

Revascularization of Infrapopliteal Arteries with Duplicated Great Saphenous Vein After Gunshot Injury

Ateşli Silah Yaralanması Sonrası Dublike Safen Ven İle İnfrapopliteal Revaskülarizasyon

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Geliş Tarihi/Received: 20.08.2014
Kabul Tarihi/Accepted: 10.10.2014

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ABSTRACT Popliteal artery injuries are among the most challenging of all extremity vascular injuries. We report case of a 29-year-old man who had a history of surgery due to right crural gunshot injury previously. He complained of rest pain. On lower extremity angiography, we detected that previously implanted saphenous vein graft was occluded, and posterior and anterior tibial arteries were filling from the collaterals. Revascularization of both anterior and posterior tibial arteries was performed with duplicated great saphenous vein. Dual saphenous vein may provide better configuration and anastomotic patency compared to single grafts.

Key Words: Saphenous vein; graft occlusion, vascular; popliteal artery

ÖZET Ekstremit vasküler yaralanmaları içinde popliteal arter yaralanması en zorlu olanlardandır. Bu vaka sunumunda daha önce krural bölgesinden ateşli silah yaralanması nedeniyle opere olmuş ve şimdi istirahat ağrısı ile başvuran 29 yaşındaki bir erkek hastayı sunduk. Alt ekstremit anjiyografisinde önceki ameliyatında kullanılan safen ven greftinin tıkalı olduğunu, anterior ve posterior tibial arterlerin kollateraller ile dolduğunu izledik. Dublike safen ven kullanılarak hem anterior hem de posterior tibial arterler revaskülarize edildi. Tek tek kullanılan greftlere kıyasla mümkün olduğu durumlarda dublike safen ven daha iyi bir konfigürasyon ve patensi sağlayabilir.

Anahtar Kelimeler: Safenöz ven; greft tıkanması, vasküler; popliteal arter

Damar Cer Derg 2016

Among civilian populations, popliteal arterial injuries comprise 18% of all extremity arterial injuries.¹ The outcome of a penetrating popliteal artery injury depends predominantly on the mechanism of injury. The mechanism of injury is gunshot in 40% of cases. The most destructive effects are seen on vessels due to kinetic energy of bullet. The amputation rate for shotgun wounds approaches 20% because of the associated soft tissue injury and septic sequelae.²

CASE REPORT

We report the case of a 29-year-old man who presented with right crural gunshot injury. First operation was saphenous vein graft interposition from infrageniculate popliteal artery to tibioperoneal trunk. One month after the operation, the patient was readmitted to our outpatient clinic with inter-

mittent claudication. His affected leg was slightly cold, and distal peripheral pulses were not palpable. Monophasic flows were detected in anterior and posterior tibial arteries by color Doppler ultrasonography. In digital subtraction angiography (DSA), popliteal artery and saphenous graft were thrombosed, anterior and posterior tibial arteries were filling from the collaterals (Figure 1).

In reoperation, popliteal artery was seen dissected from perivascular tissues, and was exposed well. Infrapopliteal arterial embolectomy was performed with 3Fr and 4Fr Fogarty catheters but the catheters did not pass beyond 10 cm. According to preoperative DSA, we decided to revascularize both anterior and posterior tibial arteries. Saphenous vein graft was prepared from the contralateral above-knee level. Saphenous vein was duplicated. We anastomosed proximal end of saphenous vein to popliteal artery. One of duplicated ends was anastomosed to posterior tibial artery. Secondly, we opened a hole in interosseous membrane, and we directed other end to anterior compartment through this hole, then we anastomosed it to the anterior tibial artery. Postoperatively, peripheral pulses were palpated, and there were no complications. Patient was discharged on postoperative fourth day with dual antiplatelet therapy (aspirin 300 mg/day and clopidogrel 75 mg/day). At the sixth month of follow up, DSA showed bypass patency (Figure 2).

DISCUSSION

Popliteal vessel injuries are the most limb-threatening and challenging among all peripheral vascular injuries.¹⁻³ The popliteal artery is a true end artery with poor collateral supply, and popliteal vein is responsible for the majority of lower leg and foot's drainage. Therefore, popliteal vascular injuries carries the greatest risk of limb loss compared to any other peripheral vascular injuries.

In popliteal arterial injuries, an end-to-end anastomosis is preferred if it can be performed without undue tension; however, this typically is not possible if more than 2 cm of the vessel is lost. Vein patch angioplasty is another option for par-

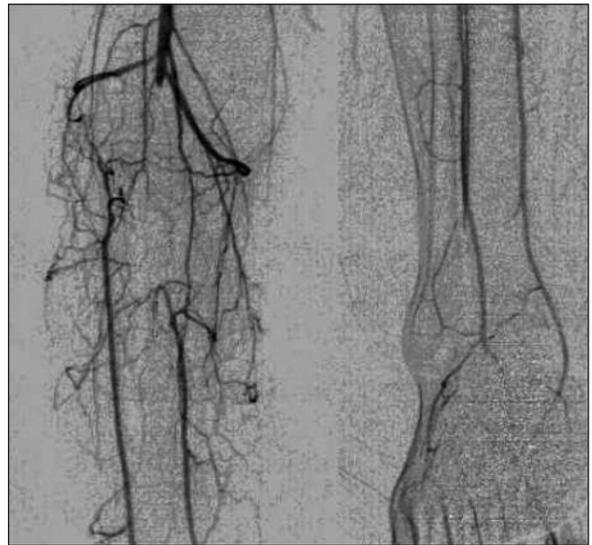


FIGURE 1: Preoperative digital subtraction angiography image showing thrombosed popliteal artery, saphenous graft and collaterals.

