Journal of Surgery
[Jurnalul de Chirurgie]

Case report Open Access

Silent popliteal artery trauma – a case report

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Abstract: We present the case of a 32 years old male admitted to the general surgery department for polytrauma, including head trauma, right popliteal region destruction, and right hallux avulsion after falling from several meters of height. The particularity was the silence of the popliteal artery trauma, with no evident signs of ischemia of the limb. The CT scan performed for the popliteal region, later, during hospitalization, showed a noticeable lack of substance in the right popliteal artery. Vascular surgery was performed with the resection of the injured portion of the popliteal artery and the end-to-end suture, with a favorable outcome and discharge on the seventh day after surgery.

Keywords: polytrauma, popliteal artery trauma, silent arterial ischemia

Introduction

Blunt arterial injuries provide tremendous challenges to the emergency physician, traumatologist, and general/vascular surgeon. For popliteal artery trauma, the most frequent scenario is the posterior dislocation of the knee. Once confirmed the diagnosis of knee dislodgement, the dislocation has to be rapidly reduced under intravenous sedation [1]. The incidence of these injuries varies from 17.9% to 8,2% after knee dislocation and is far less frequent after fractures close to the knee (around 0.2-0.8 %) [2,3].

Most patients with such traumatic lesions are young males, which poses an important problem for public health due to the high rate of amputations that follow popliteal artery injuries. The hyperextension of the knee after a fall in most cases shows a less evident clinical picture due to the absence of knee dislodgement. That`s why diagnosing a blunt injury of the popliteal artery in the presence solely of the so-called "soft signs" is usually a difficult assignment for the trauma surgeon [1,2].

Case report:

We present the case of a 32 years old male admitted to the general surgery department for polytrauma, including head trauma, right popliteal region destruction, and right hallux avulsion after falling from several meters of height. Upon admission, the

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Received: June 30, 2023; **Accepted**: September 1, 2023; **Published**: September 30, 2023
Citation: Uşurelu D., Coman I.S., Erchid A., Florea C.G., Coman Violeta Elena, Liţescu M., Pleşea I.E., Burleanu C, Grigorean V.: Silent Popliteal Artery Trauma – A Case Report. Journal of Surgery [Jurnalul de chirurgie]. 2023; 19(3): 235 - 240, DOI: 10.22551/JSURG.2023.03.05.

symptoms included headache, right popliteal pain, and dysfunctional right inferior limb with mild swelling of the distal third of the right tight. The radiologic exam denied any lesion of the bones of the tight limb. The main lab finding was a mild decrease in hemoglobin. The particular aspect revealed during the clinical examination was that even if the right lower limb was circulatory compensated, and the limb temperature was only 0.5 degrees colder than the contralateral limb, the clinician did not detect the presence of pulse at the level of the posterior tibial and dorsalis pedis arteries. The sensibility and motility were inferior to the contralateral extremity but present. During the ultrasound Doppler scan, the blood flow below the knee had minor differences compared to the contralateral limb.

The evaluation performed by the vascular surgeon on admission stated that the limb was vascular compensated and that there was no need for urgent vascular surgery, the patient being admitted for 24 to 72 hours follow-up.

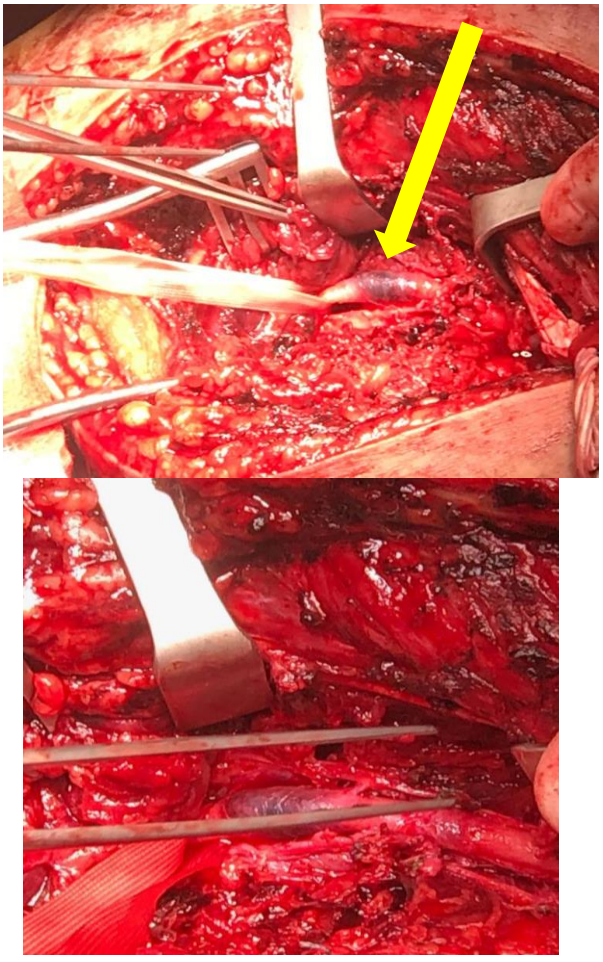
Three hours later, the patient still presented the silent signs observed during admission, but the volume of the distal third of the right tight was evidently larger than on admission. A new clinical exam performed at that moment confirmed the increase in the volume of the right thigh, and the new lab exam revealed a major decrease in hemoglobin, a clear mark of significant blood loss at the level of the right hip.

