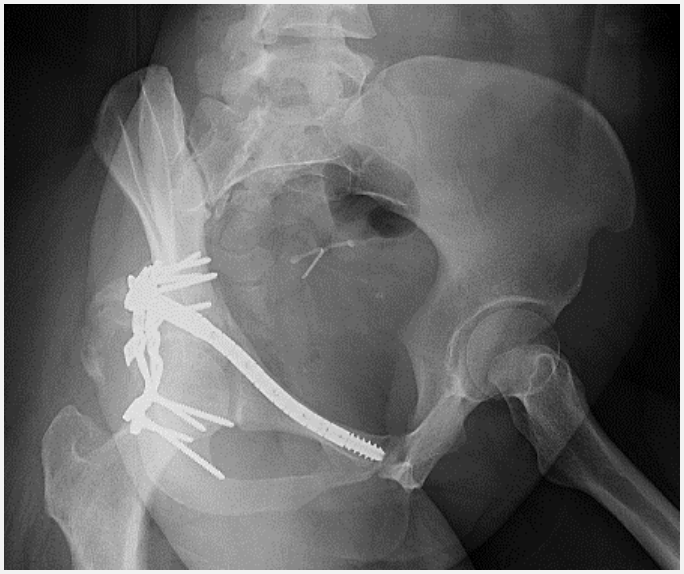

Image 15: 4 months post-op shows progressive consolidation of the fracture, and that nothing has shifted, and reduction remains.

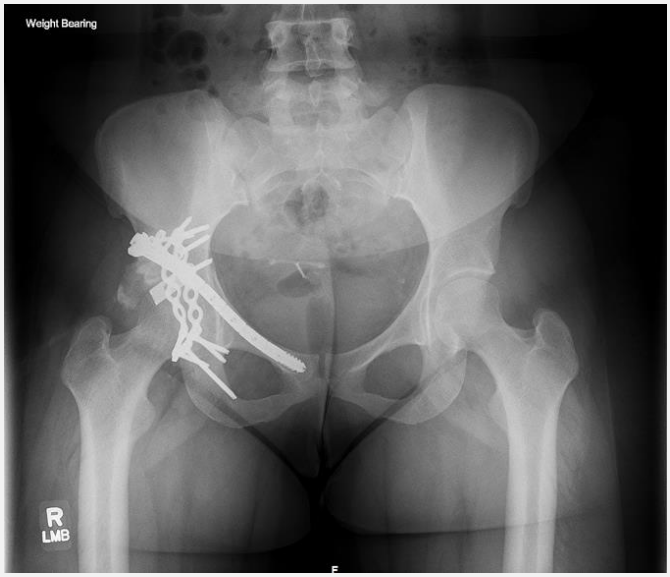

Image 16: 6 months post-op.

