

CASE REPORT

# Arterial Embolic Complications in a Patient with Acute Heart Failure

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## ABSTRACT

**Introduction:** In acute heart failure patients, the prothrombotic state is likely due to arterial and venous endothelial dysfunction. Decompensated heart failure appears to also be associated with increased levels of prothrombotic molecules, such as fibrinogen and von Willebrand factor, which also contribute to the prothrombotic state. **Case presentation:** We present the case of a 72-year-old male patient, admitted for signs of acute heart failure with bilateral ankle edema. Laboratory data showed D-dimer level  $>5 \mu\text{g/mL}$ , which raised the suspicion of pulmonary embolism secondary to deep vein thrombosis. Doppler ultrasound performed to exclude a deep vein thrombosis revealed a total occlusion of the superficial femoral artery on the lower left limb and an abdominal aorta with a lumen diameter of 35 mm and a true lumen of 18.6 mm with circular isoechoic material on the aortic wall. The computed tomography angiography described an aneurysm of the abdominal aorta with mural thrombosis extending to the bifurcation level. **Conclusion:** In patients with acute heart failure, a comprehensive vascular assessment is also needed. The therapeutic management of these patients varies from conservative to endovascular or surgical therapy, but revascularization therapy should be considered based on the patient’s medical condition.

**Keywords:** occlusion of the superficial femoral artery, aneurysm of the abdominal aorta, acute heart failure

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## INTRODUCTION

In heart failure patients, the prothrombotic state is likely due to the arterial and venous endothelial dysfunction. Heart failure appears to also be associated with increased levels of prothrombotic molecules, such as fibrinogen and von Willebrand factor, which also contribute to the prothrombotic state.

## CASE PRESENTATION

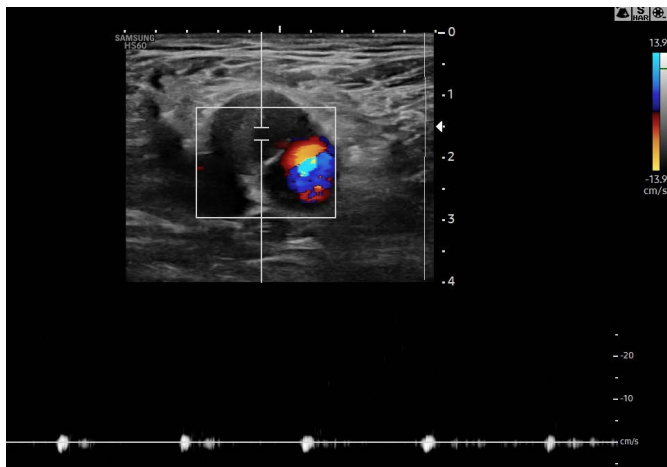
We present the case of a 72-year-old non-obese male patient admitted as an emergency to the department of cardiology with signs of acute heart failure, complaining of dyspnea, fatigue, bilateral ankle edema, and cough with sputum. He was a former smoker, but current use of alcohol was also recorded. The patient’s medical history

**TABLE 1.** Laboratory data

Parameter	Measured value
LDL-cholesterol, mg/dL	104
HDL-cholesterol, mg/dL	37.7
Triglycerides, mg/dL	62
Glucose, mg/dL	102
HgbA1c, %	5.6
Uric acid, mg/dL	5.6
Creatinine, mg/dL	1.12
GFR, mL/min/1.73 m <sup>2</sup>	63

