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Case Report

Delayed lower extremity paresis following iliosacral screws: Atypical complication and treatment

A. Garín [b], S. Abara [a,c], C. Herrera [a], I. Acuña [d], J. Cancino [d], S. Bettancourt [c], J. Alvarez [c], C. Vigueras [d], J. Lara [a], J. del Río [a,d,*]

[a] Hip Center Clínica Las Condes, Santiago, Chile
[b] Hospital Clínico Félix Bulnes, Santiago, Chile
[c] Hospital DIPRECA, Santiago, Chile
[d] Hospital Clínico Mutual de Seguridad, Santiago, Chile

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ABSTRACT

Percutaneous iliosacral screw placement has become the technique of choice for treating injuries to the posterior pelvis. However, the technique requires an understanding of the anatomy surrounding the bone corridors to avoid complications and detect them early if they occur. We present the clinical case of a patient with a U-shaped fracture of the sacrum that evolves with gluteal pain and left foot equine paresis after percutaneous fixation with iliosacral screws. Angio-CT of the pelvis shows active arterial bleeding from the superior gluteal artery associated to extensive hematoma in the thickness of the gluteus medius muscle. Emergency embolization is performed by installing coil and gelatin. Successful control of bleeding is achieved. To avoid this complication, a complete imaging study is recommended in planning the surgery and to avoid multiple repositioning of the guide or screw. Arterial injury should be suspected in case of increasing pain despite analgesia, functional impairment or neurological deficit and the angiographic study and resolution by selective embolization of the bleeding vessels must be performed.

Introduction

Advances in the understanding of the radiological anatomy of the pelvis and its bone corridors have allowed a better quality and safety of the osteosynthesis of these fractures [1]. Percutaneous iliosacral screw placement, either supine or prone, has become the technique of choice for treating injuries to the posterior pelvis. However, the percutaneous technique of screw placement requires an understanding of the anatomy surrounding bone corridors, to avoid complications and detect them early if they occur.

As the percutaneous technique is guided by intraoperative X-rays [2], there is no control under direct vision of the neurovascular structures near the entry point. The entry point of the iliosacral screws is close to the sciatic notch, through which the gluteal artery and nerves emerge [3,4]. There are reports of isolated cases of injury to the superior gluteal artery during the placement of percutaneous iliosacral screws [5]. Although rare, the index of suspicion must be high since they are potentially catastrophic.

We present the clinical report of a patient with a U-shaped sacral fracture that evolves with gluteal pain and left foot equine paresis 17 h after percutaneous fixation with iliosacral screws.

* Corresponding author at: Hip Center, Orthopaedic Surgery Department, Clínica Las Condes, Facultad de Medicina Universidad de Chile, Santiago, Chile.
E-mail address: jdelrio@clinicalascondes.cl (J. del Río).

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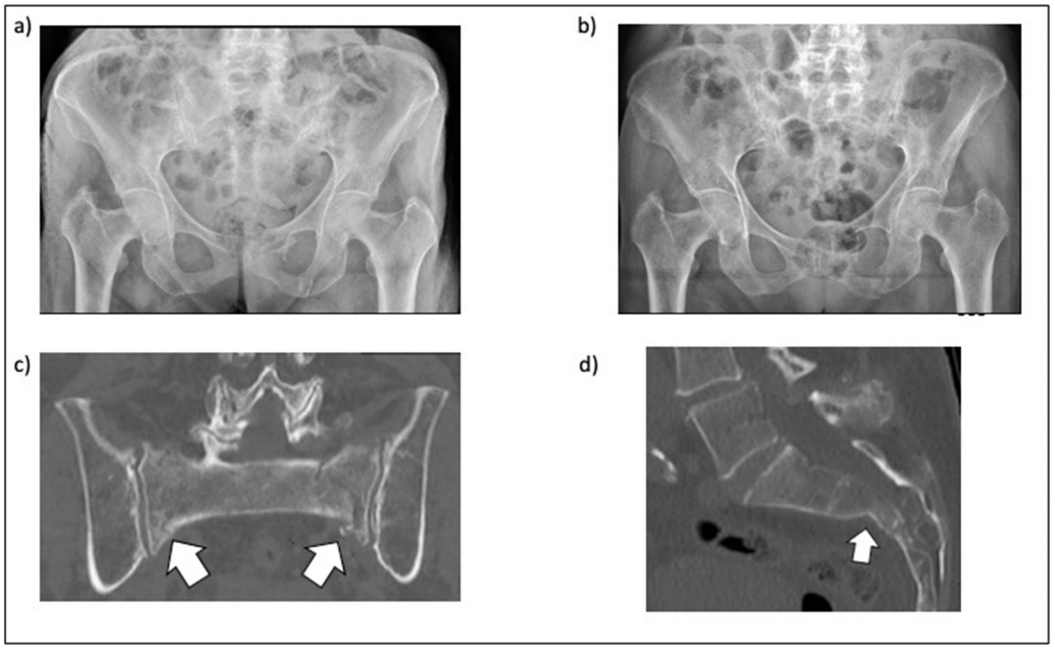