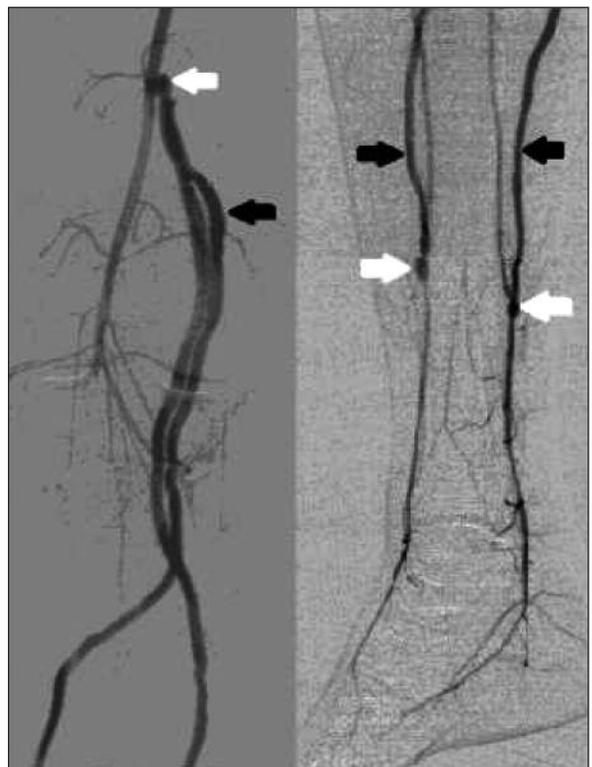


FIGURE 2: Postoperative digital subtraction angiography image shows patent duplicated saphenous vein graft (black arrow). Proximal and distal anastomoses are shown by white arrows.

tial injuries. Division of geniculate collaterals to achieve mobility should be avoided because of the negative effect on limb perfusion.⁴ If there is ve-

nous injury, venous repair increases the success of arterial repair and reduces the need for a fasciotomy. However, if more complex repairs are required, ligation is appropriate. The conduit of choice is the reversed autogenous saphenous vein from the contralateral leg, which preserves venous outflow from the injured limb. Synthetic grafts should rather be avoided as much as possible in order to decrease the incidence of postoperative infections. Duplicated systems within the great saphenous vein are relatively common, and occur at a 25% and 8% incidence in the calf and thigh, respectively.⁵ The accessory great saphenous veins runs parallel to the main trunk within the thigh and leg, in an anterior or posterior location.

Isolated occlusive injury to one infrapopliteal arteries rarely results in limb ischemia and does not, as a rule, require therapeutic intervention. A single actively bleeding traumatized vessel or arterial pseudoaneurysm can be treated by simple ligation or angiographic embolization; however, when the tibioperoneal trunk or two infrapopliteal arteries are injured, repair is required. If two or

more crural arteries are repaired, at least one may continue to be patent, and thus the chance of limb salvage increases. In addition, in traumatic cases, no collateral network contributes to the distal flow as in atherosclerotic cases. In our case, previous gunshot injury resulted extensive destruction of infra-geniculate popliteal artery. In control DSA, only anterior and posterior tibial arteries were visualized. We decided to revascularize both of them with reversed saphenous vein graft. During harvesting, we noticed that saphenous vein was duplicated, and it was implanted it as well.

In injury or peripheral vascular disease, duplicated saphenous vein should be considered if infrapopliteal arteries of revascularization with saphenous vein graft was planned. Because we think that dual saphenous vein provides better configuration and anastomotic patency compared to single grafts.

Conflict of Interest

Authors declared no conflict of interest or financial support.

REFERENCES

1. Frykberg ER. Popliteal vascular injuries. *Surg Clin North Am* 2002;82(1):67-89.
2. Dua A, Desai SS, Shah JO, Lasky RE, Charlton-Ouw KM, Azizzadeh A, et al. Outcome predictors of limb salvage in traumatic popliteal artery injury. *Ann Vasc Surg* 2014;28(1):108-14.
3. Mullenix PS, Steele SR, Andersen CA, Starnes BW, Salim A, Martin MJ. Limb salvage and outcomes among patients with traumatic popliteal vascular injury: an analysis of the National Trauma Data Bank. *J Vasc Surg* 2006 Jul;44(1):94-100.
4. Franz RW, Shah KJ, Halaharvi D, Franz ET, Hartman JF, Wright MI. A 5-year review of management of lower extremity arterial injuries at urban level I trauma center. *J Vasc Surg* 2011;53(6):1604-10.
5. Thomson H. The surgical anatomy of the superficial and perforating veins of the lower limb. *Ann R Coll Surg Engl* 1979;61(3):198-205.