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Endovascular Repair after End-to-End Anastomosis for Better Outcome: A Case Report

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Abstract: Arterial rupture is a surgical emergency that requires immediate treatment. The anterior tibial artery is the main arterial supply of the legs anterior compartment. Tibial artery rupture is a tear or rupture of the tibial artery mostly caused by vascular trauma. We reported a 54-year-old male referred to Prof. Dr. R. D. Kandou hospital with the main complaint of injury and pain in the left lower limb due to being hit by a grass cutter. On physical examination of the lateral side of left cruris region, an open wound with flat edges and muscle base appeared. The hard sign in this case was active hemorrhage and the soft sign was history of hemorrhage at the scene of the injury. During the operation, total anterior tibial artery rupture was identified with a gap less than 2 centimeters. Therefore, end-to-end anastomosis was initially performed for the 2 cm arterial gap, however, Doppler ultrasound revealed inadequate distal blood flow. Endovascular repair with drug-eluting balloon angioplasty restored good distal blood flow. Comprehensive evaluation guides optimal intervention. In conclusion, trauma to the vascular system can be devastating. In this case, there was a total anterior tibial artery rupture due to penetrating trauma. While surgery remains vital, endovascular techniques offer effective alternatives, particularly in cases of distal ischemia and minimal reconstruction needs.
Keywords: total anterior tibial artery rupture; penetrating trauma; vascular trauma

INTRODUCTION

Vascular trauma can come in three forms, as follows: blunt, penetrating, or iatrogenic. Arterial rupture is a surgical emergency that requires immediate treatment. The anterior tibial artery is the main arterial supply of the leg's anterior compartment. Tibial artery rupture is a tear or rupture of the tibial artery caused by vascular trauma. Approximately 10-15% of vascular injuries are caused by sharp injuries. Presence of hard sign of vascular injury has 92-95% for injuries requiring intervention. In this case, there was a total anterior tibial artery rupture due to penetrating trauma.[1,2]

CASE PRESENTATION

A 54-year-old male was referred to Prof. Dr. R. D. Kandou Hospital with the main complaint of injury and pain in the left lower limb due to being hit by a grass cutter since seven hours before admission to the hospital. On physical examination the lateral side of left cruris region, an open wound with flat edges and muscle base appears. The hard sign in this case is active hemorrhage and the soft sign is history of hemorrhage at the scene of the injury. During the emergency exploration, total anterior tibial artery rupture was identified with gap less than 2 centimeters. (Figure 1). In the setting of a limited circumstance, we performed end to end anastomosis for tibial artery rupture with premilene 5-0. The patient was planned for Doppler ultrasound two days after operation and then the result was no blood flow in the distal anterior tibial artery (ATA). Angiography resulted in total occlusion, a soft thrombus was seen proximally, and distal ATA could receive blood from collaterals and retrograde flow. Endovascular repair was performed. Total occlusion was penetrated with soft wire 0.014, and was continued with POBA predilates 2.5 mm with coyote, and then POBA with DEB Extender 2.5 mm. The evaluation performed with result the total occlusion was well reduced, with good flow to the distal pedal arch.

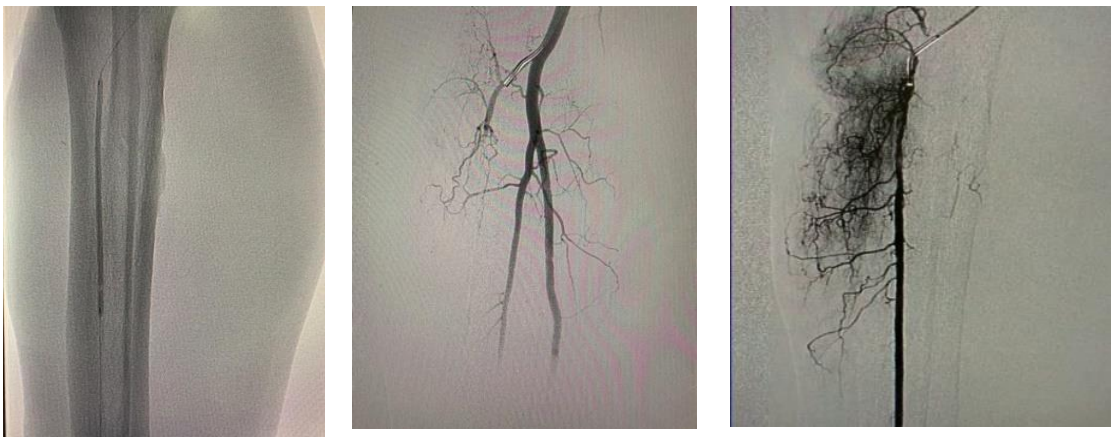

Figure 1. A, Occlusion was seen proximally; B, soft thrombosis was seen proximally; C, good reduced total occlusion and good blood flow to the distal pedal arch post angiography

