Toward Standardized Guidelines for Distal Perfusion Cannulae in V-A ECMO and ECPELLA: Timing, Sizing, Monitoring, and Management

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Dear Editor,

Acute limb ischemia (ALI) remains one of the most common complications of peripheral veno-arterial extracorporeal membrane oxygenation (V-A ECMO). Across heterogeneous cohorts, reported ALI rates vary widely (≈8–30% and higher in selected series), reflecting differences in patient selection, cannulation technique, and monitoring practices. Despite mounting observational and meta-analytic evidence, there is still no unified, evidence-graded guidance on when and how to use a distal perfusion cannula (DPC). How to size, connect, monitor adequacy, and how to adapt protocols when V-A ECMO is combined with femoral Impella (ECPELLA).[1,2] Figure 1 shows common DPC orientation.

Evidence currently associates prophylactic DPC or use of smaller-bore arterial return cannulae with lower odds of limb ischemia. [3,4] Random-effects meta-analysis studies report risk reductions of ~60% with prophylactic DPC and ~60% with smaller return cannulae.[2,5] Single-center and registry studies reinforce these findings and highlight the multifactorial nature of ALI (artery size relative to cannula, sex, age, atherosclerotic burden, shock severity, vasopressor dose, and decannulation technique).[1,6,7]

We propose that professional societies consider a consensus pathway with the following pragmatic pillars:

Timing: Early DPC placement- preferably at cannulation. Prophylactic placement protocols that embed prophylactic have reported marked reductions in ALI compared with reactive strategies.[2]

Size & Circuit: Use a reinforced 6–8 Fr antegrade sheath in the superficial femoral artery (SFA). Connected via a short, small-diameter tubing to maintain adequate blood flow, reduce stasis and minimize thrombosis risk within the DPC loop. Avoid unnecessarily large arterial cannula; target the lowest Fr size that achieves hemodynamic goals. Smaller cannula are associated with lower ALI risk.[2,5,11]

Placement Technique: Favor ultrasound-guided antegrade SFA cannulation; confirm position and runoff with Doppler or vascular ultrasound. Fluoroscopy-guided or hybrid approaches are reasonable when anatomy is uncertain or when reactive placement is required after angiography.[10]

Monitoring: Implement tiered monitoring: Hourly bedside vascular checks for flow confirmation. Near-infrared spectroscopy (NIRS) with bilateral calf probes. Evidence suggests NIRS thresholds (e.g., absolute rSO_2 <40% or ≥25% drop from baseline) can cue timely intervention and reduce need for surgical rescue.[1,8,9,12]

Escalation & Rescue: If hypoperfusion persists despite an optimally placed DPC, consider upsizing the DPC. Optimize ECMO flow and mean arterial pressure, relieving venous congestion, and early vascular surgery consultation. Percutaneous strategies, including temporary extracorporeal femoro-femoral crossover perfusion or radial-to-femoral external bypass, can rapidly restore antegrade flow when anatomy or devices preclude simple solutions.[14–16]

Decannulation & Repair: During decannulation where percutaneous closure is used, assess for late stenosis/occlusion. Have a low threshold for duplex imaging.[1,6]

ECPELLA: ECPELLA use increases ischemia risk. Observational cohorts describe a simple, reproducible mitigation strategy: bilateral antegrade DPC use where one DPC is inserted distal to the ECMO cannula, and one distal to the Impella. Use of appropriate blood flow sources is needed, which is scarce during Impella use solely, highlighting a potential gap in care. Evidence has shown zero ischemic events in center series when used prophylactically.[12,13] If limb perfusion remains marginal percutaneous contralateral crossover or external bypass can be lifesaving bridges until definitive reconfiguration (e.g., axillary Impella or upper-body cannulation) is achieved.[14, 15, 16]

Future considerations: New bidirectional cannulae are emerging on the market to address ECMO related limb ischemia where dedicated DPC channels are integrated in to the arterial cannula. Although not currently widely used this is an area where innovation may occur.

In summary, a consensus, checklist-driven framework is urgently needed to standardize timing, size, connection, and monitoring of DPCs in femoral VA-ECMO with explicit algorithms for ECPELLA. Such guidance should be evidence-graded, adaptable to resource settings, and include audit metrics (e.g., DPC placement rate in eligible femoral V-A ECMO, NIRS adoption, ALI/fasciotomy/amputation rates, time-to-DPC). We invite a society-led, multi-disciplinary consensus and pragmatic trials to close remaining evidence gaps.

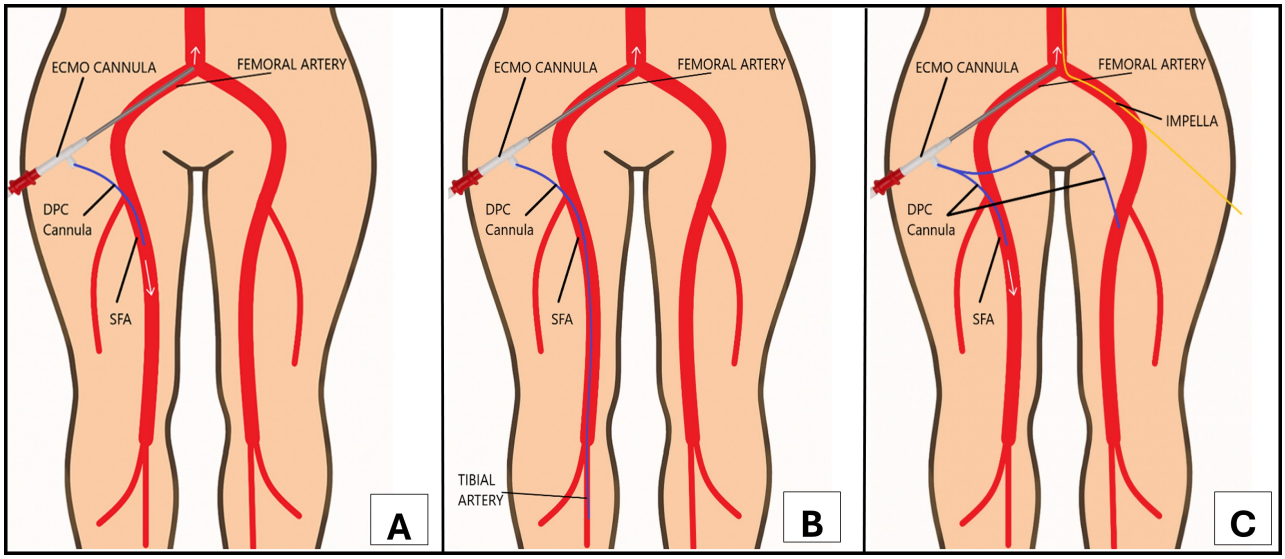

Figure 1: DPC cannula orientation towards; A: Superficial femoral artery, B: Tibial artery, C: In ECPELLA

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