Case Report

Vol. 3, No. 1; 2019; pp 34–37
DOI: 10.26676/jevtm.v3i1.76

Endovascular Repair of the Blunt Injury to Persistent Sciatic Artery in a Case of Pelvic Fracture

Olga Mayzler MD, Anatoly Leytzin MD, Victor Ginzburg MD and George Greenberg MD

Department of Vascular Surgery, Soroka Medical Center, Ben-Gurion University of the Negev, Beer Sheva, Israel

Background: Endovascular embolization has become a preferred treatment in the management of retroperitoneal bleeding due to pelvic injuries. These techniques have spread across most trauma centers as minimally invasive management of one of the most dreadful conditions in trauma.
Methods: We present a patient with persistent sciatic artery who arrived at our facility with blunt pelvic trauma suffering from retroperitoneal bleeding. Timely recognition of this anomaly led to the preservation of the vital artery and prevention of ischemic complication.
Conclusions: Although embolization of the bleeding has become a routine procedure in most busy trauma centers, precise imaging, recognition of significant anatomic variants and careful intervention planning are essential in preventing substantial complications.

Keywords: *Trauma; Pelvic Blunt Trauma; Vascular Injury; Vascular Anomalies; Persistent Sciatic Artery; Endovascular Treatment*

Received: 17 November 2018; Accepted: 17 December 2018

INTRODUCTION

Pelvic fractures represent approximately 3% of all skeletal injuries [1] and are associated with mortality rates as high as 50% [2]. The considerable associated vascular injury presents in up to 3.5% [3]. Lately, endovascular embolization has become a paradigm of this often life-threatening injury [4]. This minimally invasive procedure supplies a rapid and safe solution and is available in most tertiary trauma centers. Nevertheless, although perceived to be routine, a thorough understanding of the anatomy and planning is crucial in this vascular intervention. We present a case of "open book" pelvic fracture with retroperitoneal bleeding due to injured persistent sciatic artery (PSA). A short discussion of this rear anatomic variant follows.

Corresponding author:
George Greenberg, Department of Vascular Surgery, Soroka Medical Center, Ben-Gurion University of the Negev, Beer Sheva, Israel.
Email: georgegr@clalit.org.il

Authors contributions: All authors have substantially contributed to the study and manuscript writing.

Conflicts of interest: None.

Funding: There was no grant for this work.

Case Report

A 23-year-old male presented to our facility after a road accident. He was fully conscious. His arterial systolic blood pressure was around 100 mm, and he was tachycardic with pulses around 100. The primary survey disclosed an unstable pelvis with thigh deformity. After completion of the primary evaluation and wrapping of the pelvis, the patient underwent total body CT scan.

The CT scan revealed fractures of the pelvic ring and femur with a considerable hematoma in the right retroperitoneal area. The iliac artery on the same side did not show extravasation but the cut off of what seemed to be the internal iliac artery (Figure 1). As the patient had already received several blood transfusions and showed signs of continuous bleeding, the embolization was assigned, and the patient was transferred to the angiography suite with intent to embolize the right internal iliac artery.

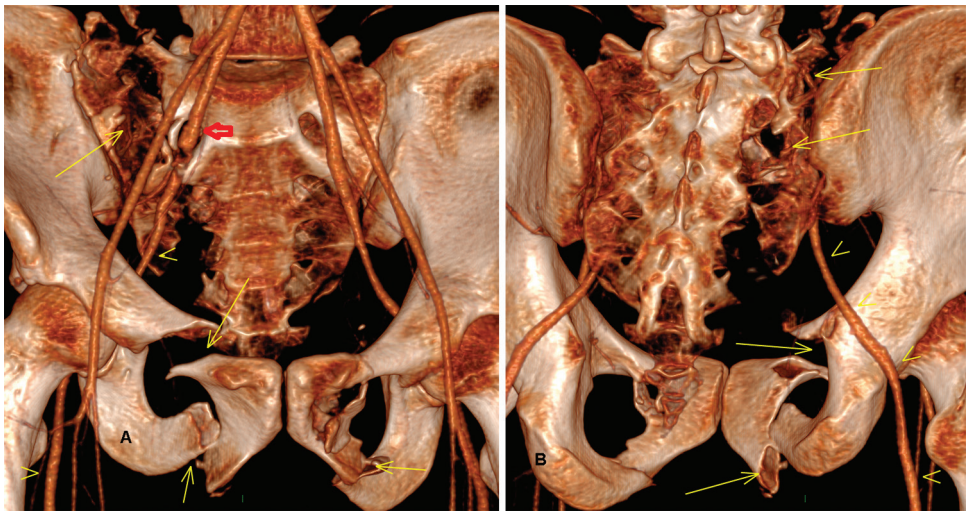

Figure 1 A three-dimensional reconstruction of the preoperative CT angiography. (**a**) Anterior and (**b**) posterior view. Yellow arrows point at multiple fractures with the disjunction of the pelvic ring. The yellow arrowheads point at the persistent sciatic artery (PSA). The red arrow points at traumatic occlusion of the PSA.