DISCUSSION

Vascular trauma can be caused by penetrating, blunt, or iatrogenic. Vascular trauma often co-exists with trauma to the organs such as nerves, muscles, and other soft tissues. Bleeding will be more severe in incomplete arterial lesions, meanwhile in vessels that break entirely will occur retraction and constriction of blood vessels so as to reduce or restrain bleeding. The severity of arterial trauma depends on the degree of invasiveness, mechanism, type, and location of trauma, and duration of ischemia.[1,3] Clinical presentation of arterial trauma may include external bleeding, ischemia, pulsatile hematoma, or internal bleeding with signs of shock. The most common clinical symptom of extremity arterial trauma is acute ischemia.[4] Presence of vascular trauma extremities can be known by looking at the signs and symptoms experienced by patient. Clinical signs of vascular injury are generally divided into "hard" or "soft" signs injury. The hard signs are as

follow: active hemorrhage, rapidly expanding hematomas, absent pulses, pallor, paresthesia, pain, paralyses, or palpable thrill or audible bruit. The soft signs are as follow: history of arterial bleeding at the scene injury, diminished distal unilateral pulse, small hematoma, neurological deficit, abnormal flow velocity wave on Doppler examination, or abnormal ankle-brachial pressure index (ABI<0.9).[1,2,4–6]

The hard sign in this case is active hemorrhage and the soft sign is history of hemorrhage at the scene of the injury. The clinical evaluation of the injured extremity after penetrating trauma is of outmost importance. The presence of hard signs in penetrating trauma during the physical examination usually determines the anatomic level of vascular injury and the need for immediate surgery. Tibial artery rupture is a tear or rupture of the tibial artery caused by vascular trauma. The anterior tibial artery is the main arterial supply of the legs anterior compartment. In this case, on physical examination of the lateral side of left cruris region, an open wound with flat edges and muscle base appeared. During the operation, total anterior tibial artery rupture was identified with gap less than 2 centimeters.[1,4,7] Comparatively, Kashyap et al[1] demonstrated that endovascular therapy for acute limb ischemia reduced morbidity and complication risks when appropriate patient selection was applied. While conventional surgical management remains essential in specific vascular trauma cases, advancements in endovascular techniques offer an effective alternative, particularly for trauma with distal ischemia and minimal reconstructive requirements. This combined strategy underscores the importance of comprehensive clinical evaluation and individualized approaches in determining the optimal intervention.

Penetrating trauma is differentiated according the severity of the injury, which in this case is included in level 3. In level 3, the blood vessels are completely severed but no major hemorrhage. Arteries will experience vasoconstriction and retraction because of its elasticity, so that, the hemorrhage is causing ischemia that appears distally. Further complications that may occur is hemorrhagic hypovolemic shock and pulsating hematoma. Level 3 trauma often as a result of penetrating trauma. Surgical treatment is in the form of anastomosis between the two arterial stubs with or without interposition of vessel grafts or interposition of prostheses.[3,4,6,8–10] In this case, percutaneous transcatheter angioplasty (PTA) was performed and obtained total occlusion (Figure 1A), a soft thrombus was seen proximally (Figure 1B), distal ATA could obtain blood flow from collaterals and retrograde flow, then endovascular repair was performed. On evaluation angiography, we found satisfying reduced total occlusion and blood flow to the distal pedal arch (Figure 1C).

CONCLUSION

This case highlights the management of a 54-year-old male with total anterior tibial artery rupture due to penetrating trauma. Initial end-to-end anastomosis failed to restore adequate distal blood flow, leading to the necessity for endovascular repair using drug-eluting balloon angioplasty, which successfully achieved limb revascularization. Endovascular techniques reduce morbidity in acute limb ischemia and are particularly effective in cases of distal ischemia requiring minimal reconstruction. Timely and precise interventions are crucial in the management of vascular trauma.

Conflict of Interest

The authors affirm no conflict of interest in this study.

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