

Successful repair of complete popliteal artery rupture due to blunt trauma

Künt travmaya bağlı popliteal arter komplet rüptürünün başarılı tamiri

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Although blunt trauma of the extremities is a common diagnosis in emergency clinics, blunt vascular trauma may be difficult to diagnose in such patients. Time to repair is determinative for the success of vascular repair following vascular trauma. Late diagnosis or repair may result in neurological damage or even the loss of an extremity. This case report presents a 43-year-old male who sustained a blunt trauma to the right lower extremity resulting in the complete rupture of the popliteal artery. Although successful vascular repair with end-to-end anastomosis prevented the loss of the extremity, late diagnosis of the vascular injury caused postoperative mild neurological sequela in this case.

Key words: Blunt trauma of the extremities; blunt vascular injury; vascular surgery; vascular trauma.

Vascular injury of extremities following blunt trauma is an unusual complication. Detection of vascular injury in blunt trauma is extremely difficult because of accompanying apparent wounds requiring immediate intervention. However, urgent diagnosis and treatment of vascular injury is of particular importance for limb salvage or to even save patients' lives. The success of vascular repair is directly related to the ischemic period elapsed. Here we present a 43-year-old patient with blunt trauma of the right lower extremity resulting in complete rupture of the popliteal artery. Due to prior misdiagnoses at the initial emergency clinic, the patient had lost about 10 hours before definitive diagnosis of the vascular injury occurred. Successful vascular repair was ensured with end-to-end anastomosis. This repair gave rise to complete arterial continuity and the salvage of the right limb, but mild neurological injury with failure of dorsal flexion of the right ankle persisted.

Ekstremitelerin künt travmaları acil servislerde-sık şekilde görülen bir tanı olmasına karşın, bu hastalarda künt vasküler travmanın tanısı zor olabilmektedir. Tamire kadar geçen süre vasküler travma sonrası yapılacak vasküler tamirin başarısında belirleyicidir. Geç tanı veya tamir nörolojik hasar ve hatta bir ekstremitenin kaybı ile sonuçlanabilir. Bu olgu sunumunda, sağ alt ekstremitenin künt travması sonucu popliteal arterde komplet rüptür meydana gelen 43 yaşındaki bir erkek sunuldu. Bu olguda, uç uca anastomoz ile yapılan başarılı vasküler tamir ekstremitenin kaybını önlemiş olmasına karşın, vasküler yaralanmanın tanısında gecikilmiş olunması ameliyat sonrası hafif nörolojik sekele yol açmıştır.

Anahtar sözcükler: Ekstremitelerin künt travmaları; künt vasküler yaralanma; vasküler cerrahi; vasküler travma.

CASE REPORT

A 43-year-old male patient was referred to an emergency clinic due to blunt trauma of the right lower extremity. A concrete block had fallen down on the extremity from a high floor of a building under construction. Initial evaluation had consisted of inspection and direct roentgenograms of the extremity in search of a fracture, but no fractures were detected. Above-knee, below-knee, and knee levels of the right lower extremity were reported as echymotic, swollen, and warm due to blunt trauma. The absence of an open wound, the blunt characteristic of trauma, and the relatively good status of the patient led the emergency clinic physicians to make a diagnosis of soft tissue trauma and not search for any additional problems that might have been associated with this trauma. The patient was discharged after analgesic treatment. Hours after discharge, lower extremity pain increased markedly,

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forcing the patient to return to the hospital. After physical examination in the emergency room, he was referred to the cardiovascular surgery clinic. Initial examination revealed an echymotic, swollen leg with pallor, coldness, and pain at below-knee level of the right lower extremity (Figure 1). Distal pulses of the right anterior and posterior tibial arteries were not palpable. Doppler ultrasonography revealed the absence of arterial blood flow at distal arteries and discontinuity of arterial blood flow at the above-knee popliteal artery. Further investigation revealed a discontinuation of the popliteal artery and active bleeding at the level about the outlet of the hunter canal. As a matter of fact, even in the absence of vascular trauma, the excessively swollen extremity would require a fasciotomy. Due to the amount of time that had elapsed, an angiography was not performed, and the patient was transferred to the operating room immediately.

