

Penetrating gluteal trauma managed by surgical treatment with an added value of digital subtraction angiography

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ABSTRACT

Penetrating traumas to the gluteal region can occur via vascular injury, nerve injuries, or damage to the perineal organs. Vascular injuries are usually life-threatening injuries in gluteal penetrating traumas. Therefore, the use of angiograms may be necessary for the management of penetrating traumas to assess the bleeding focus. Herein, the case of a 24-year-old male who applied to the emergency department with a penetrating stab wound injury to the gluteal region is presented. Digital subtraction angiography (DSA) was performed for urgent vascular evaluation, which showed a pulsatile bleeding from the femoral left circumflex lateral artery, whereupon the vascular surgeon proximally ligated the type 3 lateral circumflex artery. However, the control DSA taken due to continued bleeding after the procedure revealed that the flow of the ligated lateral circumflex artery was interrupted, but the bleeding continued in the same region with the blood supply of the collateral coming from the iliolumbar branch of the internal iliac artery. Thereupon, a peripheral 5×60 mm balloon was inflated in the internal iliac artery, and whether the bleeding stopped was evaluated. Afterward, the patient was taken back to surgery by the vascular surgeon, and the bleeding was stopped by collateral ligation. In this case, we showed with a demonstrative case that vascular imaging may be required not only before but also after the procedure in vascular injuries due to penetrating trauma and that treatment can be provided by closure of the feeding artery in both directions in dense collateral areas.

Keywords: Angiography, imaging, penetrating trauma.

Penetrating traumas constitute up to 3% of all injuries in the gluteal region.^[1] The penetrating injury to the buttock is not a common condition, and it is present in up to 3% of all penetrating injuries.^[2,3] In the systematic review, it was shown that penetrating traumas can be associated with severe diagnostic and clinical problems and a mortality rate of up to 2.9%.^[1] Therefore, a stab wound to the gluteal region might be considered potentially life threatening, and every effort should be made to locate possible injuries. In penetrating traumas to the posterior abdomen region, the death rate is 0 to 2%.^[2] In the abdomen, this rate is between 0 and 4.4%, whereas it is 2.5 to 5.6% in the thorax.^[2,3] The gluteal injury mortality rate is 2.9%, which is quite high concerning the other areas of the body.^[2,3]

Penetrating vascular traumas may require urgent surgical treatment, and mortality may occur despite appropriate intervention.^[1-3] Gluteal region blood supply is provided by both common femoral, deep femoral, and internal iliac arteries.^[1-3] We aimed

to report a case with a gluteal stab wound trauma managed by a multidisciplinary team.

CASE REPORT

A 24-year-old male patient was admitted to the emergency department with the presence of bleeding after a penetrating injury to the gluteal region. At the time of admission, the patient's blood pressure was 112/73 mmHg, hemoglobin value was 14 mg/dL, and heart rate was 110 bpm. The patient was alert and agitated, and there was a stab wound over the left gluteal area; no additional injury was observed in the

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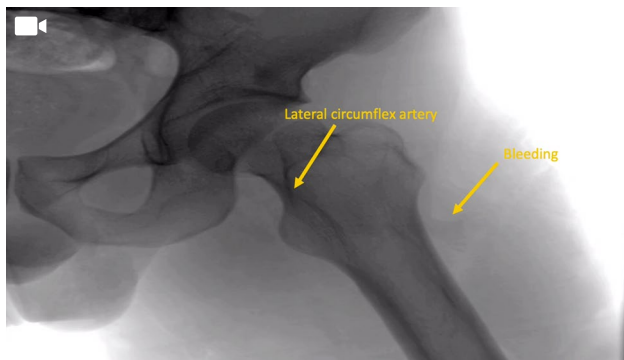
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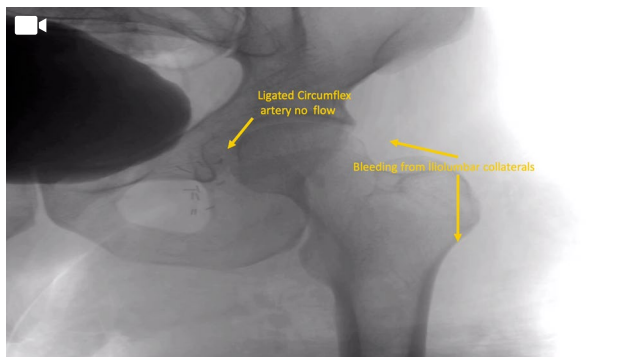
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abdominal ultrasonography. A catheter of the urine bladder was placed, and no macroscopic bleeding was found. No anomaly was observed in the digital rectal examination.

As the gluteal hemorrhage was pulsatile on admission, computed tomography angiography (CTA) was planned to evaluate the source of the hemorrhage, but invasive imaging was decided since the patient was agitated (since motion artefact might be present), and invasive vascular imaging was also possible. On the vascular imaging with digital subtraction angiography (DSA), the left common femoral artery (CFA) was visualized with a contrast injection from the common iliac artery. On the imaging, significant bleeding was observed from the type 3 left lateral circumflex artery (LLCA), which branched from the left CFA (Video 1). After DSA, a surgical approach was planned. In the operation, the LLCA was ligated with a surgical intervention from the left groin region.