HgbA1c, glycated hemoglobin; GFR, glomerular filtration rate

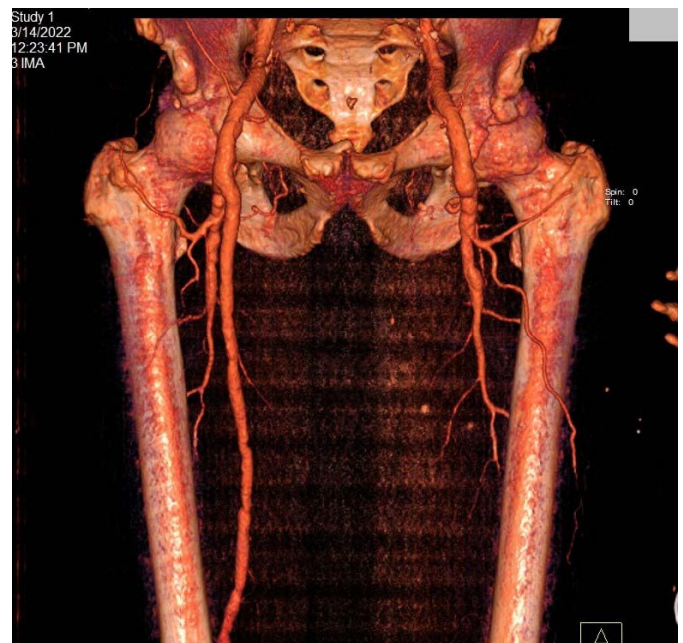
was positive for dilated cardiomyopathy (DCM), second grade arterial hypertension, chronic obstructive pulmonary disease and pulmonary fibrosis, and also toxic hepatitis. He had been previously prescribed treatment with angiotensin-converting enzyme inhibitor (ACEI), beta-blockers, calcium-channel blockers, and diuretics, which has been ceased by the patient in the last two weeks. A resting electrocardiogram (ECG) was performed, which revealed sinus rhythm, heart rate of 115 beats/min, and flattened T waves in the inferior leads with several premature ventricular beats. On echocardiography examination, a reduced systolic function was revealed, with a left ventricular ejection fraction of 25–30%, hypo-akinesia in the basal and middle third of the septum, as well as severe mitral regurgitation and moderate aortic and tricuspid regurgitation. Given the presence of dyspnea and cough, a chest X-ray was carried out, which described right pleural effusion, enlarged mediastinum, and increased cardio-thoracic index. Laboratory data showed an elevated NT-proBNP of 24.725 pg/mL and D-dimer

**FIGURE 1.** Duplex ultrasound transversal section: occlusion of the left superficial femoral artery

level >5 µg/mL. Further data regarding cardiovascular risk profile are shown in Table 1.

Due to high suspicion of pulmonary embolism secondary to a possible deep vein thrombosis, a computed tomography pulmonary angiography was performed, which excluded the presence of pulmonary artery thrombus but confirmed the presence of right pleural effusion and fibrosis on the left apical lobe. Deep vein thrombosis of the lower limb was ruled out by compression Doppler ultrasound, but on the lower left limb, a total occlusion of the superficial femoral artery was detected by hypoechoic material (Figure 1).

In order to search for thrombotic events in the arterial tree, we continued the investigations with the screening of the abdominal aorta, where a lumen diameter of 35 mm was detected, with a true lumen of 18.6 mm and circular isoechoic material on the aortic wall. The iliac arteries did not show significant modifications. To choose the optimal revascularization procedure, a computed tomography angiography was performed, which described an aneurysm of the abdominal aorta with mural thrombosis and extension to the level of the aortic bifurcation, with a total lumen of 42 mm and a true lumen diameter of 25 mm. No stenoses of the external iliac arteries were visible, but there was a lack of contrast agent in the left superficial femoral artery, and important collateral arteries were observed (Figure 2). On this site, a trifurcation was detected, but no flow was seen in the popliteal artery. In

**FIGURE 2.** Computed tomography angiography: occlusion of the left superficial femoral artery

the right lower limb, there were no stenoses or perfusion defects present. Arterial ankle pressures were as follows: left posterior tibial artery 60 mmHg, arm pressure 120 mmHg, with an ankle-brachial index of 0.5; no pulse was detected on the dorsalis pedis artery; on the right side, posterior tibial artery pressure was 70 mmHg, and dorsalis pedis artery pressure was 75 mmHg, with an ankle-brachial index of 0.58.

The patient did not complain of signs of acute ischemia, and no tissue damage was present upon clinical examination. Therapeutic anticoagulation was started with low molecular weight heparin, antiplatelet therapy, statin, sodium-glucose transport proteins (SGLT2), beta-blocker, calcium-channel blocker, diuretics, and bronchodilators. The patient refused any options for revascularization procedures and was discharged after remission of symptoms of heart failure on oral anticoagulation therapy with coumarin, with an INR of 2.

