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Veno-Pulmonary Extracorporeal Life Support in Lung Transplantation using ProtekDuo Cannula: A Systematic Review and Description of Configurations

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Submitted for publication.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 14 June 2024 and was last updated on 14 June 2024.

INTRODUCTION

Review question / Objective ECMO as a bridge to lung transplantation (LTx) is an established approach for refractory ARDS and end-stage lung disease in the context of pulmonary hypertension (PH) and RV dysfunction. An alternative approach for RV support is the use of the ProtekDuo, which is a single-site dual-lumen cannula for percutaneous insertion through the right internal jugular vein and placement of its tip in the main pulmonary artery. The proximal fenestration of the cannula drains venous blood from the right atrium (RA) to the ECMO system and re-infuses it into the main pulmonary artery through the distal fenestrations. This configuration, namely (dl)V-P ECMO, bypasses the RV leading to suitable and effective RV assistance. The use of VP ECMO may mitigate the development or progression of right ventricular dysfunction and lead to a potentially different outcome considering that VV ECMO is challenged by the onset of RV dysfunction and may require reconfiguration to V-P ECMO. The addition of an oxygenator membrane lung (ML) provides VV ECMO support with reduced potential for recirculation. Single-site dual-lumen VP ECMO cannulation has been used to provide haemodynamic support in different settings. Although versatile and with important clinical advantages, the use of V-P ECMO configuration is still relatively new, and its adoption may be slow and infrequent compared to the standard of care VV ECMO. Although there is wide recognition of the use of VV ECMO support in bridging critical patients to lung transplant, we sought to review the use of the ProtekDuo in this challenging setting and how its role is currently evolving.

Condition being studied Refractory ARDS and end-stage lung disease in the context of pulmonary hypertension (PH) and RV dysfunction.

METHODS

Participant or population Patients with refractory ARDS and end-stage lung disease in the context of

pulmonary hypertension (PH) and RV dysfunction requiring bridge to lung transplantation.

Intervention The use of VP ECMO with ProtekDuo cannula as a bridge to lung transplantation.

Comparator n/a.

Study designs to be included Case series, case reports, observational studies and cohort studies, randomised prospective trials.

Eligibility criteria Inclusion of prospective and retrospective clinical studies; case series and case reports. Exclusion of case reports with less than 3 patients, editorials, review articles, letters, abstracts, and any non peer reviewed publications.

Information sources A web-based literature search on PubMed and EMBASE.

Main outcome(s) Despite the present limited evidence, the use of ProtekDuo has become very promising for the management of end-stage lung disease as a bridge to lung transplantation. Perseverance and liaison with ELSO may increase awareness and usage.

Quality assessment / Risk of bias analysis The literature was screened for any relevant publication on the subject followed by a redundancy check. All authors contributed to the selection of the eligible articles that would be included in the systematic review. Discordances were addressed by consensus.

Strategy of data synthesis The literature was screened for any relevant publication on the subject followed by a redundancy check. All authors contributed to the selection of the eligible articles that would be included in the systematic review. Discordances were addressed by consensus.

Subgroup analysis The literature was screened for any relevant publication on the subject followed by a redundancy check. All authors contributed to the selection of the eligible articles that would be included in the systematic review. Discordances were addressed by consensus.

Sensitivity analysis n/a.

Country(ies) involved United Kingdom, United States, Germany, The Netherlands.

Keywords ECLS; ECMO; Extracorporeal Membrane Oxygenation; Lung Transplantation; ProtekDuo; Right Ventricular Assist Device.

Contributions of each author

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