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Need for Guidelines on Anticoagulation Reversal During Transition From Cardiopulmonary Bypass to ECMO—Call for Research

TO THE EDITOR: The transition from cardiopulmonary bypass (CPB) to extracorporeal membrane oxygenation (ECMO) is a critical phase in cardiac surgery, especially in cases requiring mechanical circulatory support for postcardiotomy shock or other indications. However, one aspect that remains inadequately addressed in the literature and clinical guidelines is the optimal anticoagulation reversal strategy during this transition.

Typically, systemic heparinization is fully or partially reversed with protamine after CPB. However, if ECMO support is initiated immediately after bypass, this creates a clinical dilemma: fully reversing heparin may predispose to thrombosis in the ECMO circuit, whereas inadequate reversal may increase the risk of bleeding. A study highlighted this risk, identifying the lingering anticoagulant effects of systemic heparinization and the altered coagulation dynamics that occur during and after CPB to be a cause.[1]

The cessation of systemic anticoagulation in the ECMO setting may reduce the risk of bleeding in patients with high risk of bleeding. However, in the absence of prospective clinical data and randomized studies, the routine omission of anticoagulation cannot be done safely.[2]

Despite the frequency and severity of this issue, there is a lack of standardized protocols or consensus guidelines on balancing bleeding and thrombosis risks during this conversion. Clinical decision-making, such as protamine-to-heparin dosing ratio strategies, is often based on individual experience, institutional practice, or trial and error, leading to variability in patient outcomes.[3]

We urge professional societies and ECMO consortia to recognize this gap and to initiate consensus-building processes or multicenter studies aimed at developing clear, evidence-based guidelines. Suggested focus areas should include the following:

- Timing and dosing of protamine administration
- Half-dose protamine, fully reverse, or allow natural half-life
- Role of point-of-care monitoring (eg, activated clotting time, thromboelastography, rotational thromboelastometry)
- Consideration of ECMO with coated surfaces
- Management protocols for high-risk bleeding
- Special considerations for patients receiving direct thrombin inhibitors or dual antiplatelet therapy

Standardizing the anticoagulation reversal approach in this setting could reduce complications and improve early ECMO outcomes as suggested in Figure 1.

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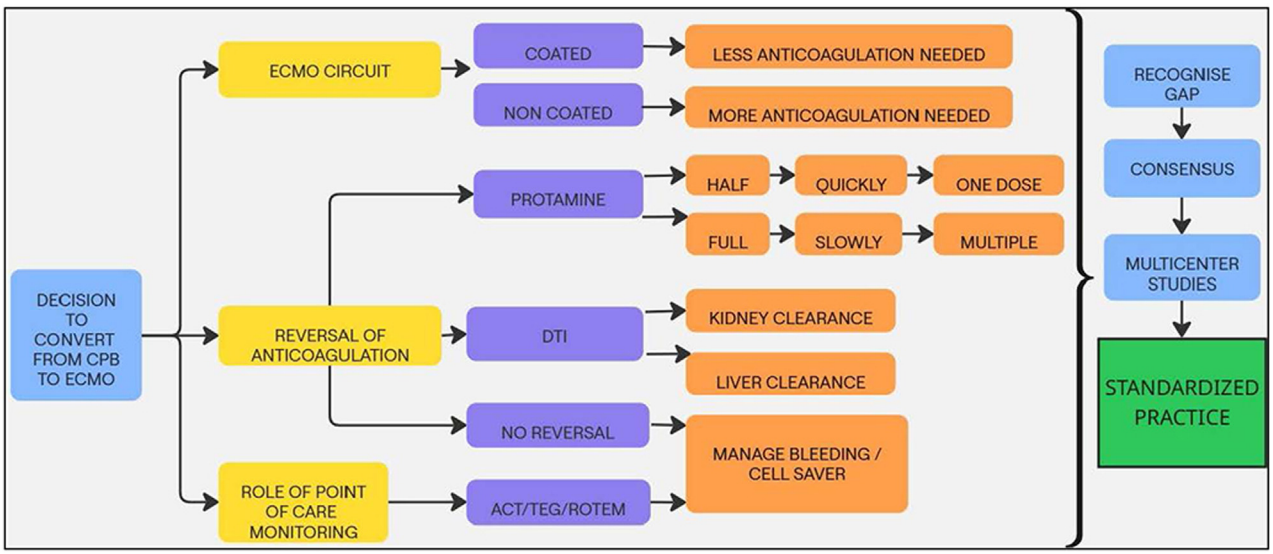

FIGURE 1 A flowchart outlining the key considerations and decision-making pathways involved in transitioning from cardiopulmonary bypass (CPB) to extracorporeal membrane oxygenation (ECMO). This structured approach aims to optimize safety and consistency in clinical practice. (ACT, activated clotting time; DTI, direct thrombin inhibitor; ROTEM, rotational thromboelastometry; TEG, thromboelastography.)

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