Isolated Iliac Vein Injury in Blunt Pelvic Trauma: A Case Report

Fatema Muhanna[1], Tamadher Al-Barhi[2], Umaima Al-Wahaibi[2], Khalifa Al-Wahaibi[3] and Hani Al-Qadhi[4]

[1]General Foundation Program, Oman Medical Specialty Board, Muscat, Muscat, Sultanate of Oman

[2]General Surgery Resident, Oman Medical Specialty Board, Muscat, Sultanate of Oman

[3]Senior Consultant Vascular Surgeon, Department of General Surgery, Sultan Qaboos University Hospital, Muscat, Oman

[4]Senior Consultant Trauma Surgeon, Department of General Surgery, Sultan Qaboos University Hospital, Muscat, Oman

Received: 12 October 2024

Accepted: 21 January 2025

*Corresponding author: hani_qadhi@hotmail.com

DOI 10.5001/omj.2028.09

Abstract

Isolated pelvic vascular injuries in the absence of pelvic fractures due to blunt traumas are rare conditions. Therefore, they remain a challenge in their diagnosis and management which contributes to high morbidity and mortality in trauma patients, despite the advancement in trauma management. We report a case of 46 years old lady who sustained a blunt injury after she was struck by a vehicle. Pan computed tomography (CT) was conducted and revealed the finding of partial transection of the right external iliac vein with no active venous extravasation in addition to a large hematoma extending along the pelvic side wall and no pelvic fractures were detected. As the patient remained hemodynamically normal, we were able to successfully manage the case conservatively. The main controversy in the literature revolves around the decision between ligation and primary repair for the treatment of iliac vein injuries. Both approaches have traditionally been discussed in relation to unstable patients, while the conservative management approach has not been thoroughly explored in previous studies which was successfully done in this study. Furthermore, the utilization of endovascular techniques as a management still remain low in the literature. Deep vein thrombosis (DVT) remains the most concerning outcome in patients with venous injuries regardless of the type of management, moreover it is the most prevalent complication observed in patients treated conservatively.

Keywords: *blunt trauma, iliac vein, pelvic fracture*.

Introduction

Blunt traumas to the pelvic region is a very common consequence of motor vehicle collisions, motorcycle accidents, pedestrian incidents and industrial mishaps, which can result in significant pelvic organs and vascular injuries.[1] Although penetrating traumas are notably more likely than blunt traumas to cause pelvic vascular injuries,[2] the occurrence of isolated iliac vessel injuries without pelvic fractures in blunt traumas is seldom observed.[1,2,3] According to literature, the incidence of these injuries is less than 2% of all vascular traumas; however, they are associated with considerable morbidity and mortality[1,2,4] due to the challenges in diagnosis and the resulting life-threatening outcomes.[1,2] Given the ongoing controversy surrounding the management of isolated iliac vein injuries in the literature,[2] this subsequent case report presents a successful conservative approach for an isolated iliac vein injury resulting from a blunt pelvic trauma without bony fractures and its subsequent outcome.

Case Report

A 46 years old Omani lady was struck by a vehicle traveling at a speed of 100 km/h while crossing the road. At the scene, she was initially managed by the paramedics of Emergency Medical Services (EMS). Their report indicated that the only discernible injuries were to the head and neck, as the impact was primarily to the face.

On arrival at the emergency department, she was managed by the trauma team as per the Advanced trauma life support (ATLS) protocol. The primary survey was conducted and yielded no significant findings apart from mild tachycardia. She was normotensive, slightly tachycardic at 104 beats/min, saturating well on room air. She was given 500ml bolus of normal saline. Subsequently, chest and pelvis x-rays were obtained, which revealed no abnormalities. In the secondary survey, a thorough examination of the patient from head to toe revealed notable abdominal tenderness in the right lower quadrant, as well as edema and bruises in the right lower limb among other areas of the body.

