

Our experience with VV ECMO-assisted surgery: case report series

Chovanec Z.^{1,2}, Pestal A.^{1,2}, Berkova A.^{1,2}, Cervenak V.^{2,3}, Penka I.^{1,2}, Cundrle I.^{2,4}

¹1st Department of Surgery St. Anne's University Hospital Brno, Czech Republic

²Faculty of Medicine, Masaryk University, Brno, Czech Republic

³Department of Medical Imaging, St. Anne's University Hospital Brno, Czech Republic

⁴Department of Anesthesiology and Intensive Care, St. Anne's University Hospital Brno, Czech Republic

Veno-venous extracorporeal membrane oxygenation (VV ECMO) is a technique of extracorporeal support that facilitates blood gas exchange, enabling the complete replacement of lung function for a specified duration, such as during surgery. By using this method, we are able to provide surgical treatment to highly selected patients who would otherwise be unable to undergo thoracic surgery, including tracheal/carinal surgery and high-risk one-lung ventilation due to previous lung resection or severe lung impairment. This case series presents our experience with elective and acute ECMO-assisted thoracic surgery (excluding lung transplantation and cardiac surgery).

Key words: veno-venous extracorporeal membrane oxygenation, thoracic surgery, acute respiratory distress syndrome.

Naše zkušenosti s VV ECMO asistovanou chirurgií – série kazuistik

Veno-venózní extrakorporální membránová oxygenace (VV ECMO) je metoda mimotělní podpory zajišťující adekvátní okysličení a eliminaci oxidu uhličitého. Touto metodou jsme schopni poskytnout chirurgickou léčbu vysoce selektovaným pacientům, kteří by jinak nemohli podstoupit hrudní operaci (tracheální/karinná chirurgie, rizikové ventilace jedné plíce z důvodu předchozí resekce plic nebo těžkého postižení plic). Tato série kazuistik představuje naše zkušenosti s elektivní a akutní hrudní chirurgií asistovanou VV ECMO (kromě transplantace plic a kardiochirurgie).

Klíčová slova: VV ECMO, hrudní chirurgie, akutní respirační selhání.

Introduction

To facilitate access to vascular structures and bronchi, lung resection surgery is typically performed with selective intubation and ventilation on a collapsed (non-ventilated) lung. Acute respiratory distress syndrome (ARDS) is one example of a medical condition that can make one-lung ventilation difficult or impossible. Other examples include a previous pneumonectomy, a planned lobectomy in a patient who has already undergone a bilobectomy or lobectomy on the other side, and severe bullous emphysema of the lung that remains untreated. Also, selective intubation might not be possible for patients who have tracheal stenosis, tracheomalacia, injured tracheobronchial tree, or pressure on the tracheobronchial tree from the outside (mediastinum).

The thoracic surgeon must anticipate these non-standard situations and, if necessary, consider a possible alternative to ensure safe surgery with adequate ventilation. One option that may completely replace

lung ventilation is veno-venous extracorporeal membrane oxygenation (VV ECMO). VV ECMO support facilitates blood gas exchange and can entirely replace lung function for a specified duration, such as during surgery [1]. Unlike cardiopulmonary bypass, VV ECMO can continue post-thoracic surgery for days or weeks. With its use, we are able to offer safe surgical treatment to highly selected patients in whom benefits outweigh the risks. Despite its potential benefits, the intraoperative use of VV ECMO in thoracic surgery remains rare, often reserved for transplant surgery departments [2].

In our cases, the indications for elective VV ECMO-assisted surgery included either impossible or high-risk selective intubation and/or one-lung ventilation in patients who were otherwise functionally capable of lung resection. Indications for acute VV ECMO-assisted surgery were surgical interventions in patients with respiratory failure (ARDS) including empyema, lung abscess, bronchopleural fistula, and massive air-leak and lung necrosis.

KORESPONDENČNÍ ADRESA AUTORA:

Ivan Cundrle Jr., M.D., Ph.D., Ivan.Cundrle@seznam.cz

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