The CT angiography scan of the right inferior limb exhibits a lack of substance at the level of and below the right popliteal artery (Figures 1A and 1B).

Figures 1A and 1B. Lack of substance at the right popliteal artery

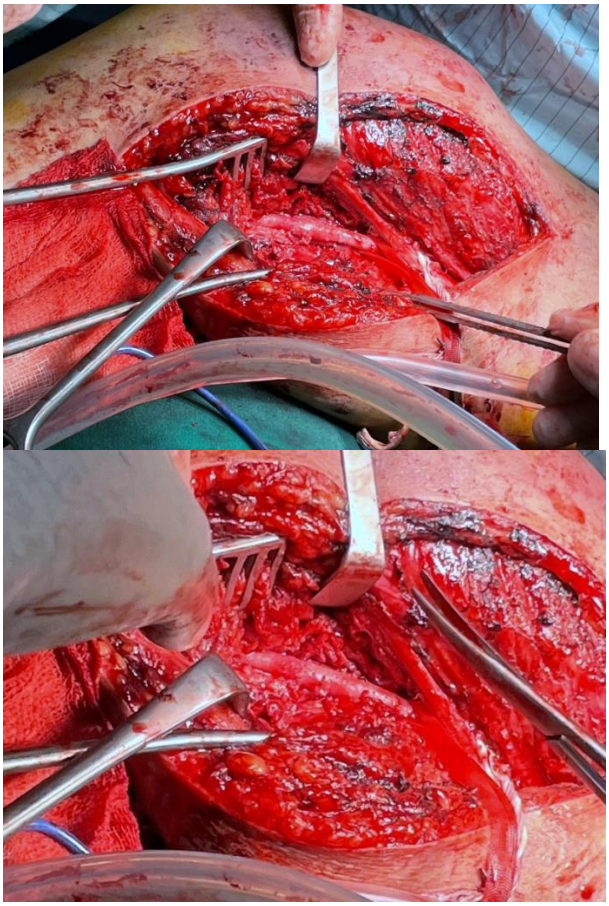
Because a hematoma was forming at the level of the right thigh and the level of hemoglobin was significantly lower than admission (Hb = 6g/dl), urgent surgery was performed by a multi-disciplinary trauma team formed of vascular, general, and orthopedic surgeons for hemostasis and repairing of the vascular axis of the right limb.

The approach was a classical popliteal incision between the proximal and distal segments in the affected zone. After the evacuation of the hematoma, the surgical team performed the ligation of the avulsed arterial collaterals and the control of the right popliteal artery (Figures 2A and 2B).



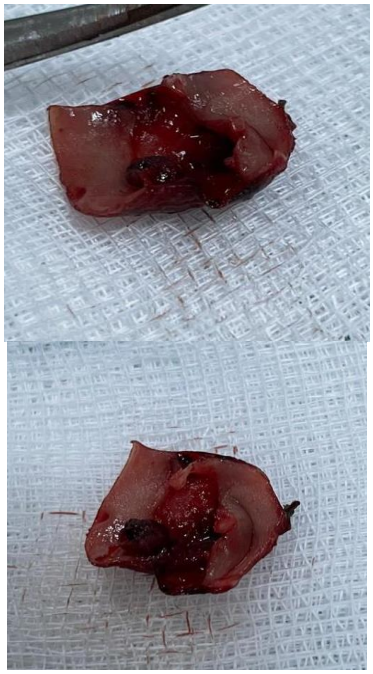
Figures 2A and 2B. Intraoperative aspect of the affected artery (popliteal artery - yellow arrow)

After finding the affected zone of the popliteal artery, we performed an embolectomy with a Fogarty catheter, followed by the excision of the affected part of the artery and an end-to-end anastomosis, with distal pulse appeared after removing the arterial clamps (Figures 3A and 3B).



Figures 3A and 3B. Right popliteal artery after end-to-end anastomosis (popliteal artery - blue arrow)

The resected zone of the popliteal artery was sent to the pathology department. (Figures 4A and 4B).