Fig. 1. a) X-ray at first admission, b) X-ray at second admission due persistent pain, c–d) CT shows U-shaped sacrum fracture.

Case

An 83-year-old female patient, self-reliant, with a history of atrial fibrillation treated with oral anticoagulant (apixaban), hypothyroidism, lymphoproliferative syndrome, and renal failure.

She suffers a fall at home, impacting in a semi-sitting position. At emergency room the patient shows groin and left buttock pain (VAS 10/10). Physical examination highlights pain on sacral palpation without irradiation, with a normal neurological examination. The imaging study on admission is compatible with left ilium and ischiopubic ramus fractures plus incomplete ipsilateral sacral aileron fracture, without major displacement (Fig. 1a). Orthopedic management is indicated with rest and weight bearing as tolerated with a walker, being discharged on the fifth day of hospitalization.

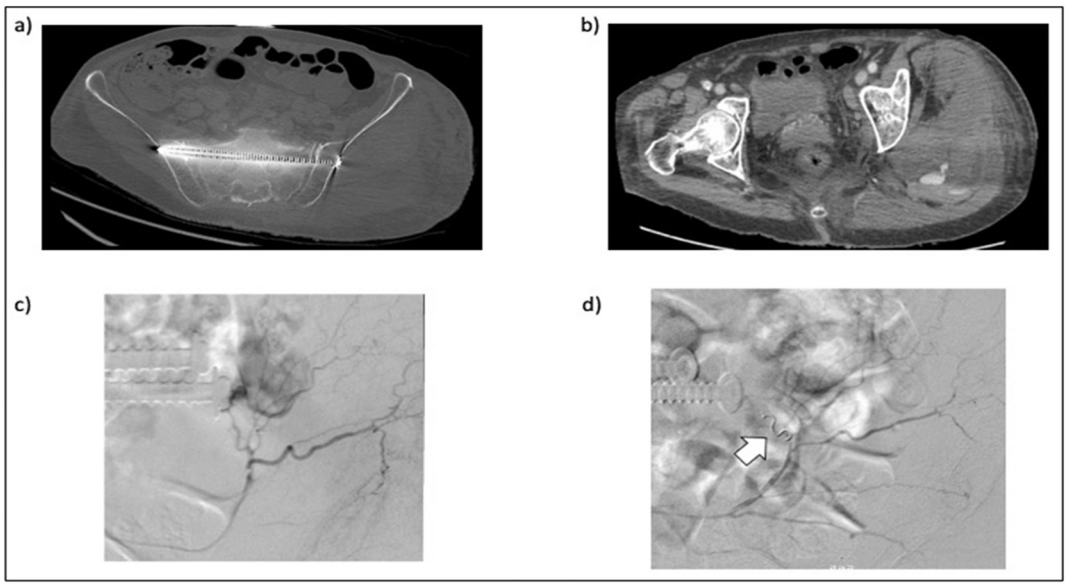

Fig. 2. a–b) Pelvic angiography shows active arterial bleeding from the superior gluteal artery associated with extensive hematoma in the thickness of the gluteus medius muscle, c–d) Embolization performed installing coil and gelatin achieving bleeding control.

