Introduction: Blastomycosis dermatitidis is a dimorphic fungus endemic to North America capable of causing fatal respiratory failure in immunocompetent adults (1,2). Acute respiratory distress syndrome (ARDS) complicates up to 10% of pulmonary Blastomycosis in hospitalized patients and is associated with mortality of 50-90% despite maximal medical therapy and ventilatory support (3-6). Currently there are no case reports of survival following extracorporeal membrane oxygenation (ECMO) in this clinical setting (7,8). We present a case series of three patients with severe, refractory Blastomycosis related ARDS successfully treated with ECMO.

Objectives: Our primary objective was to describe the applicability of ECMO in the setting of Blastomycosis associated ARDS.

Methods: We performed a retrospective review of our ECMO database for patients treated with veno-venous ECMO for Blastomycosis from 2009-2013.

Results: Three previously healthy adults aged 21, 22, and 39 were referred from isolated locations in northwestern Ontario in late fall or winter with progressive respiratory illnesses. Patients reported 3-10 day prodromes of cough with expectoration, fever, malaise, and dyspnea. On presentation, common vital sign abnormalities included fever (temperature 38.9-39.3°C), tachypnea (respiratory rate 38-48), and hypoxemia (room air SaO2 78-92%). All patients developed severe bilateral opacities on chest radiography (Figure 1). Patients A and B required intubation within six hours of presentation for hypoxemic and mixed respiratory failure respectively. Patient C was initially managed with bilevel positive airway pressure ventilation and was intubated for progressive hypoxemia at hour 48. All patients satisfied Berlin criteria for severe ARDS, with trough PaO2/FiO2 ratios of 58, 61, and 55 on respective PEEP levels of 16, 24, and 12 cmH20(9). Murray lung injury scores were 4, 2.75, and 3.75. Endotracheal or BAL samples demonstrated broad-based yeast consistent with Blastomycosis at hours 24, 12, and 48 respectively. All patients subsequently received treatment with liposomal amphotericin B. Despite lung protective ventilation strategies and maximal FiO2 (patients A-C), neuromuscular blockade (patients A,B), and inhaled nitric oxide at 40ppm (patient A), progressive hypoxemia resulted in use of veno-venous ECMO at hours 42, 58, and 24 of mechanical ventilation. Access was obtained via 19/21F common femoral venous cannulae (patient A) and 31F Avalon bi-caval dual lumen catheters (Patients B and C). Initial flow rates were 4-5.5L/min allowing de-escalation of mechanical ventilatory support (Figure 2). All patients were decanulated from ECMO (day 12, 8, and 23), liberated from mechanical ventilation (day 19, 18, and 48), and survived to discharge or rehabilitation facility. Patient A’s course was complicated by acute kidney injury requiring continuous renal replacement therapy which recovered completely. Patient B developed a mycotic cerebral vasculitis. On discharge to a community facility, the patient had mild antegrade memory disturbances but was near their cognitive baseline. Seven days after decanulation, patient C sustained a 15 minute PEA arrest due to tension
pneumothorax. Despite therapeutic hypothermia, an anoxic cerebral injury occurred requiring prolonged rehabilitation. Seven months later the patient returned home and is independent with many activities of daily living.

Figure 1: AP Chest Radiography at Initiation of Extracorporeal membrane oxygenation

Patient A  Patient B  Patient C

Figure 2: Respiratory Support following ECMO

(i) PEEP Levels  (ii) Peak Inspiratory Pressure  (iii)\(\text{PaO}_2/\text{FiO}_2\)

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<th>Time (hours) from ECMO Initiation</th>
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- Patient A
- Patient B
- Patient C