Video 1. The first digital subtraction angiography showing bleeding from the lateral circumflex artery.



Video 2. The second digital subtraction angiography, conducted after the first surgery, revealing bleeding from the iliolumbar collateral and the ligation of the lateral circumflex artery.

In the operation, the LLCA was hard to reach directly; therefore, it was ligated from the origin with a surgical intervention from the left inguinal region. Due to the persistence of the bleeding after the surgical ligation, the patient was taken into the angiography unit again. On the repeat angiogram we have seen that the bleeding was not originated from LLCA, instead the origin of the Bleeding was iliolumbar branch of the internal iliac artery (IIA) (Video 2). To confirm this, a 0.35 hydrophilic wire was sent to the left IIA via the destination sheath; it was observed that the bleeding stopped when the image was taken again by giving a contrast material from the left common iliac artery after a 5×60 balloon inflation. It has been confirmed that there is no additional collateral to cause bleeding (Video 3).

This time, collateral from the iliac branch of the iliolumbar artery was ligated. Exploring the



Video 3. The third digital subtraction angiography displaying no bleeding from the lateral circumflex artery and the iliolumbar collateral with balloon inflation in internal iliac artery.

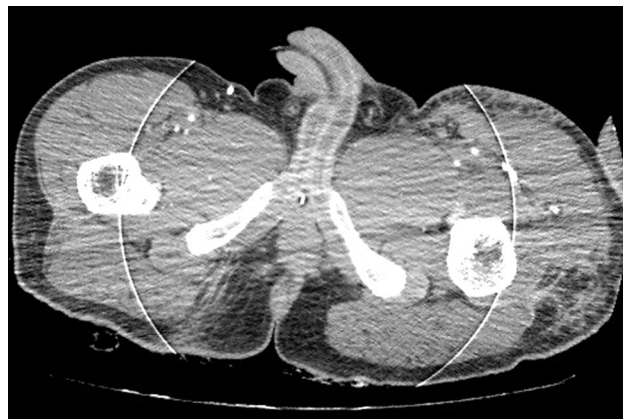


Figure 1. Computed tomography angiography section demonstrating no bleeding after the second operation.

iliolumbar collateral artery between gluteal muscles, the bleeding source was directly ligated with a 5-0 Prolene suture. No bleeding was observed in the CTA taken after the second procedure (Figure 1). The patient's postoperative course was uneventful, and the surgeons recommended conservative management of the symptoms.

DISCUSSION

In this case, we showed that vascular imaging might be better not only before the procedure but also after the procedure in areas with dense collaterals. Endovascular intervention was not performed as there was no coil at our hospital at the time of the patient's admission; however, if the coil had been made from the proximal lateral circumflex artery, it would not have been successful due to bleeding from the iliolumbar artery.

The gluteal area has complex anatomical characteristics. This morphology is associated with the likelihood of pelvic or abdominal penetration following gluteal injury. Penetrating injuries account for up to 90% of vascular injuries, and vascular injuries often occur between the ages of 20 and 40.^[4,5] Surgical exploration and repair are carried out as fast as feasible in individuals with "hard" symptoms of vascular injury, such as refractive hypotension and apparent limb ischemia. Moreover, the authors advise that CTA should be confirmed with DSA if the CTA is not sufficient at the time of the accident with suspicion of heavy vascular injury.^[6] At the discretion of the surgeon, arteriography can be conducted preoperatively.^[7,8] Only 12 patients undergoing interventional radiology treatment were utilized to control bleeding or target ballot in 12 individuals as the sole method in the systematic review.^[7,8] Laparotomy and prolonged gluteal operation were conducted in 207 (33.7%) subgroup patients out of 615 individuals with gunshot or stab trauma.^[7,8]

The LCA is the biggest branch of the deep femoral artery. It is 1.5 cm from the origin of the CFA in 67% of the instances and is directly derived by the CFA in 14 to 20%.^[9] The iliac branch of the IIA travels laterally into the iliac fossa to supply the iliac muscle and the iliac bone. This branch also forms anastomoses with iliac branches of the obturator artery, the deep circumflex iliac artery, the LCA, and the superior gluteal artery.^[9] In addition, the modern techniques including angiographic imaging accompanied by

internal balloon occlusion provided us the opportunity to localize bleeding source. After the detection of the bleeding source, we had an opportunity to guide re-operation procedure and appropriate management.

In conclusion, successful initial surgical ligation with DSA guidance may not be sufficient in the dense collateral region, particularly in a group of patients with vascular injury, in which there is no standard recommendation after the surgery. Reimaging might be necessary for detailed bleeding control after the procedure in case of suspicion.

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Data Sharing Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

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