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EDITORIAL

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Pushing the boundaries for the use of ECMO in acute hypoxic respiratory failure

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Extracorporeal membrane oxygenation (ECMO) has an established place in the treatment of acute cardiorespiratory failure in children based on over 25 years of accumulated clinical experience. The Extracorporeal Life Support Registry (ELSO) database now contains outcome data on over 20,000 patients with survival rates varying between more than 80% in neonates to 40–50% in older children and adults. In 1996 a randomized trial in the United Kingdom showed better outcomes in neonates with severe respiratory failure treated with ECMO compared to conventional ventilation [1]. There has been no equivalent study in older children, and although ECMO has been used for the treatment of adults with ARDS since the 1970s, two randomized trials have failed to show superiority to standard treatment [2, 3]. Despite this there has been encouraging single-centre experience of the successful use of ECMO as rescue therapy in adults with ARDS and following lung transplantation [4, 5, 6, 7, 8]. This, combined with criticisms of study design in the original trials, has prompted the launching of a further randomized controlled trial on the use of ECMO in adults with acute hypoxic respiratory failure (AHRF) in the United Kingdom. Despite the lack of high-level efficacy data in children there have been increasing numbers placed on ECMO at a time when neonatal ECMO numbers are falling, due to changes in ventilation strategy which now includes pressure limitation and the use of high-frequency oscillatory ventilation and inhaled nitric oxide. Advances in oxygenator technology have extended the life of ECMO circuits and has led to a reduction in complications associated with bleeding. This has emboldened people to push the boundaries of ECMO into areas such as AHRF associated with hematological malignancy and bone marrow transplantation, which were previously thought to be contraindications [9, 10].

The case report by Macintosh et al. [11] in the *Intensive Care Medicine* merits publication because it takes ECMO into uncharted waters where many would have not considered it an option, i.e., a patient with undiagnosed lung disease and prolonged (20 day) period of mechanical ventilation with pulmonary barotrauma who was also immunosuppressed. Most or all of these factors would have been considered contraindications in most ECMO centres. While there might be some discussion about some of therapeutic choices prior to cannulation, we should applaud the authors' perseverance and tenacity. What could be a better outcome than a live and intact child after an acute life-threatening illness. At the same time we should acknowledge that successful case reports are the ones that get published, not the heroic failures, and people should think carefully about the potential exit strategy before instituting ECMO. The availability of high-tech life support sometimes results in the ethical dilemma of withdrawal of therapy several weeks down the road when there is no lung recovery in an otherwise intact child. The best outcomes in ECMO support will always be seen in children with single-system pulmonary disease with a known cause rather than in patients with acute respiratory distress syndrome and multiple organ dysfunction. In the meantime we should await with interest the results of the current randomized trial in the United Kingdom to see whether the use of ECMO in adults with AHRF takes on a new lease of life.

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