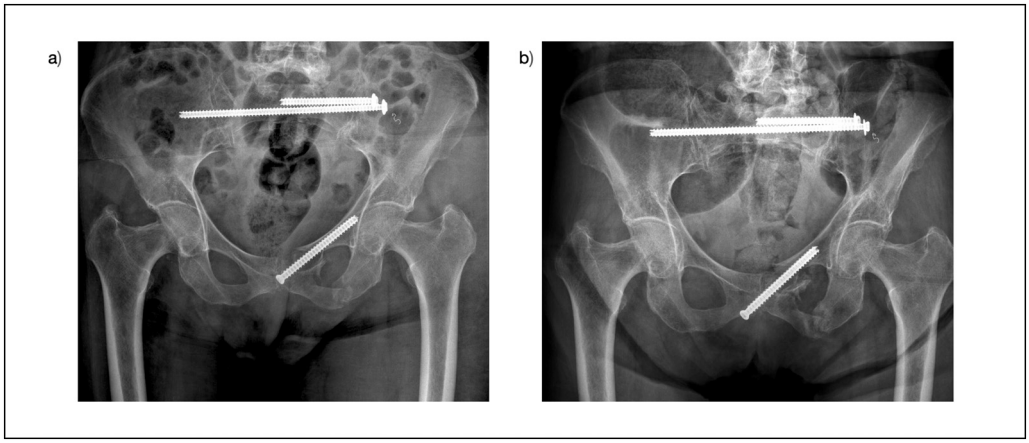

Fig. 3. a) X-ray day after surgery, b) X-ray at 12 months follow-up.

On the eleventh day after trauma, she returned to the emergency department for hypertensive crisis caused by severe pain in the inguinal region and left buttock, she did not tolerate rehabilitation, sitting or standing.

An X-ray was performed showing displacement of the pelvic fracture (Fig. 1b). The CT-scan shows a complete fracture in the right and left sacral aileron, with displacement. In sagittal view, the sacrum shows kyphosis with an image of a fracture in the coronal plane along the body of S2, configuring a U-shaped fracture of the sacrum (Fig. 1c and d).

The patient underwent reduction and percutaneous osteosynthesis of the iliopubic ramus with supraacetabular and distractor tutor assistance. Subsequently, percutaneous reduction and osteosynthesis of the sacrum was performed with a transiliac-transsacral screw and a iliosacral screw, both from the left side of the pelvis. Intraoperative imaging control was performed with O-arm® that confirms adequate reduction and position of the osteosynthesis. Direct closure of the skin with Ethilon® 3-0.

At recovery room, the patient progresses without pain and with a normal neurovascular status.

10 h postoperatively, the patient begins left gluteal pain, with the neurovascular status intact but with 10% drop in hematocrit. 17 h postoperatively, the patient evolved with an increase in left buttock volume and paresis in the left L5 territory (muscle strength 1/5 in the peroneal muscles and muscular strength 2/5 in the extensor hallucis longus muscle). The dressings at the operative site showed no evidence of bleeding.

Given the suspicion of hematoma, pelvic angiography was performed, showing an image compatible with active arterial bleeding from the superior gluteal artery associated with extensive hematoma in the thickness of the gluteus medius muscle to distal (Fig. 2a and b).

Emergency embolization is performed by an interventional radiologist, installing coil and gelatin. Successful control of bleeding is achieved (Fig. 2c and d).

Patient evolves with immediate pain reduction and clinical neurological recovery 1 h post-embolization. Progressively achieves sitting without pain, discharging on the fifth day after embolization.

During the follow-up, the patient progressively returns to her daily self-reliant activities, the last X-ray at 12 months follow-up shows bone healing and minimal displacement of superior pubic ramus screw (Fig. 3).

Discussion

Fragility fractures of the pelvis are injuries seen more frequently today due to the aging of the world population [6]. These injuries have been associated with significant morbidity: chronic pain, loss of independence, need for home hospitalization, prostration, delirium, pneumonia, thromboembolic events, pressure ulcers and urinary complications, among others. In general, the treatment is initially conservative, but an important group of patients do not achieve adequate pain management with these measures.

Among all pelvic insufficiency fractures, a complex group to manage are U-shaped sacrum fractures. They are infrequent fractures and difficult to diagnose, especially if this clinical entity is not known and is not suspected. U-sacrum fractures are generally uncommon injuries, but they are the most common type of spinopelvic dissociation. The U-pattern, which includes vertical fractures on both sacral ala and a transverse fracture on the sacrum, dissociates the pelvic from the spine. In elderly patients, or with osteoporotic bone, U-shaped fractures can be caused by low-energy trauma (falls or even without known trauma), being difficult to investigate with radiographs, even with computed tomography in some cases [7].

An early fixation of this type of fracture prevents displacement, the recurrence of pain and restores the patient's functionality. Percutaneous fixation is one of the most widely used techniques since it minimizes bleeding, operative/anesthetic time, wound complications and confers better recovery rates [1].

Superior gluteal artery injury has a published incidence of 0.6–1.2% in cadaveric studies [4]. Injuries of this type can be caused by direct damage with the insertion of the guide, by tearing the guide, or by direct damage with the placement of the screw. The incidence study is limited given the nature of the soft tissues in cadavers, which are more rigid, and may even have a higher rate compared to

living bodies. There are no studies reporting the incidence of superior gluteal artery injury in living patients. This is the only arterial injury diagnosed in the series of 428 percutaneous screws by the main author, equivalent to 0.2%.