After left femoral access, a cross-over guidewire with a sheath was introduced and diagnostic angiography performed (Figure 2). The anatomy was confusing, so a trauma team invited a vascular specialist, who diagnosed the PSA on both sides, with a hypoplastic superficial femoral artery.

After successful passage of the guidewire through the occluded segment of the PSA, the balloon mounted 6 × 49 mm² covered stent (BeGraft, Bentley Innomed, Hechingen, Germany) was delivered and deployed, with preservation of the artery and restoration of the blood flow to the limb. Two days later the orthopedic team performed a successful reconstruction of the pelvis (Figure 3). The rest of the hospitalization was uneventful, and the patient was referred to a rehabilitation program.

DISCUSSION

A PSA is a rare vascular anomaly with an estimated incidence of 0.03–0.06% [5]. The sciatic artery is a major branch of the internal iliac artery and is the principal blood supply to the lower extremity in the human embryo before the development of the femoral artery. It leaves the pelvis next to the sciatic nerve and is continuous with the popliteal artery. With the development of the femoral artery, the sciatic artery disappears. If it persists, two types are recognized by its relationship to the femoral artery: complete and incomplete [6]. The complete type denotes complete preservation of the sciatic circulation with hypoplastic femoral elements.

The reported patient had a complete type with a dominant, persistent sciatic vessel from the pelvis straight to the popliteal artery as the main trunk and hypoplastic superficial femoral artery (SFA). The significance of the timely recognition of this variant is crucial. In circumstances of the sometimes chaotic environment of trauma management, hasty advised embolization of the internal iliac artery can be disastrous with severe ischemic complications and inadvertent amputation or even mortality. Correct, timely recognition of this anomaly by the vascular surgeon in our patient led to the preservation of the artery by covered stent with optimal outcome. This case underscores the importance of familiarity with vascular anatomy and awareness of vascular anomalies.

In general, the vascular specialist is not part of a trauma team routinely, and the decisions are almost exclusively taken by cooperation with the invasive radiologist. In this context, we strongly recommend immediate consultation with a vascular specialist in any case of unusual or uncertain anatomy. A diagnostic angiography of the limb is an additional important point. Complete imaging of the circulation of the area of interest is essential in even the sometimes pressing and chaotic conditions of trauma management. That is the only way to demonstrate vascular anatomy and anomalies and accordingly reveal them and take therapeutic decisions.

The precision of the embolization is another interesting point. Embolization of the main stem of the artery is unnecessary in most cases and may be counteractive, with multiple distal feeders inaccessible after embolization. Selective embolization is more precise and retains the main trunk for additional interventions if required later.

The patient we described was relatively stable. It would be interesting to speculate what should be the management of the same, but hemodynamically unstable patient. Generally, it would depend on the facilities, protocols, and skills available at the institution. Historically, the severely unstable patient would go straight to the

