

Massive Pulmonary Embolism with Cardiac Arrest During Routine Tibial Bypass Surgery

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Introduction

- Pulmonary embolism (PE) is the third most common cause of cardiovascular death, accounting for 5-10% of total in-hospital mortality.
- While massive PE accounts for less than 5% of cases, it carries a 90-day mortality of greater than 50%.
- Historically, massive PE was treated with systemic thrombolysis despite a significant risk of major bleeding, including intracranial hemorrhage.

Case Background

- A 48-year-old male was referred to vascular surgery following an unsuccessful free flap to cover a chronic non-healing ankle wound.
- A left lower extremity angiogram demonstrated a chronic occlusion of the distal superficial femoral artery (SFA) and popliteal arteries with collateralization to the peroneal artery (Figure 1).
- SFA to peroneal artery bypass was planned.



Figure 1: Initial angiography of left lower extremity showing (A) chronic occlusion of distal SFA and popliteal artery and (B) collateralization to peroneal with further distal posterior tibial collateralization.

Case Intervention

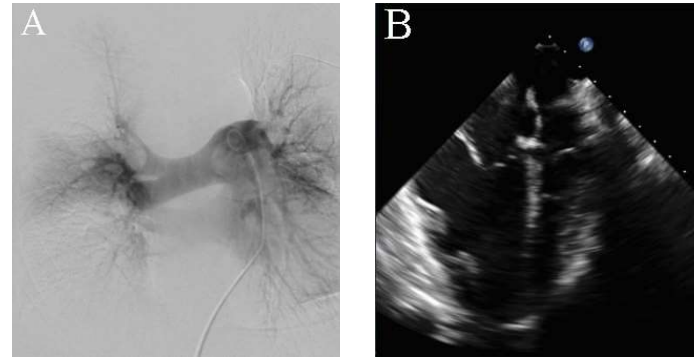


Figure 2: Intraoperative (A) pulmonary angiography demonstrating bilateral filling defects following cardiac arrest and (B) transesophageal echo demonstrating right heart dilation.

- Strong leg contraction upon exposure of the greater saphenous vein precipitated hypotension and cardiac arrest.
- During ongoing CPR, pulmonary angiography revealed significant bilateral filling defects with greater clot burden on the right (Figure 2A).
- Return of spontaneous circulation was achieved after 2 minutes of CPR and transesophageal echocardiogram revealed McConnell's sign (Figure 2B).
- An Indigo CAT8 catheter was then used to perform serial bilateral aspiration thrombectomies resulting in improved hemodynamic stability.
- Local thrombolysis was initiated with bilateral Cragg-McNamara catheters that infused tissue plasminogen activator (tPA) at a rate of 0.5mg/hr.
- Thrombolysis was continued for 48 hours with hemodynamic improvement.
- The patient was weaned from inotropic support by the fourth postoperative day with no further echocardiographic evidence of right heart strain on postoperative day five.
- A successful left SFA to peroneal bypass was completed one week following cardiac arrest and the patient was discharged home two weeks post-arrest in excellent clinical condition.

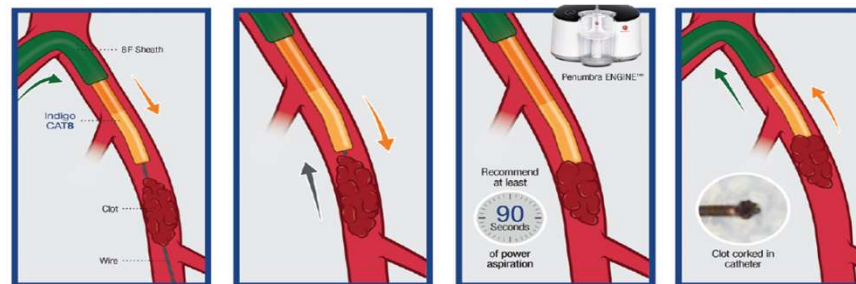


Figure 3: Demonstration of the Indigo aspiration thrombectomy system removing a clot in the common iliac artery.

Discussion

- Current guidelines still recommend systemic thrombolysis as initial therapy for massive PE although some reports have shown catheter-directed thrombolysis (CDT) to have fewer complications and lower mortality rates.
- Retrospective analysis of various suction thrombectomy devices demonstrated similar outcomes compared to CDT in the setting of submassive and massive PE.
- EXTRACT PE, a prospective trial, found Indigo significantly reduced right ventricular strain in submassive PE while avoiding intraprocedural thrombolysis in 98.3% of patients.
- Updated 2021 CHEST guidelines now endorse catheter-assisted thrombus removal in patients with acute PE associated with hypotension who also have (i) a high bleeding risk, (ii) failed systemic thrombolysis, or (iii) shock that is likely to cause death before systemic thrombolysis can take effect.

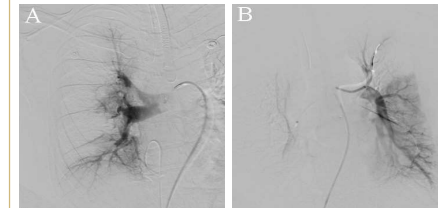


Figure 3: Completion pulmonary angiography of the right (A) and left (B) lungs following aspiration thrombectomy.

Conclusions

- There is a need for alternative therapies for individuals with contraindications to thrombolytics (such as in this case) and the incorporation of endovascular devices into PE management guidelines suggests this technology is here to stay.
- Vascular surgeons already use these devices in the periphery and expanding this skillset to PE management will increase their value as providers and improve patient care.