Risk factors for superior gluteal artery injury are a history of use of anticoagulants, arterial calcifications, deep anatomical variation of the superior gluteal artery, being closely related to the bone corridor, multiple repositioning of the guide or screw to achieve reduction [8]. This surgical technique should be performed by experienced surgeons to avoid multiple changes at the entry point.

Maslow [9] reported that the combination of the S1 iliosacral screw plus the S2 transsacral-transiliac screw would be safer than the placement of two S1 transsacral-transiliac screws, in relation to the risk of vascular injury to superior gluteal artery. However, it should be mentioned that the fixation used depends on the characteristics of the bone corridors of each patient.

In our patient, it was not possible to determine the exact moment when the injury was done, since there was no evidence of profuse bleeding intraoperatively, and during the first postoperative hours the patient was asymptomatic. It is important to highlight that the screw position was considered correct on fluoroscopy, also verified with intraoperative tomography.

The alternatives reported for the treatment of this injury are performing a tamponade with gauze or extending the incision for exposure and ligation of the artery, which is difficult and not without complications. For this reason, we believe that embolization is the best alternative to stop bleeding previously confirmed by angiography [10].

To avoid this complication, a complete imaging study is recommended to plan the intervention and avoid multiple repositioning of the guide or screw. Arterial injury should be suspected due to profuse bleeding, increasing pain despite analgesia, functional impairment or neurological status deficit. In that case, an angiographic study and resolution using selective embolization of the bleeding vessels must be performed. The clinical manifestation of bleeding and bruising may occur, as in this case, delayed.

In conclusion, a case of superior gluteal artery injury associated to neurological deficit due an extensive hematoma and its successful resolution through embolization, has been reported in a patient with a U fracture of the sacrum fixated with iliosacral screws and transiliac - transsacral screws.

References

[1] J.A. Bishop, M.L. Routt Jr., Osseous fixation pathways in pelvic and acetabular fracture surgery: osteology, radiology, and clinical applications, J. Trauma Acute Care Surg. 72 (6) (2012 Jun) 1502–1509.
[2] J. Del Río, C. Barrientos, M. Valencia, et al., Técnica quirúrgica para facilitar la colocación de tornillos sacroilíacos percutáneos, Rev Chilena Ortop y Traum 52 (2011) 46–54.
[3] Z. Yong, Y. Libo, L. Wei, Z. Dexin, D. Shengjie, S. Tao, Z. Shudong, W. Dan, L. Jingning, L. Wenliang, Z. Yuchi, Anatomical relation between S1 sacroiliac screws' entrance points and superior gluteal artery, J. Orthop. Surg. Res. 18 (1) (2018) 15, 13.
[4] C. Collinge, D. Coons, J. Aschenbrenner, Risks to the superior gluteal neurovascular bundle during percutaneous iliosacral screw insertion: an anatomical cadaver study, J. Orthop. Trauma 19 (2) (2005) 96–101.
[5] S. Kang, P.H. Chung, J.P. Kim, Y.S. Kim, H.M. Lee, G.S. Eum, Superior gluteal artery injury during percutaneous iliosacral screw fixation: a case report, Hip Pelvis 27 (1) (2015) 57.
[6] P.M. Rommens, C. Arand, A. Hofmann, D. Wagner, When and how to operate fragility fractures of the pelvis? Indian J. Orthop. 53 (1) (2019 Jan-Feb) 128–137.
[7] H. Eckardt, A. Egger, R.M. Hasler, C.J. Zech, W. Vach, N. Suhm, M. Morgenstern, F. Saxer, Good functional outcome in patients suffering fragility fractures of the pelvis treated with percutaneous screw stabilisation: assessment of complications and factors influencing failure, Injury 48 (12) (2017 Dec) 2717–2723.
[8] D.J. Stephen, Pseudoaneurysm of the superior gluteal arterial system: an unusual cause of pain after a pelvic fracture, J. Trauma 43 (1997) 146–149.
[9] J. Maslow, C. Collinge, Risks to the superior gluteal neurovascular bundle during iliosacral and transsacral screw fixation: a computed tomogram arteriography study, J. Orthop. Trauma 31 (12) (2017 Dec) 640–643.
[10] M. Rysavý, T. Pavelka, M. Khayarin, V. Dzupa, Iliosacral screw fixation of the unstable pelvic ring injuries, Acta Chir. Orthop. Traumatol. Cechoslov. 77 (2010) 209–214.