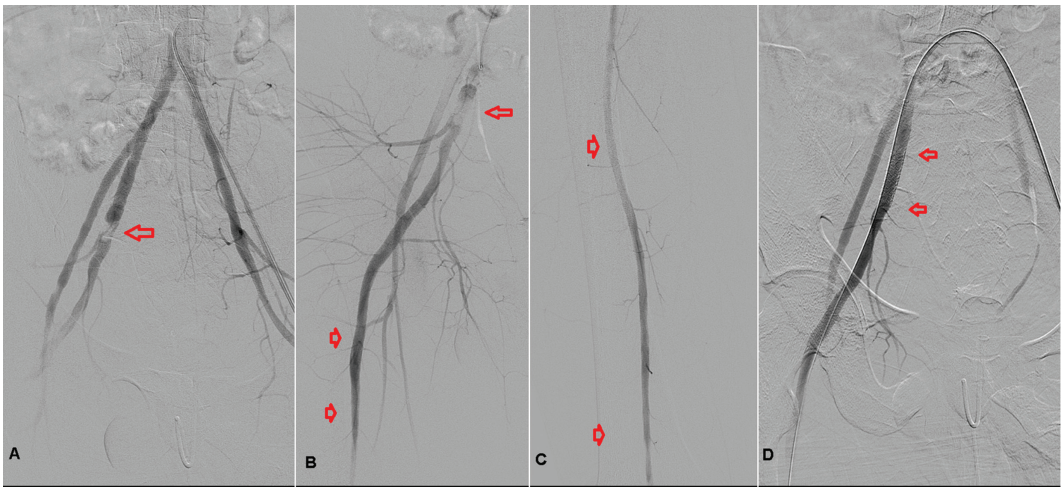

Figure 2 Angiographic images of the persistent sciatic artery (PSA). (**a**) The arrow points at the traumatic occlusion. (**b**) Short arrows point at the pelvic portion of the PSA. (**c**) A femoropopliteal portion of the PSA. (d) Patient artery after repair. Arrows point at the covered stent.

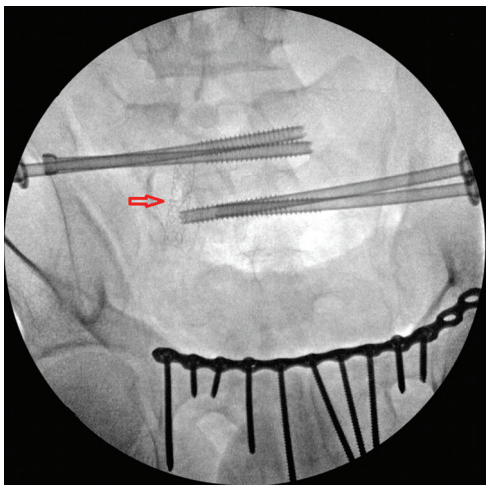

Figure 3 Repaired pelvic ring. The arrow points to the covered stent in the persistent sciatic artery.

operating room; however, we want to note that the open access to bleeding PSA is an extremely challenging undertaking and if successful, reconstruction would most probably include ligation of PSA and performance of the femoropopliteal bypass. Considerable bleeding and collateral damage (pelvic veins, ureter for example) are generally feared complications.

Lately, the paradigm of unstable patient management has begun to change. In our opinion, such a scenario would be a classic indication for REBOA in zone 3 with hypotensive resuscitation on the way to the angio suite or hybrid room. The management there would depend on the information available at the initiation of angio. If the area and side of bleeding are unknown, the diagnostic angiography can be performed through the opposite side to the REBOA by positioning the REBOA a few centimeters above the aortic bifurcation. If the side of bleeding is opposite the REBOA, it can be switched to the cross-over PTA balloon in common iliac artery for bleeding control and provide a platform for precise imaging and crossing of the lesion. Deployment of the covered stent follows at the last stage. If the bleeding is ipsilateral to the REBOA the cross-over sheath with a PTA balloon can be introduced through the opposite side and the procedure accomplished by the same strategy. The main principle is to keep endovascular hemostatic proximal to the injury occlusion up to the last stage of the covered stent deployment. We used this strategy with success in non-compressible high groin vascular injury. The technique is user-friendly to those who have expertise in endovascular management. Multidisciplinary cooperation and thorough intervention planning are critical and would improve the results of trauma patient management.

CONCLUSION

Rare vascular anomalies can present as an emergency in trauma and require interventions. Early vascular specialist involvement in patient management, multidisciplinary cooperation with thorough imaging, and intervention planning are essential in preventing ischemic complications with resulting limb loss.

REFERENCES

[1] Grotz MR, Allami MK, Harwood P, et al. Open pelvic fractures: epidemiology, current concepts of management and outcome. Injury. 2005; 36:1.

[2] Durkin A, Sagi HC, Durhman R, Flint L. Contemporary management of pelvic fractures. Am J Surg. 2006;192: 211–23.

[3] Cestero RF, Plurad D, Green D, et al. Iliac artery injuries and pelvic fractures: a national trauma database analysis of associated injuries and outcome. J Trauma. 2009;67:715–8.
[4] Vaidya R, Waldron J. Angiography and embolisation in the management of bleeding pelvic fractures J Am Acad Orthop Surg. 2018;26:e68–76.
[5] van Hooft IM, Zeebregts CJ, van Sterkenburg SM, de Vries WR, Reijnen MM. The persistent sciatic artery. Eur J Vasc Endovasc Surg. 2009;37:585–91.
[6] Baumgartner FJ, Kalinowski A, Grant S. Endovascular repair of injury to a persistent sciatic artery. Tex Heart Inst J. 2009;36:61–4.