

An isolated iliac vein injury due to blunt trauma by a bicycle handlebar without a pelvic fracture: A case report

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ABSTRACT

Abdominal and pelvic blunt vascular trauma without skeletal injury is considered a rare condition. Iliac vein injuries are usually seen with penetrating trauma, whereas they result from blunt trauma very rarely. A 15-year-old boy was admitted who fell from a bicycle and got his left hypogastric region hit by the handlebar. He had an isolated left external iliac vein injury and massive bleeding related to this blunt trauma, which eventually resulted in hypovolemic shock and a huge regional hematoma. The hematoma compressed the left external iliac artery and triggered ischemia. In conclusion, prompt diagnosis and treatment are of utmost importance to save the extremities and lives of patients.

Keywords: Hematoma, iliac vein, injury, ischemia, trauma.

Abdominal and pelvic vascular trauma can be divided into two main groups as blunt and penetrating injuries. Iliac vein injuries are more often seen with penetrating than blunt traumas.^[1] Blunt pelvic venous injuries present with pelvic fractures in 82.7% of cases and, therefore, blunt trauma in the pelvic region leading to vascular injury without a skeletal fracture is considered a rare condition in the literature.^[1,2]

In this article, we report a young male case of an isolated iliac vein injury due to blunt trauma by a bicycle handlebar without a pelvic fracture.

CASE REPORT

A 15-year-old boy suffered from a trauma after falling from his bicycle. The bicycle's handlebar hit his lower abdomen. He was referred to our hospital in a hypovolemic shock condition. He was alert, tachycardic and hypotensive with poor verbalization. His physical examination findings were unremarkable, except for the abdomen and left lower

extremity. The left hypogastric region was swollen and ecchymotic (Figure 1). His left leg was pale, paralyzed and paresthetic, cold and pulseless. His hemoglobin level was 6 mg/dL. He was transfused four packs of 0-Rh negative erythrocyte suspensions until confirmation of his blood type. He was transferred to the computed tomography (CT) unit after recovery from the hypovolemic shock condition with supportive replacement therapy. We suspected an injury to his left common iliac artery or the external iliac artery (EIA). There was a hematoma (Figure 2a), but no arterial extravasation was present. In addition, no contrast agent was seen on the left below the knee arteries (Figure 2b, c). Since compression by a huge hematoma on the arterial system could be the reason for ischemia without an injury in the arterial course, the patient was transferred to the operating room. A written informed consent was obtained from his parents and/or legal guardians.

No problem regarding hemodynamic instability occurred during the anesthetic induction. A midline explorative laparotomy was performed. No organ

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Figure 1. Swelling and ecchymosis on left hypogastric region.

injury was identified. Following removal of the hematoma, there was a massive venous bleeding in the left pelvic area; instead of the tamponade effect of the hematoma, strong compression with surgical towels was successfully executed. For a better visualization, we performed an oblique incision on the left hypogastric area. A vertically injured left external iliac vein (EIV) was detected; it was controlled by digital and sponge stick compression proximally

and distally and was, then, clamped securely. Intraoperative systemic heparin was administered. After clamping the proximal and the distal parts, thrombectomy was performed, but no thrombus was seen. The EIV was, then, repaired with 6-0 Prolene® (Ethicon Inc., NJ, USA) continuous sutures. The EIA was clamped proximally and distally. Embolectomy was performed; however, no thrombotic material was driven either proximally or distally. Arteriotomy was also repaired by 6-0 Prolene® continuous sutures. Finally, the pulselessness, pallor, paresthesia and paralysis of the left lower extremity disappeared after the hematoma compressing the left EIA was removed (Figure 2b). Postoperative CTA demonstrated that the arterial patency was accomplished in the left lower extremity (Figure 2d-f). Intravenous (IV) heparin infusion was initiated postoperatively and, fortunately, no (+) inotropic support was required. The patient was extubated approximately 3 h later and remained in the intensive care unit (ICU) for two days. Low-molecular-weight heparin (LMWH) was initiated instead of heparin infusion in the ward. Acetylsalicylic acid and clopidogrel were given after a full diet regimen on postoperative Day 4 and the patient was discharged on postoperative Day 5.

