

Ethical challenges in extra corporeal membrane oxygenation use

Tony Makdisi¹, George Makdisi²

¹Palliative care division, University of Massachusetts Medical School, Berkshire Medical Center, Pittsfield MA, USA; ²Division of cardiothoracic surgery, University of South Florida, Tampa General Hospital, Tampa FL, USA

Correspondence to: George Makdisi, MD, MPH, MS. Division of cardiothoracic surgery, University of South Florida, 5 Tampa general circle, Suite 820, Tampa, FL 33606, USA. Email: gmakdisi@hotmail.com.

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Introduction

According to the Extracorporeal Life Support Organization (ESLO) registry, mechanical circulatory support (MCS) was used in over 7,900 cases in 2015, comparing to approximate 3,400 case 5 years prior (1). This vast increase in the number treated with MCS and ECMO of patients with severe cardiac and pulmonary dysfunction refractory to conventional management, with ECMO support we can control gas exchange and perfusion, decrease the risk of ongoing iatrogenic injury, and allow ample time for evaluation, diagnosis, treatment, and recovery from the primary injury or disease (2), ECMO is also being used now as bridge to cardiac and lung transplant and support for lung resections in unstable patients (3-7). This immense increase of patients treated with ECMO raises novel ethical challenging questions due to the uncertainty of the outcome as well as lack of clarity on the intended treatment direction, whether bridge to recovery or bridge to lifetime mechanical support or bridge to transplant or even “bridge to nowhere” (8,9) when the patient is not a candidate for any transplant and will not likely to recover which means no clear end treatment point or definite cure for such patients, this outcomes that could be considered by some to be “worse than death” (10,11). These ethical questions include what patients should be treated with ECMO? Is ECMO use in the patient’s best interest? This decision should be balanced against non-maleficence of the patient. Whether or not it is ethical to perform ECMO without full evaluation of patient condition? When the ECMO support should be stopped (12)? Is the goal quantity of life or quality of life? Are we helping the patient or just delaying death? Other questions could be raised: about patient’s autonomy, whether decision about using ECMO should involve

patient’s surrogates, and the issues of informed consent in this emergent condition and limited time available before initiation the support; whether it is justified to have patients or surrogates sign documents stating that the circuit will be withdrawn if the ECMO-specific goals are not met; whether it is appropriate to continue ECMO in brain dead potential organ donors (13,14). A recent ethics committee consultations review found that the most common ethical issue involved disagreement about the ongoing use of ECMO, which included multiple axes: disagreement among health care providers, disagreement among surrogates, and disagreements between health care providers and surrogates over stopping or continuing ECMO (15). These questions hard to be categorized in guidelines; however, in this article we discuss these questions through patient’s scenario.

Case part (I): emergency: it is the only way to save his life now! It needs to be done now!

A 62 years old male found unresponsive by his wife. She called 911 and started cardiopulmonary resuscitation (CPR) for 9 minutes before the arrival of emergency medical services (EMS), the patient was intubated, CPR was continued, and multiple cardioversions were needed to be converted from ventricular fibrillation to sinus rhythm. Upon arrival to the hospital he underwent an emergent cardiac catheterization, two stents were placed in the mid left anterior descending artery and the right coronary artery, and he was placed on therapeutic hypothermia protocol. Some hours later the patient developed refractory ventricular tachycardia (VT storm), our ECMO team was consulted for circulatory support, at this time there is no information about the brain condition, no studies were performed to

assess his brain function while he is on hypothermia protocol. The indication of ECMO support was questionable without exit strategy if there is brain injury, to ensure the patient's beneficence the decision was made to proceed with ECMO support to give the patient the benefit of the doubt, and if he is neurologically intact the ECMO will help supporting him while performing any ablation therapy. These concerns were quickly explained to the patient's wife while the team was preparing to perform ECMO insertion, the patient's wife was under immense emotional stress, she consented for the ECMO, acknowledging that this was the only opportunity 'to save his life at this time' and stating that any potential complications are worth the risk.

