Therapeutic Management of Lower Extremity Arterial Bypass Graft Occlusion: Case Report

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BACKGROUND

- Lower extremity peripheral arterial disease (PAD) is primarily caused by atherosclerosis and thromboembolic processes that alter the normal function of the arteries of lower extremities.
- Acute limb ischemia (ALI) is a type of PAD that arises with sudden decrease in reperfusion that threatens the tissue viability and often associated with thrombosis due to plaque rupture, thrombosis of lower extremity bypass graft, or embolism originating from the heart or proximal arterial aneurysm.[1]
- In cases of acute limb ischemia due to arterial emboli or thrombosis, immediate treatment with unfractionated heparin should be given. The expert panel suggests reperfusion therapy (surgery vs intraarterial (IA) thrombolysis), although surgery is recommended over IA thrombolysis.[1]
- Once ALI is suspected, timely clinical evaluation is needed in order to make decisions on treatment.
- Surgical revascularization, such as bypass graft, is indicated in patients with limb ischemia without adequate improvement by exercise rehabilitation, pharmacologic therapy, and significant limitations of daily activities.
- Bypass graft occlusion may result due to various reasons such as:
  - Technical complications of the graft
  - Thrombosis due to inadequate outflow of blood
  - Myointimal hyperplasia
  - Progression of atherosclerosis
- Results of prospective, randomized trial demonstrated that thrombolysis in acutely ischemic (<14 days) improved limb salvage and reduced the magnitude of the surgical procedure.[2]
- Studies demonstrated 57% success rate with streptokinase, whereas almost 90% of grafts have been successfully opened with tPA in other studies.[3]
- If patency of the occlusion is not restored, patient will have to be reassessed for surgical revascularization and possible amputation.

CASE REPORT

- Patient is a 58 year old male who presented to an outpatient clinic for evaluation due to complaints of severe right leg pain unable to be controlled by his pain medications.
- He has a past medical history significant for PAD requiring right popliteal-to-posterior tibial artery bypass two weeks prior to admission.
- Patient also complains of tingling in his right foot, in which the duplex ultrasound demonstrated occlusion of the right lower extremity bypass graft.
- He was subsequently admitted to a general medical and surgical hospital with 250 beds for restoring patency of the bypass graft.
- Upon presentation for evaluation, it was also noted that the incision on his right thigh was intact and dry; however, the incision on his calf had mild separation with some sero-sanguineous drainage.
- Based upon the patient's arterial graft thrombosis and need for urgent revascularization, as well as possible presence of infectious process, the patient was admitted to intensive care unit and was initiated on both therapeutic alteplase and heparin infusions.

SUMMARY OF EVENTS

Days (D) of hospitalization	
D1	• Patient presents to the outpatient clinic with complains of severe pain and tingling in his right leg two weeks after popliteal-to-posterior tibial artery bypass • Dx: Occlusion of right femoropopliteal bypass graft • Admitted to cardiovascular intensive care unit and started on alteplase and heparin infusions
D2	• Continued to infuse tPA and Heparin drip • RLE incision with superficial abrasion and opening along surgical incision
D3	• Continued to infuse tPA and heparin drip • Right foot cool, toes cyanotic with non-healing ulcerations, sensation intact
D4	• Angiogram performed and revealed patency of patient's bypass graft • Alteplase and heparin infusions were discontinued. • Foot pink and warm post discontinuation of lysis • 5th toe ulcer with necrotic toe tips x2 • Posterior tibial artery 2+ palpitation pulse
D5	• Reocclusion of right popliteal-to-posterior byass - 3rd and 5th toes dusky • Patient had hypotension which appears to be related to a recent non-ST-elevated myocardial infarction (NSTEMI) • No plan for reintervention of RLE at present due to NSTEMI
D6	• Echocardiogram confirmed acute changes in left ventricular ejection fraction with increase in troponin • Left heart catheterization performed • Heparin continuous infusion started • No plan for reintervention for RLE at present
D7	• Underwent coronary arterial bypass graft (CABG) w/ endoscopic vessel harvest (EVH) of saphenous vein • At the time of surgery, patient found to have calcific atherosclerosis of below-knee popliteal artery • Continued heparin continuous infusion • No plan for revascularization for RLE at present
D37	• Patient returned to the hospital with developed dry gangrene on right 2nd, 3rd, and 5th toes
D42	• Right trans-metatarsal amputation on all 5 toes.