Following this, the patient underwent pan contrast-enhanced computed tomography (CT) to further investigate the condition. The CT scan uncovered subgaleal hematoma and partial transection of the right external iliac vein with no active venous extravasation but there was evidence of large hematoma extending along the pelvic side wall. There was no evidence of arterial extravasation [Figure 1A]. Additionally, bilateral lower limb x-rays were ordered, but no fractures were detected.

Due to the well-contained nature of the hematoma without active extravasation and the absence of hemodynamic deterioration in the patient, a decision was made to pursue conservative management. Consequently, the patient was admitted for observation, specifically monitoring for any signs of hemodynamic abnormalities or a decrease in hemoglobin (HB) levels. Laboratory tests were repeated every six hours. Furthermore, the patient was regularly examined for signs of deep vein thrombosis (DVT) which was not there.

During her stay, she was kept on mechanical pneumatic compressor, analgesia and incentive spirometry for chest physiotherapy along with limbs physiotherapy.

On the second day of admission, she dropped HB from 10.2 g/dl to 8.7 g/dl, hence, one unit of packed red blood cells (pRBCs) was transfused resulting in an improvement of her hemoglobin levels to 10.1 g/dl. CT angiogram including the pelvis and the lower limbs was repeated after 48 hours from the injury which showed decrease in the size of the hematoma [Figure 1B]. However, there were small filling defects in the right common iliac vein and in the right femoral vein at the level of the adductor canal suggestive of localized thrombus. In light of this finding, she was kept on a therapeutic dose of enoxaparin for 48 hours. The patient remained in a stable condition and was discharged home on the fifth day following the injury, with a prescription of Rivaroxaban for a period of three months.