Figures 4A and 4B.: Traumatic part of the right popliteal artery

After the procedure, antibiotherapy was initiated, along with daily acetylsalicylic acid. The postoperative course was uneventful (Figure 5) and the patient was discharged 7 days after the surgery with trauma marks in the course of healing.

Figure 5. Early postoperative image (day one postoperatively)

Discussions:

Often, on initial presentation, the popliteal artery trauma is clinically occult and frequently results in devastating effects if untreated. However, some alarm signals still exist and recognition of this type of injury should lead to rapid decisions about the appropriate diagnostic study and provide specific therapy under the direction of the vascular and trauma surgeon [4].

Peripheral vascular injuries result from blunt or penetrating trauma of the extremities. A major priority of initial management is deciding whether the trauma requires surgical intervention. The main pitfall to avoid in the emergency department is a missed diagnosis. In any patient with blunt or open trauma of the lower limb, even without obvious signs of a peripheral vascular injury, a careful history of bleeding, physical examination that includes an ankle-brachial index (ABI), an ultrasound Doppler scan, and the CT arteriography should determine the diagnosis of arterial injury [1-4].

The mechanisms through which blunt trauma injures vessels usually are: crushing or tearing tissue due to direct contact with the traumatic agent, hyperextension or even dislocation of vicinal joints, or breaking bones in close contact with the arteries.

Penetrating trauma, caused by a sharp object or disruption of the tissue by a high-velocity penetrating object (the projectile of a firearm, for example), may result in a laceration of an artery. Signs of arterial injury include loss of pulses in an extremity, expanding hematoma, thrill or bruit, active pulsatile bleeding, and neurologic deficit in the limb. Because there is a high correlation between these clinical findings and the presence of arterial injury, these “hard” signs warrant evaluation for arterial injury [1-3].

"Soft" signs of arterial injury include a cool limb, change in color, nonexpanding hematoma, and non-pulsatile bleeding. The prevalence of arterial injury is generally lower when only soft clinical signs are present, but ignoring the possible occurrence of arterial damage is a major pitfall. Serious arterial injury is less frequent in proximity injuries, that is, penetrating injuries in which the trajectory of the penetrating object through the tissue passes near arteries but in which there are no hard signs of arterial trauma [5].

Choosing a surgical treatment strategy for patients with traumatic extremity injuries requires rapid detection, localization, and characterization of a possibly accompanying vascular injury. Physical and sonographic examinations after extremity trauma are reliable means of detecting an occult arterial lesion [1-4]. As a result, routine digital subtraction angiography, once advised as the method of choice, is not considered necessary in every patient with extremity trauma [5-8]. However, digital subtraction angiography remains useful for recognized indications after penetrating or blunt extremity trauma in patients with a diminished pulse, nonexpanding hematoma, or abnormal duplex sonography result. The CT angiography easily shows the signs of arterial lesions and delivers additional information regarding bone and soft-tissue injuries can also be routinely obtained. CT angiography is efficient and accurate in evaluating clinically significant lower extremity arterial injuries after trauma [7].

Computed tomographic (CT) angiography is a reliable and convenient imaging modality for diagnosing arterial injuries after blunt and penetrating trauma to the extremities. It is a noninvasive modality that could replace conventional arteriography as the initial diagnostic study for arterial injuries after trauma to the extremities. The technique requires scanning with multidetector helical CT after rapid intravenous injection of iodinated contrast material. The CT angiographic signs of arterial injuries in the extremities are active extravasation of contrast material, pseudoaneurysm formation, abrupt narrowing of an artery, loss of opacification of a blood vessel, and arteriovenous fistula formation [7].

Regarding treatment, the surgeons agree on the mandatory repair of the popliteal artery. But, the surgical procedure for repairing the affected artery depends on the length of the traumatic lesion, and with this factor in mind, one should choose between primary end-to-end sutures or interpositions of vein or PTFE grafts. Whatever is the type of repair, the amputation rate is not influenced, the single important factor being the duration of the ischemic time [10].

Conclusions:

Arterial injury may occur after blunt or penetrating trauma to the extremities. The clinical outcome depends on rapid diagnosis and repair of the trauma.

Computed tomographic (CT) angiography is a noninvasive and rapid imaging technique that shows high sensitivity and specificity in identifying arterial injuries in the extremities.

The faster the decision-making for surgical artery repair, the better the outcome for the patient.

Together with the emergency transport to an adequate hospital, the recognition of the soft signs of silent popliteal artery injury is the most important factor which dictates the future of the patient.

Funding: This research received no external funding.

Informed Consent Statement: Informed consent was obtained from the patient involved in the study.

Data Availability Statement: The study did not report any data.

Acknowledgments: The authors would like to thank the patient for his participation in this study.

Conflicts of Interest: The authors declare no conflict of interest.

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