Intraoperatively, the popliteal artery was approached through an above-knee anteromedial incision at about the level of the outlet of the hunter canal. The popliteal artery was completely ruptured due to blunt trauma creating an avulsion injury in all layers of the artery. Separated ends of the popliteal artery were beveled and clamped. The patient was heparinized. Arterial continuity was ensured with direct end-to-end anastomosis of the ruptured popliteal artery (Figure 2). Due to the long ischemic period which had elapsed and severe edema at the right lower extremity, fasciotomies were performed at the anteromedial and anterolateral portions of the right calf to prevent compartment syndrome. Anticoagulant therapy was begun after the surgery.



Figure 1. Echymosis at the medial side of right leg after blunt trauma.

DISCUSSION

In the early postoperative period, distal pulses of the right lower extremity were palpable. Preoperative pallor and coldness resolved within the first few hours. Physical examination on the first postoperative day revealed a lack of movement in the foot and toes. This improved significantly up until the fourth postoperative day, but mild lack of right ankle movement persisted thereafter. Extremity elevation and daily local wound care for the fasciotomies continued until the 10th postoperative day. A skin graft obtained from the right thigh was used for closure of the fasciotomies. Passive physiotherapy was performed in the early postoperative period followed by active rehabilitation with walking therapy after the 15th postoperative day. The patient was discharged on the 19th postoperative day with palpable distal pulses but a lack of dorsal flexion in the right ankle representing mild neurological injury due to the elapsed ischemic period persisted.

After blunt trauma, the vascular injury most commonly seen is avulsion in which the artery is stretched. This stretching most commonly results in the disruption of tunica intima or tunica media layers of the artery leaving the highly thrombogenic tunica externa to maintain temporary vessel continuity. This mechanism may lead to thrombosis of the artery. However, complete rupture of the artery following blunt trauma is a rare complication which leads to arterial discontinuity.^[1] It is of particular importance to distinguish whether blunt trauma resulting in thrombosis or whether a complete rupture caused the arterial discontinuation. Treatment modalities vary depending on the type of arterial injury. Diagnosis is established with physical examination

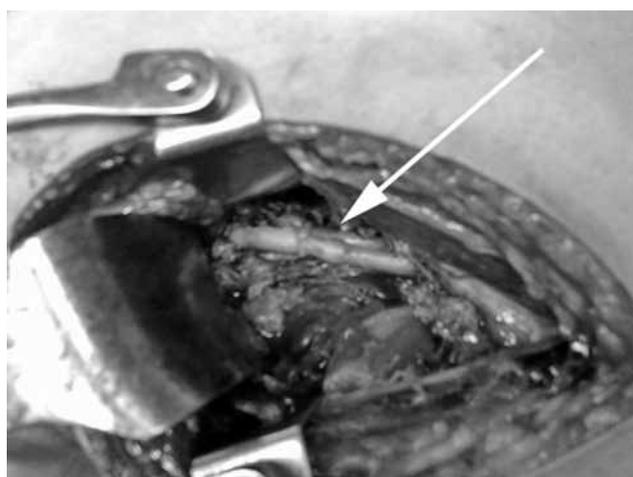


Figure 2. Intraoperative view through anteromedial thigh incision demonstrating end-to-end anastomosis of the popliteal artery.

followed by imaging techniques including Doppler ultrasonography, diagnostic angiography, and computed tomographic angiography. Although angiography is considered the gold standard for evaluation or confirmation of arterial injury, it can be time consuming and can delay definitive treatment. Therefore, angiography should be reserved for patients with soft signs of vascular injury.^[2]

The most commonly injured lower extremity arteries in the setting of blunt trauma are the anteroposterior tibial arteries.^[1] However, the popliteal artery, which starts below the adductor hiatus and ends at the soleus arch, may also be injured. Because the vessel's start and end point areas are relatively fixed, there is a potential for significant stretch injury at the knee joint.

A warm ischemia time of less than six hours is generally accepted as the standard interval within which arterial continuity must be restored to prevent permanent damage to the soft tissues. This interval may vary depending on several factors, including the level of injury, previous vascular disease, the presence of collateral vessels, and previous extremity surgery.^[3]

Possible vascular injury should be kept in mind in a patient with blunt trauma of the extremities. The success of surgical repair depends on early diagnosis and treatment. Late vascular repair may result in neurological complications or even the loss of extremities.^[4]

This case report demonstrates that appropriate vascular repair may prevent extremity loss after 10 hours following the complete rupture of the popliteal artery due to blunt trauma. However, late vascular repair may also result in neurological injury, although mild in our case.

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