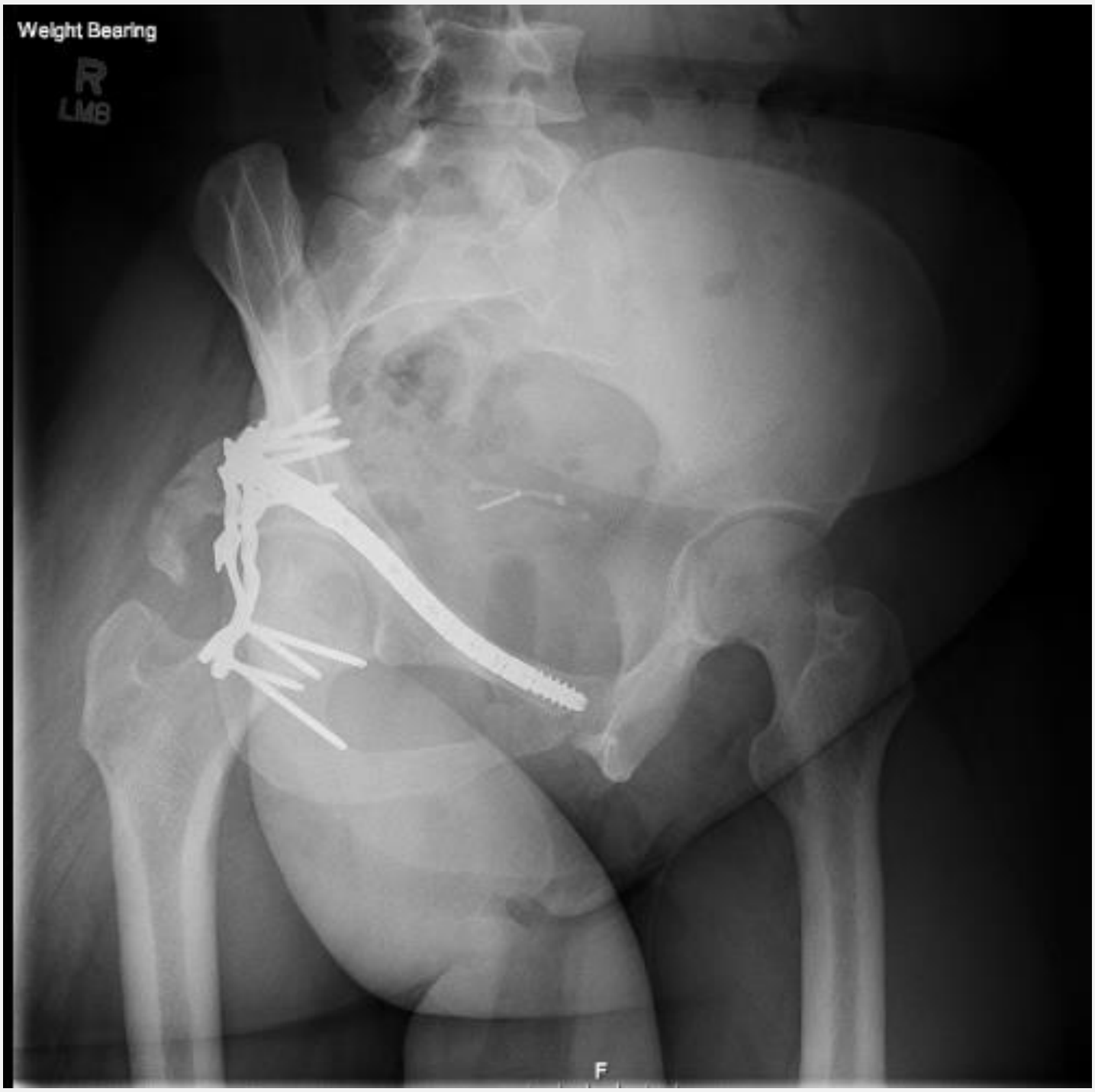

Image 17: 6 months post-op.

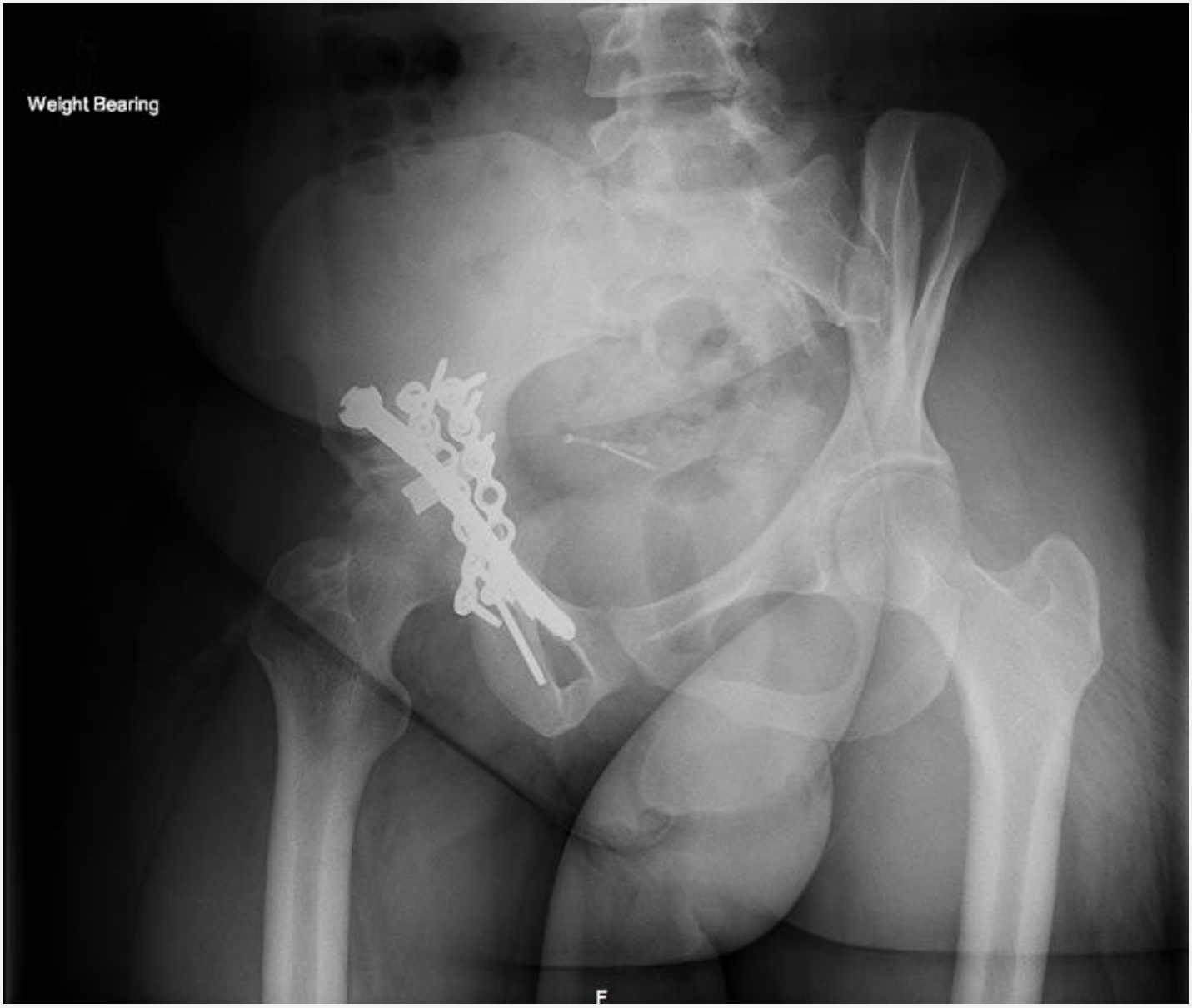

Image 18: 6 months post-op.