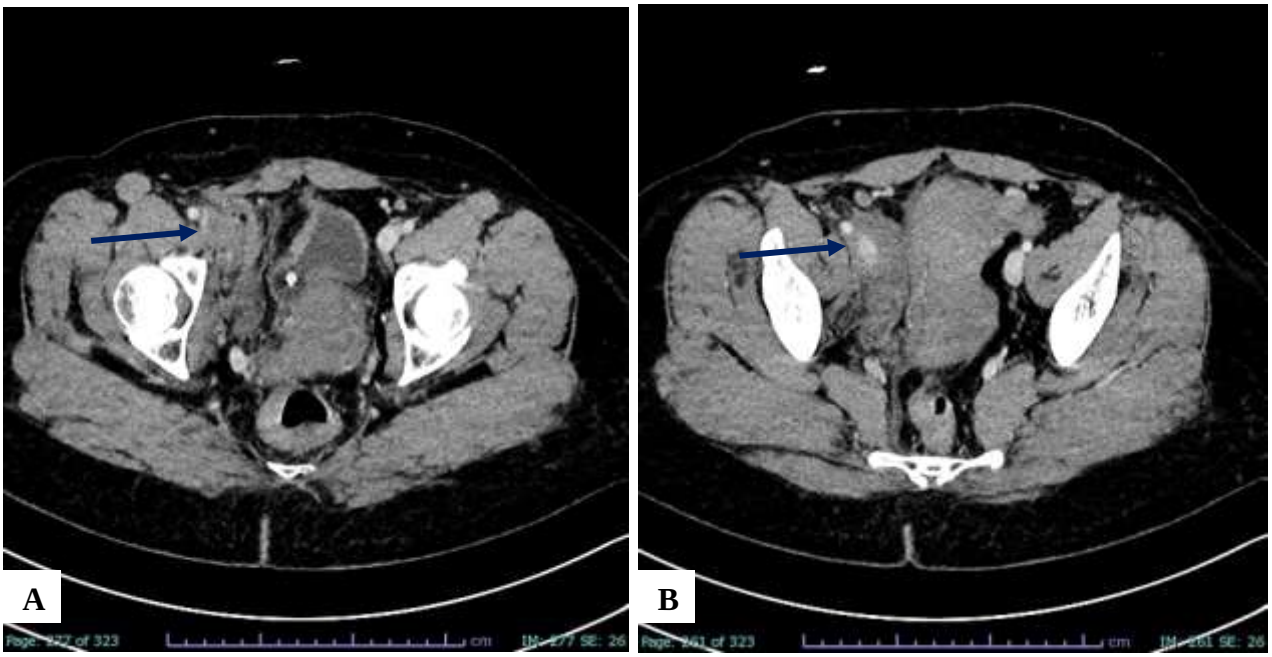

Figure 1: CT scan of the patient at time of admission (A) shows filling defect of the right external iliac vein and after 48 hours (B) shows improved hematoma.

She was seen again in the clinic after 2 weeks. She was clinically doing well, there was no abdominal tenderness and her lower limbs were similar in size with no significant finding. Her hemoglobin level on that day was 11.9. She was scheduled for repeat CT angiography to follow up the hematoma and the thrombosis but she did not show up. Over the phone she admits being well, doing her regular activities without any complaint.

Discussion

Isolated injuries to the iliac vessels are considered rare presentations in the cases of blunt pelvic trauma, with only few reported instances where such injuries occurred without pelvic fractures.[2,5,6] Despite the advancements in surgical techniques and the progress made in managing trauma patients, the occurrence of iliac vessel injuries continues to pose significant risks to patients morbidity and mortality. According to the National Trauma Data Bank, isolated iliac vein injuries in patients with blunt abdominopelvic trauma have been associated with a 30-day mortality rate of 16.5%.[2]

The exact mechanism by which blunt trauma results in iliac vein injuries in the absence of pelvic fractures remains unknown. However, some theories propose that these injuries may be related to seat-belt use.[7] Alternatively, other cases reported compression of the lower abdomen by the steering wheel while in a seated position as a potential mechanism.[8] In the current case, however, the patient was a pedestrian hit by a car. Similarly, Helton documented a pedestrian case who sustained an injury to the left common and left external iliac veins. They related the injury to be due to stretching mechanism, though this remains a theory.[1]

The clinical presentation during initial evaluation usually lacks an indication to these injuries[1,9] which in turn contributes to the high mortality and morbidity due to the challenging nature of the diagnosis. On one hand, patients may exhibit hemodynamic instability, leading to identification of the injury through emergency exploration.[9] Conversely, hemodynamically stable patients may present without symptoms, as demonstrated in this case where the injury was only detected through pan CT as part of the trauma protocol. While CT scan can identify the injury, pelvic venogram remains the preferred investigative method for a definitive diagnosis.[1,9]

The main controversy in the literature revolves around the decision between ligation and primary repair for the treatment of iliac vein injuries. Both approaches have traditionally been discussed in relation to unstable patients, while the conservative management approach has not been thoroughly explored in previous studies.[2] However, in this particular case, we were able to effectively monitor the injury conservatively. This decision was influenced by the patient's hemodynamic stability and the absence of active extravasation on imaging, which aligns with similar cases documented by Helton.[1] and Nicholas.[9]

As the surgical management is considered challenging, therefore, endovascular management has been reported as an alternative treatment modality. The contribution and utilization of endovascular techniques were evaluated in a review of the National Trauma Data Bank (NTDB) representing the largest series of iliac vein traumas.[10]

The assessed endovascular managements of iliac vein traumas in this study included both embolization for pseudoaneurysm or active extravasation and stent/stent graft repair for vascular wall defect, intraluminal stenosis, or occlusion.[10] However, they concluded that utilization of endovascular therapy in iliac trauma remains low, ranging from 1.3% to 11.3% in this review and there was a higher use with blunt trauma in comparison to penetrating traumas injury, and the likely increase in this utilization as endovascular technology continues to advance.[10]

