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Popliteal artery injury due to blunt trauma: delayed diagnosis and treatment

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ABSTRACT

Despite the appropriate treatment, the rate of amputation in popliteal artery injuries is still high in current practice. Hence, early diagnosis and treatment are extremely important in cases with such vascular injuries to save extremities. We present a 30-year-old male patient with popliteal artery injury, who had diagnosed 20 hours after internal fixation of the femoral fracture. He successfully underwent arterial repair.

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Keywords: Blunt trauma; delayed diagnosis; popliteal artery injury; vascular surgery

Introduction

The amputation rates due to popliteal artery injury in lower extremity traumas are quite high despite the appropriate treatment. The diagnosis of vascular injuries especially after blunt traumas of the extremities can be quite difficult in some cases, causing delayed treatment. Delayed diagnosis and treatment may cause neurological damage and loss of extremity [1, 2].

In this report, the successful delayed treatment of a popliteal artery injury due to blunt trauma following a traffic accident was presented. Neurological deficit related with delayed treatment and complications of compartment syndrome were discussed with reviewing the literature.

Case Presentation

A 30-year-old male patient admitted to the emergency department with complaints of pain, coldness and swelling of the left leg. In his history, he had a traffic accident the day before and internal fixation was performed due to left femur fracture at other hospital. The patient was transferred to our cardiovascular surgery clinic with complaints

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of swelling and pain in the left leg after the initial treatment. During the examination, on physical examination, his left leg was extremely swollen, tight and cold. Both femoral arteries were strongly palpable during pulse examination whereas left leg distal pulses were non-palpable below the left popliteal artery. Arterial pulses of the right leg were palpable. Sensorial loss and motor deficit was determined during the neurological examination of the left leg. A clear image could not be achieved by the Doppler examination due to widespread edema. Computerized tomographic angiography (CTA) study showed total occlusion of the popliteal artery at the upper knee region (Figure 1).

The patient was taken to the operating theatre for immediate surgery. Under general anesthesia the popliteal artery was explored via posterior popliteal incision. Hematoma of 600 ml was removed from the Hunter channel and the popliteal region. Popliteal artery was occluded. No injury was determined in the popliteal vein and nerve. After intravenous administration of 5000 IU unfractioned heparin, embolectomy was carried out on the distal and proximal artery segments by Fogarty embolectomy catheter. The thrombus materials inside the distal and proximal artery segments were removed. Following embolectomy, retrograde blood flow from the distal segment and normal blood flow from the proximal artery was achieved. The damaged segment of the popliteal artery was excised. Popliteal artery was suitable for end-to-end primary repair. After mobilization of the proximal and distal arterial segments, the end to end anastomosis was done by 6/0 prolene suture. There was tension in the left leg compartments. Hence, multiple fasciotomies were performed in the same session (Figure 2). Distal pulses were palpable after the operation and motor deficit regressed. Leg edema reduced during the one month follow-up and fasciotomy incisions were closed 5 weeks after the first operation. The patient was discharged at the postoperative 45th day. Left leg pulses were palpable and the left lower extremity neurological examinations were normal at the time of discharge.

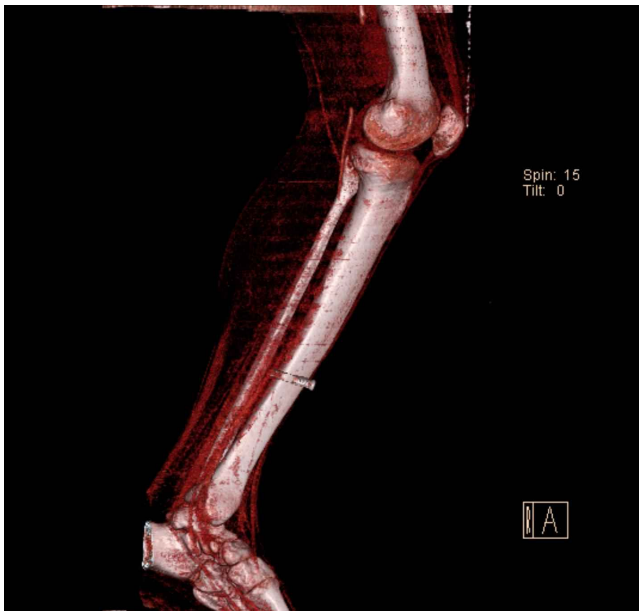

Figure 1. Imaging of computerized tomographic angiography of occluded popliteal artery at the upper knee region.

Figure 2. The appearance of postoperative fasciatomy.

Discussion

Even though the ratio of popliteal artery injury is low, it causes a high rate of amputation due to complications. The amputation rate following popliteal artery injury is reported to be between 37%-65% [1, 3]. The reperfusion time is crucial in vascular injuries. Ischemia duration of over 7 hours and the development of compartment syndrome are significant factors that increase the risk of amputation [1]. Another factor that increases the amputation risk following vascular injuries is skeletal trauma. Wani *et.al.* [4] stated that the saved extremity ratio was 85% for patients with both vascular damage and skeletal trauma whereas this ratio was 100% for the patients with no accompanying skeletal trauma . Left leg femur fracture was present in this case following blunt trauma and the femur fracture was initially treated with internal fixation. However, the vascular injury was somehow overlooked. Appropriate treatment including revascularization was carried out even though the ischemia duration of 20 hours and distinct compartment syndrome.

The symptoms and findings known as "hard signs" and "soft signs" are determined for vascular injury diagnosis. Active bleeding or hematoma widening, feeling of thrill at the lesion site and ischemia are among the hard signs. Bone fracture / soft tissue damage as well as the existence of pathologies such as hematoma and knee dislocation are known as "Soft signs". These patients should be examined frequently by Doppler ultrasonography. CTA or conventional angiography are also useful for the diagnosis of these patients. Primary end-to-end repair is suggested as the treatment of choice in popliteal artery injuries. However reversed saphenous vein graft should be preferred in cases of which a graft interposition is required [5].

Compartment syndrome can be diagnosed with a clinical suspicion and the patients should be examined closely with the foresight that compartment syndrome might develop in patients following extremity ischemia of over 6 hours and the existence of popliteal vein ligation. Early prophylactic fasciotomy carried out prior to the signs of tissue loss in patients is preferred instead of therapeutic fasciotomy. This ratio is stated to be 64% in some series [6]. Compartment syndrome in the left leg was detected in this case during vascular repair. The patient was diagnosed late and thus the leg was ischemic and fasciotomy was applied just after the revascularization. It is stated in literature that complete occlusion of popliteal artery following blunt trauma was treated successfully after a delay of 10 hours but that a neurological damage remained in the related extremity [2].

In this case, it was observed that the neurological deficit in the left lower extremity determined prior to the operation regressed afterwards. Collateral circulation can be effective in the regression of the neurological deficit despite a delay of 20 hours. The existence of retrograde blood flow following the embolectomy on the distal PA site during the operation supports this hypothesis.

Conclusion

Early diagnosis and revascularization are crucial for preventing the possible amputation that might occur after vascular traumas. However, in cases such as this one where the diagnosis is delayed, extremity loss can be prevented by a proper surgical operation. It should not be forgotten that Doppler ultrasonography will not always be enough for diagnosis in patients with blunt trauma and that the vascular pathology should be verified via CTA or conventional angiography for suspicious cases.

Informed Consent

Written informed consent was obtained from the patient for the publication of this case report.

Conflict of interests

The authors declared that there are no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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