

# Repair of Popliteal Artery and Vein Penetrating Injury Using Posterior Approach: Case Report

## Popliteal Arter ve Ven Penetran Yaralanmasının Posterior Yaklaşımla Tamiri

Aslıhan KÜÇÜKER,<sup>a</sup>  
Fethi SAĞLAM,<sup>a</sup>  
Levent ÇETİN,<sup>a</sup>  
Mete HİDİROĞLU,<sup>a</sup>  
Ayşegül KUNT,<sup>b</sup>  
Hüseyin BAYRAM,<sup>a</sup>  
Ünsal ERÇELİK,<sup>a</sup>  
Erol ŞENER<sup>a</sup>

<sup>a</sup>Clinic of Cardiovascular Surgery,  
Atatürk Training and Research Hospital,  
<sup>b</sup>Department of Cardiovascular Surgery,  
Yüzüncü Yıl University  
Faculty of Medicine, Van

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Yazışma Adresi/Correspondence:  
Aslıhan KÜÇÜKER  
Atatürk Training and Research Hospital,  
Department of Cardiovascular Surgery,  
Ankara,  
TÜRKİYE/TURKEY  
asliastan@yahoo.com

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Ulusal Vasküler Cerrahi Derneği

**ABSTRACT** Vascular injuries from penetrating or blunt traumas frequently threaten the extremity and even may be life-threatening, necessitating emergent treatment. Management of these patients aim to save the extremity and the patient's life. Standard surgical incisions may be hard to be applied in trauma patients since the wounds and traumatic regions differ in each patient. Therefore, to make surgical management easier, surgical incisions should be modified according to the localization of the injury. We present a 38-year-old trauma patient with a pistol shot injury at the popliteal region. We performed surgery via posterior popliteal approach since there was a big tissue defect in this region together with popliteal artery and vein interruption.

**Key Words:** Popliteal artery; popliteal vein; penetrating wounds; gun shot wound

**ÖZET** Penetran veya künt travmalara bağlı vasküler yaralanmalar sıklıkla ekstremitayı ve hayatı tehdit edebildiği için, acil tedaviye gerek vardır. Bu hastalara yaklaşım hem ekstremitayı hem hastanın hayatını kurtarmayı amaçlar. Travma hastalarında standart cerrahi kesilerin yapılması, her hastada travmatik yaralanma şekli değişeceği için zor olabilir ve cerrahi kesilerin yaralanma bölgesine göre modifiye edilmesi gerekebilir. Popliteal bölgede ateşli silahla yaralanması olan ve popliteal bölgede arteriyel-venöz yaralanma ile birlikte doku defekti olan 38 yaşında kadın hastaya posterior yaklaşımla uyguladığımız operasyonu sunmaktayız.

**Anahtar Kelimeler:** Popliteal arter; popliteal vein; penetran yaralanmalar; ateşli silahla yaralanma

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Vascular injuries from penetrating or blunt traumas frequently threaten the extremity and even may be life-threatening, necessitating emergent treatment. Management of these patients aim to save the extremity and the patient's life. Standard surgical incisions may be hard to be applied in trauma patients since the wounds and traumatic regions differ in each patient. Therefore, to make surgical management easier, surgical incisions should be modified according to the localization of the injury, as we preferred to do the incision at the popliteal region in a patient with pistol shot injury. This case report is important since we must to keep in mind modifying the surgical incisions based on the localization of the injury because trauma patients are frequently challenging and difficult to manage.

## CASE REPORT

A 38-year-old young woman was admitted to our emergency department because of pistol shot injury at the left knee region. She had a tissue defect of about 6x8 cm and 7x10 cm at the popliteal cavity. Bleeding was observed as minimal leakage. Bilateral femoral pulses were palpable but popliteal and distal pulses were absent in the left extremity. The leg was pale and cold with a motor deficit. Multiple fractures were detected at the knee region and distal femur. Lower extremity Doppler ultrasound imaging detected no flow inside the arteries distal to the injured popliteal artery. No further imaging evaluation was required in order to not delay surgical reconstruction for the ischemic leg. First, orthopedic surgeons performed external fixation in order to avoid damage to the vessels after the reconstruction procedure (Figure 1). Later, the patient was repositioned in prone position and covered in a sterile fashion. The existing tissue wounds were dissected without making any new incisions. Popliteal artery and vein were found in easily. Both popliteal artery and vein were cut completely, and their free margins were thrombosed.