The surgical management of iliac vein injuries raises concerns due to the potential complications associated with repair procedures. Existing reports indicate that repairing these lacerations can result in a narrowing of the veins by 20-30%, which in turn increases the risk of thrombosis and pulmonary embolism.[3] Furthermore, there appears to be a higher 30-day mortality rate (18.8%) associated with ligation procedures.[2]

However, deep vein thrombosis (DVT) remains the most concerning outcome in patients with venous injuries regardless of the type of management.[2,4] Similarly with our patient, the repeated CT angiogram during her stay showed features suggestive of DVT although she was on mechanical prophylaxis. Medical prophylaxis was not started upon admission as she was at risk of re-bleeding.[8] Other possible outcomes for venous injuries that may occur are pulmonary embolism, fasciotomy, amputation, and acute kidney injury[2] that were not observed in this case.

Conclusion

Isolated injuries to the iliac vein in the absence of a pelvic fracture are rare, nevertheless they carry high mortality rates that demand immediate identification and intervention. Diagnostic methods encompass the utilization of contrast CT, venogram, or surgical exploration in patients exhibiting hemodynamic instability. For patients in a stable hemodynamic state, adopting a conservative approach was deemed the optimal course of action. The development of deep vein thrombosis is the most prevalent complication associated with these injuries if managed conservatively and thus thromboprophylaxis is necessary.

Disclosure

Authors declared no conflict of interest. A written consent was obtain from the patient

Acknowledgments

We would like to acknowledge the contribution of general surgery and radiology departments in Sultan Qaboos university hospital.

References

1. Helton N, McNeill C, Witham W. Iliac Vascular Injury in the Absence of a Pelvic Fracture. J Trauma Nurs 2017;24(5):323-325.

2. Magee GA, Cho J, Matsushima K, Strumwasser A, Inaba K, Jazaeri O, et al. Isolated iliac vascular injuries and outcome of repair versus ligation of isolated iliac vein injury. J Vasc Surg 2018 Jan;67(1):254-261. Accessed 18 Oct 2020. Internet.

3. Boulanger B, Green J, Rodriguez A. Blunt traumatic iliac vein laceration without pelvic fracture: a rare entity. J Vasc Surg 1992 Jul;16(1):87-89. Accessed 29 Jan 2024. Internet.

4. Yosowitz P, Hobson RW II, Rich NM. Iliac vein laceration caused by blunt trauma to the pelvis. Am J Surg 1972 Jul;124(1):91-93.

5. Sofue K, Sugimoto K, Mori T, Nakayama S, Yamaguchi M, Sugimura K. Endovascular uncovered Wallstent placement for life-threatening isolated iliac vein injury caused by blunt pelvic trauma. Jpn J Radiol 2012 Oct;30(8):680-683. Accessed 29 Jan 2024. Internet.

6. Çiçek MC, Çiçek ÖF, Karakurt K, Çankaya B. Iliac Artery and Vein Injury Without Pelvic Fracture Due To Blunt Trauma: A Rare Case. J Clin Anal Med 2014;5(suppl 4):487-489.

7. Gupta N, Auer A, Troop B. Seat belt-related injury to the common iliac artery: case report and review of the literature. J Trauma 1998 Aug;45(2):419-421. Accessed 29 Jan 2024. Internet.

8. Takahashi H, Shoko T, Okamoto H, Shimizu T, Oshiro A, Onishi S, et al. Blunt traumatic iliac vein injury without pelvic fracture - A case report. Trauma Case Rep 2021 Feb;32:100412.

9. Sheets NW, Roderick O, Plurad DS. Common Iliac Vein Injury in Blunt Abdominal Trauma Without Pelvic Fractures. Cureus 2021 Apr;13(4):e14401.

10. Lauerman M, Joglar F, Rybin D, Doros G, Kalish J, Hamburg N, et al. Characterization and outcomes of iliac vessel injury in the 21st century: A review of the National Trauma Data Bank. J Am Coll Surg 2010 Sep;211(3):S143 .