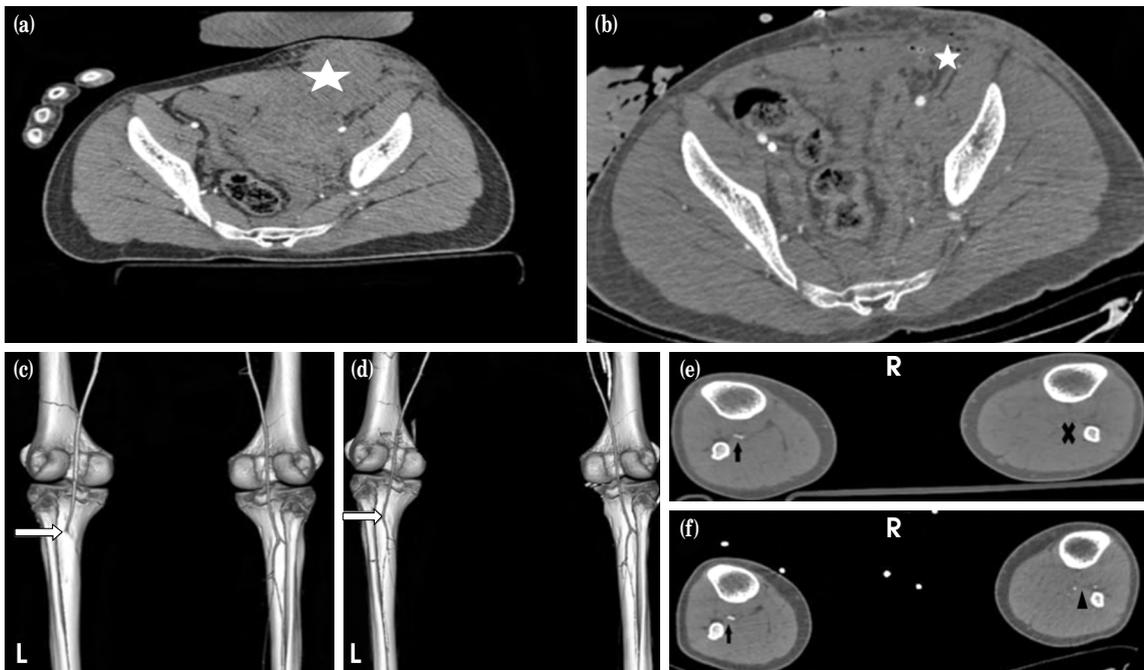


Figure 2. (a) A preoperative axial CT view of hematoma (white star). (b) A postoperative axial CT view of the removed hematoma (white star). (c) Sudden cessation of left popliteal artery in 3D image (white arrow). (d) A postoperative 3D image of left popliteal and distal arterial patency (white arrow). (e) Popliteal bifurcation on right leg (black arrow), sudden cessation of left popliteal artery (black cross). (f) Postoperative popliteal bifurcation on right leg (black arrow), patency of left below the knee arteries (black triangle).

L: Left; R: Right; CT: Computed tomography; 3D: Three-dimensional.

DISCUSSION

Iliac vessel injuries without concomitant pelvic skeletal damage after abdominal blunt trauma are uncommon. In particular, isolated iliac vein injuries (0.1%) are very rare and can be fatal. Morbidity is another problem with isolated iliac vein injuries, including deep venous thrombosis (DVT) in 12.6%, pulmonary embolism (PE) in 1.4%, fasciotomy in 11.5%, amputation in 1.9%, and acute kidney injury in 3.6%.^[1]

Boulanger et al.^[2] reported a case of a lacerated common iliac vein (CIV) associated with a perforated small bowel. Hemorrhage was controlled by lateral horizontal everting mattress sutures with 4-0 pledgeted Prolene® sutures. Luminal narrowing was 20 to 30% in the left CIV. Intravenous heparin 5,000 IU twice a day was administered; however, the patient developed PE postoperatively. In our case, we performed the repair of both vein and artery using 6-0 and not 4-0 Prolene® sutures which did not decrease the luminal diameter of the EIV. In addition, we considered that intraoperative systemic heparin could inhibit thrombus formation around 6.0 Prolene® suture lines more easily. Our patient was administered IV heparin infusion for two days and LMWH was initiated instead of heparin infusion in the ward to prevent venous thromboembolism (VTE).

In another study, Frank et al.^[3] reported 108 VTEs in 435 traumatic major vascular injury patients. The patients who developed VTE less often received intraoperative systemic heparin, postoperative antiplatelet, and heparin-enoxaparin for prophylaxis. Therefore, they developed VTE and complications such as loss of venous repair patency, DVT at the injury site, PE, requirement for vena cava filter implantation, compartment syndrome and prolonged ICU-hospitalization more frequently. In our case, we did not encounter any of these consequences. The case that Houston and Chandrasekar^[4] reported had also a blunt trauma caused by a bicycle handlebar. In this patient, there were both a transected EIA and a lacerated EIV and was in hemorrhagic shock, similar to our case. However, the patient unfortunately experienced a peri-cardiac arrest during the anesthetic induction, whereas ours did not. The authors repaired the lacerated vein and used it as an interposition graft to anastomose the artery.

Although iliac vein injuries can be treated by repair or ligation surgically, endovascular repair must be

always an alternative method to surgery, as such injuries can be diagnosed and treated rapidly by deploying a stent to the rupture site.^[5] Lateral venorrhaphy, patch venoplasty, end-to-end anastomosis or graft interposition with saphenous vein or a synthetic graft are the options for repair. Of note, repair allows venous drainage and causes less extremity edema and has a lower incidence of shock and mortality compared to ligation.^[1,6]

In conclusion, iliac venous injuries originating from a blunt trauma without any sign of pelvic skeletal fractures are challenging at the time of diagnosis and in the intra- and postoperative period. If the patient is in a hemodynamically unstable condition exposed to a blunt trauma in the abdominopelvic region, particularly that caused by a bicycle handlebar, vascular injury must be always kept in mind. A prompt and precise diagnosis with an urgent and very well-managed resuscitative and operative performance may save these patients' extremities and lives.

Declaration of conflicting interests

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