The patients who needs an ECMO support are acutely ill, lost their autonomy, as they are unable to participate in decision-making and decide their own care. The patient's family often leans toward more aggressive therapies hoping for reversal of his condition and recovery. The family and the ECMO team are under time pressure to make decisions and intervene rapidly assuming patients' beneficence to support the patient in extreme situations in which the patient is in cardiogenic shock or while performing CPR. The unclear outcomes, if the ECMO was adequate treatment or the primary condition is untreatable, along with the uncertainty about the exit strategy. On the other hand emergent cases do not allow for clear and thoughtful conversations between the clinical team and the patient's family, which could ultimately compromise the process of informed consent. Surrogate decision makers may be pressured while having little time to review consent documentation and fully absorb and understand the clinical risks and benefits of such emergent therapies (16). Additionally, hurried clinicians may oversimplify these complex interventions, or presenting it as "the only option for the patient to live" without offering enough details about potential complications, the goals of support or when the treatment is futile (17). Although a prospectively well prepared conversation is not always feasible during such emergencies, ECMO team must try to provide the key elements of appropriate informed consent, including essential information regarding the device risks, benefits, and the limitation of this technology, ensuring that there is understanding of the information provided.

Case part (II): Continuity of support, complications: I am not sure this is "the way he likes to live"

A peripheral VA ECMO "using femoral vein and artery"

was initiated on 25 minutes of making decision. During the first few hours the patient developed compartment syndrome in the same side of ECMO insertion, vascular surgery was consulted and a four compartments fasciotomy was performed, and the ECMO cannula was switched to the contralateral side. After the reversal of hypothermia, the patient continued to develop leg ischemia, and the vascular surgery recommended above knee amputation. The wife had a lot of concerns about amputation she was not sure if the patient is willing to accept that, specially his job requires a significant physical activity and carrying, also she was not sure that "this is the way he likes to live" but finally, after long discussion with the ECMO team, ICU and ethic team she agreed to proceed to give him more chance to live, and a left above knee amputation was performed.

During the ECMO support, earning the family trust and confidence is crucial; this might help in resolving and managing conflicts that might occur between the families and the health care team. It is important also to maximize patient's comfort, to ensure patients' non-maleficence. This trust and alliance with the family could be achieved with multiple multi-disciplinary family meetings involving primary physicians, social workers, spiritual advisors, psychologists, palliative care specialists and the immediate care providers and hospital ethics committees. The family should be informed with a defined time and goals of support and clear transparent updates, whether it is recovery or deterioration in patient conditions, as well as the expectation for patient condition after ECMO separation.

Case part (III) withdrawal of care: there is no hope we should stop!

After hypothermia reversal, in the next few days the VT storm was under control with medications, minimal bleeding of the amputation stump, the patient didn't show any neurologic improvement and brain CT scan showed severe irreversible brain injury not compatible with normal life. The ECMO support was stopped with family agreement 8 days after the ECMO.

Whenever, an ongoing ECMO support is futile or no longer meets its intended goals, or when the outcome is not optimal or the quality of life is not acceptable according to the patient or family wishes, a discussion of limiting treatment to either no escalation or withdrawal of life support should be considered (8). It is important not to force patient's family into making decisions that are against their beliefs and to provide them with adequate

psychological support through and after the process, it is also important to understand their emotional needs, and understand the problem from their prospective (16). It might be helpful to explain that withdrawal of care is not abandoning the patient, but is the best treatment option available at this time; that we can offer according to the patient's wishes. When the treatment is futile, the ECMO withdrawal becomes in the best interest for the patient, if the surrogates are unable to make decision about the ECMO separation, the final decision is medical decision and we should proceed with ECMO withdrawal to ensure non-maleficence of the patient. The ECMO team and the ICU team personnel as well, would benefit from team meetings with debriefings about the case and psychological support.

The process of ECMO separation should be thoughtfully coordinated and facilitated by a multidisciplinary team around patient comfort and family support (17). This support should include along with the ECMO team, the ICU team, a comfort care plan, psychiatric, spiritual and social support team. The timing of ECMO separation should be chosen by the family members; this will give some reasonable time for bereavement, and allow time for extended family to say goodbye prior to ECMO separation.

Summary

ECMO is typically initiated emergently; which leaves little time for a well-defined consent and a sustained conversation with the patient's family about the ECMO support goals, the expectations, the duration of support, as well the acceptable functional outcomes by the patient. While the patient is on ECMO support, the family should be informed with a regular transparent updates if any progression or regression in patient condition. This is better to be harmonized by multidisciplinary team-based approach; early involvement of ethics team in routine care of ECMO patient should be considered. Attention to the associated ethical issues is of great importance as more evidence in regards to its indications, policies and ethical use is needed.

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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