Proximal and distal free edges of the artery were dissected first and the thrombotic material was removed. Proximal flow was satisfactory, but thrombectomy was performed for the distal part of the popliteal artery, providing good backflow. Since the arterial defect was too big to perform a primary anastomosis, saphenous vein graft was harvested from the right leg, above the knee. Popliteal artery reconstruction was first performed with the saphenous vein interposition. After arterial continuity was achieved, popliteal vein reconstruction was performed with saphenous vein interposition in the same way (Figure 2). Subcutaneous tissue was closed to cover the vascular structures. After the surgery, tibialis posterior and dorsalis pedis pulses were palpable. In the follow up, no edema was observed in the left leg with arterial and venous flow patencies were confirmed with Doppler ultrasonography. The patient was transported to the orthopedics department for further manage-



FIGURE 1: External fixation was performed first.

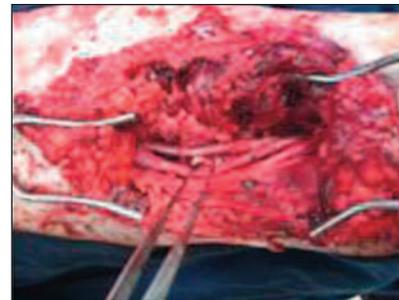


FIGURE 2: Popliteal arterial and venous continuity provided with saphenous vein interposition.

ment of the fractures. Arterial and venous systems were normal on postoperative 2<sup>nd</sup> and 4<sup>th</sup> week follow ups.

## DISCUSSION

Vascular injuries usually necessitate urgent management often with a multidisciplinary approach. The surgical exploration should be done as soon as possible when the injury of a great artery is detected or suspected.

The communication between the orthopedic and the vascular surgeons is essential to determine the order of the management: whether the vascular or the orthopedic injury must be managed first.<sup>1</sup> In patients who have bony and vascular trauma at the popliteal fossa, it is suggested to perform bony fixation first and the vascular repair thereafter.<sup>2</sup> Similarly, we preferred to perform bony fixation first, as the procedure was not time-consuming and did not increase the ischemic time, and on the other hand, fixation procedure itself might pose a risk

of vascular injury if performed after the vascular reconstruction. However, some authors suggest prompt vascular repair before orthopedic intervention for combined vascular and skeletal injuries of the lower extremity.<sup>3</sup> We consider that this depends on the patient; when the patient is hemodynamically unstable, admitted to hospital late with a long ischemia duration, or has active bleeding, vascular reconstruction should be done first. Primary repair or anastomosis, autologous great or small saphenous vein interposition from ipsilateral or contralateral leg, or prosthetic graft interposition may be performed for vascular reconstruction.

The classical medial incision is the most frequently used approach for popliteal artery diseases. The medial approach consists of a combined supra-genicular and infragenicular incision at the medial side of the leg. The posterior approach includes a lazy S-shaped incision in the posterior aspect of the knee, with dissection in between the medial and lateral heads of the gastrocnemius muscle, taking care not to injure the tibial nerves and the popliteal vein.<sup>4</sup> As this technique includes a curved incision in the popliteal fossa and tissue defects were present in our patient due to the gun shot injury in this area, we did not make any incisions and just dis-

sected the existing wound. We avoided new incisions with medial approach, and obtained a good exposure of both popliteal artery and vein. Some authors suggest posterior approach as the gold standard for popliteal artery aneurysms not extending above the Hunterian canal as well.<sup>5</sup> We believe that posterior approach is also a feasible way to reach popliteal vascular structures in vascular trauma, and should be kept in mind in such patients. Posterior approach also provides less subcutaneous tissue dissection that may serve to decrease the risk of wound infection.

Popliteal arterial trauma carries the greatest risk of limb loss compared to any other peripheral vascular injury. Although popliteal vascular injury is uncommon, it is associated with significant rates of limb loss, functional disability, and mortality.<sup>6</sup> Primary outcomes depend on rapid diagnosis of vascular injury with rapid management. As trauma patients are challenging and difficult to manage, surgeons may modify the surgical incisions based on the localization of the injury.

### **Conflict of Interest**

*Authors declared no conflict of interest or financial support.*

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