## DISCUSSION

The presented case report underlines the extended arterial thrombotic complications of a patient with acute heart failure in whom the choice of treatment can be a real medical challenge that requires a strong multidisciplinary framework.<sup>1</sup> According to current guidelines for screening for abdominal aortic aneurism, in male smokers aged 65 to 75, a single screening test is recommended.<sup>2–4</sup> The ESC guideline on the treatment of peripheral arterial diseases recommends that revascularization should be attempted as long as it is feasible. There are very few studies that show significant differences between endovascular treatment and bypass surgery. Endovascular treatment presents fewer periprocedural complications but has less durability compared to bypass surgery, which is associated with short-term increase in morbidity and has longer durability, thus decreasing the reintervention rate.<sup>5</sup> The BASIL trial compared these two treatment options, and the results at two years of follow-up did not show differences between the two techniques. However, after two years, bypass surgery was associated with better survival and amputation-free survival.<sup>6</sup> According to the results of the BEST-CLI trial, which randomly assigned two cohorts of over 1,800 patients with chronic limb-threatening ischemia, for whom both surgical and endovascular treatment were feasible, showed that surgical revascularization with autologous great saphenous venous graft is superior to endovascular intervention. Both major adverse limb events and death were observed in patients who went through surgery.<sup>7</sup>

Nonetheless, the GLASS classification helps stratifying the anatomic severity of the lesions, serving as a guide for revascularization. For example, a review and meta-analysis using eight studies, performed on over 2,000 patients, showed that in advanced stages, bypass surgery obtained better results than endovascular therapy.<sup>8</sup> Endovascular therapy techniques are evolving and aim to give better results. In a recent retrospective study, the authors compared drug-coated balloon (DCB) with scaffold devices in patients with chronic total occlusion of the superficial femoral artery. The study compared 31 patients treated with DCBs and 44 patients treated with a stent or stent-graft, and the results showed the DCB strategy was associated with reduced re-occlusion and acceptable patency rates.<sup>9</sup>

## CONCLUSIONS

Patients with acute heart failure are at high risk of developing thromboembolic complications. Therefore, a comprehensive clinical assessment is necessary. Since ankle edema is frequent in this vulnerable patient group, a thrombotic event has to be ruled out. Duplex Doppler ultrasound, as a first-line diagnostic approach, has to be carried out at the patient's bedside, where the examination of the abdominal aorta is also required. In patients with atherosclerotic lesions of the lower limb, a comprehensive vascular assessment is needed in order to identify further vascular lesions. In case of aneurysms of the abdominal aorta, besides medical therapy, revascularization techniques should be considered according to the patient's medical condition and the extension of the aneurysm.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

## REFERENCES

1. Mando R, Gemayel R, Chaddha A, et al. Peripherally Embolizing Aortic Thrombus: The Work-Up, Management, and Outcome of Primary Aortic Thrombus. *Case Rep Cardiol*. 2019; 8132578. doi: 10.1155/2019/8132578.
2. Shaikat NM, Taha F, Vortsman E, et al. Diagnosis of abdominal mural aortic thrombus following discovery of common femoral artery and vein thrombosis by point-of-care ultrasound. *J Ultrasound*. 2015;18:415–420. doi: 10.1007/s40477-015-0183-0.
3. Chaikof EL, Dalman RL, Eskandari MK, et al. The Society for Vascular Surgery practice guidelines on the care of patients with an abdominal aortic aneurysm. *J Vasc Surg*. 2018; 67:277.e2. doi: 10.1016/j.jvs.2017.10.044.

4. Knypl K. The abdominal aortic artery aneurysm and cardiovascular risk factors. *e-Journal of Cardiology Practice*. 2020;18:28.
5. Ichihashi S, Nagatomi S, Iwakoshi S, et al. Balloon-oriented puncture for creating an access for endovascular aortic aneurysm repair in a case of iliac and femoral artery occlusion. *CVIR Endovasc*. 2020;3:25. doi: 10.1186/s42155-020-00116-3.
6. Aboyans V, Ricco JB, Bartelink ML, et al. 2017 ESC Guidelines on the Diagnosis and Treatment of Peripheral Arterial Diseases. *Eur Heart J*. 2018;39:763–816. doi: 10.1093/eurheartj/ehx095.
7. Farber A, Menard MT, Conte MS, et al. BEST-CLI Investigators. Surgery or Endovascular Therapy for Chronic Limb-Threatening Ischemia. *N Engl J Med*. 2022;387:2305–2316. doi: 10.1056/NEJMoa2207899.
8. Shirasu T, Takagi H, Gregg A, et al. Predictability of the Global Limb Anatomic Staging System (GLASS) for Technical and Limb Related Outcomes: A Systematic Review and Meta-Analysis. *Eur J Vasc Endovasc Surg*. 2022;64:32–40. doi: 10.1016/j.ejvs.2022.03.044.
9. Hayakawa N, Kodera S, Arakawa M, et al. Clinical outcome of drug-coated balloon versus scaffold device in patients with superficial femoral artery chronic total occlusion. *Heart Vessels*. 2022;37:282–290. doi: 10.1007/s00380-021-01912-0.