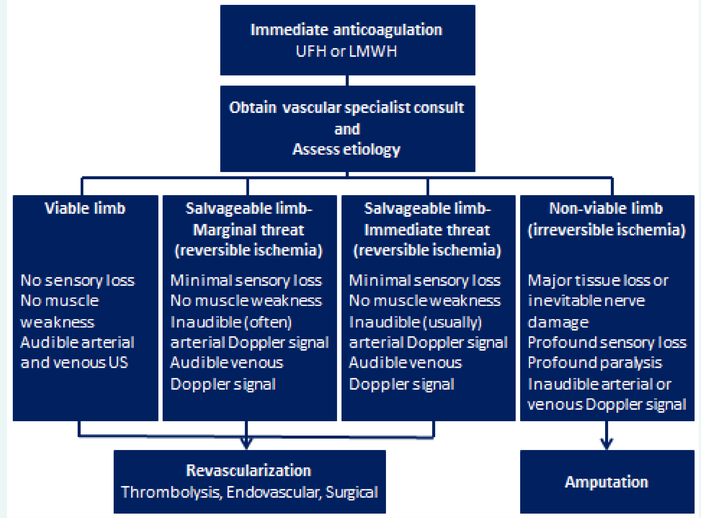
DISCUSSIONS & CONCLUSION

Because peripheral arterial disease is primarily caused by atherosclerosis and thromboembolic processes, all patients undergoing revascularization should be placed on antiplatelet therapy indefinitely to reduce the risk of MI, stroke, and vascular death, unless contraindicated. ACC/AHA recommends aspirin 75 to 325 mg to be safe and effective to reduce the risks.[1,5] Clopidogrel 75 mg is considered to be safe and effective as an alternative to aspirin.[1,5] All patients should be placed on a high-potency statin therapy, such as atorvastatin and rosuvastatin, as PAD is a type of ASCVD.[6] Antihypertensive therapy should be administered to patients with hypertension to reduce the risk of MI, stroke, CHF, and cardiovascular death.[5] Glycemic control should be maintained to reduce microvascular complications and improve cardiovascular outcomes.[5] If the patient is a smoker, should ask the patient about smoking status at each session and assist with counseling and developing a plan for quitting that may include pharmacotherapy.[1]

Long-term patency of bypass grafts should be evaluated for at least 2 years using resting ankle-brachial index (ABI), physical exam, and a duplex ultrasound at regular intervals.[1]

For patients who have severe PAD with a viable or salvageable limb, the ACC/AHA PAD guideline recommends initial management with unfractionated heparin (UFH) or low molecular weight heparin (LMWH) followed by catheter-based thrombolysis over surgical revascularization for occlusion of peripheral arteries based on trials that included occlusion of native arteries and bypass grafts.[1]
However, there is not specific management for peripheral arterial bypass graft occlusion available. More studies that focus specifically on peripheral bypass occlusions are needed to improve prevention, management, and monitoring after revascularization.

SEVERE PAD MANAGEMENT[1]



Assess Etiology	Guides to Treatment
• Embolic (cardiac, aortic, infra-inguinal) • Progressive PAD (prior claudication history) • Leg bypass graft thrombosis • Arterial trauma • Popliteal cyst or entrapment • Ergotism • Hypercoagulable state	• Embolus versus thrombus • Site and extent of occlusion • Native artery versus bypass graft • Duration of ischemia • Patient co-morbidities • Contraindications to thrombolysis or surgery

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DISCLOSURES

Nothing to disclose: Young Park, Dusty Lisi