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Extra Corporeal Membrane Oxygenation (ECMO) in Severe Pulmonary Tuberculosis: A case study

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Introduction

Each year 2.2 million people develop TB in India and estimated 2,20,000 die from the disease. There are two main types of drug resistant TB: MDR-TB and XDR. Globally in 2015 the World Health Organisation (WHO) estimated that 3.9% of new cases and 21% of previously treated cases of TB were of MDR/RR-TB. Active pulmonary TB is a rare primary cause of acute respiratory failure (ARF) however, high mortality rates have recently been reported in patients with ARF arising from TB. In-hospital mortality of tuberculosis patients remains high, especially among those requiring admission to the intensive care unit (ICU) and mechanical ventilation (MV). Tuberculosis patients requiring ICU care may also develop acute respiratory distress syndrome (ARDS). ARDS severe enough to require ECMO support is estimated to occur in nearly 5 to 10 cases per million populations per year.

Case Report

A 31 year old married female Diabetic on OHA, diagnosed with pulmonary TB on ATT started four days back came with chief complaint of high grade fever for one month, dry cough for one month. Her BAL done outside showed AFB(3+) and CECT chest showed Bilateral cavitatory lesions with infiltrates and mediastinal and Axillary lymph nodes. Pulmonology consult was taken. Patient was started on insulin infusion for high sugar and urine ketones positive. Initially patient was managed on BIPAP 14/8 for tachypnoea being hemodynamically stable and conscious with pH 7.3, pCO_2 47.1, pO_2 173. Her 2D Echo showed EF 50% with no RWMA. Her CXR showed bilateral infiltrate with consolidation. On 31/3 she was intubated for increasing tachyponea and tachycardia. Antibiotics were upgraded empirically to meropenem, collistin and anti fungal voricanazole to provide broad spectrum coverage. Post intubation on FOB was done which showed inflamed mucosa.

BAL sample was taken She required FiO_2 of 1.0 with PEEP 8-10 and plateau pressure reaching 30 cm H_2O. With her P/F ratio of less than 100 and not improving with conventional ventilatory strategy the family was counselled about requirement of VV ECMO. On 2/4 she was put on VV ECMO with pH 7.53 pCO_2 47 pO_2 50. Heparin bolus of 6000U was given baseline ACT 436. Flow was set at 4L with gas flow of 4L/min. All investigations were carried out as per institutional ECMO protocol. Post ECMO ventilators setting were changed to PCV-AC mode withFiO_2. 40 pressure of 20 PEEP 6 FiO_2. 6 f 12. ABG showed improvement pH 7.515 pCO_2 44.2 pO2 87.7 Lac 1.7. She was started on anti-influenza treatment which was stopped after report was negative. Also systemic steroids like hydrocortisone injection were started in consultation with Pulmonologist. Her urine culture grew *E.coli* for which antibiotics were changed according to susceptibility. ACT target was kept between 150-160.BAL stain was AFB positive .RT feeding was started. Flow on ECMO reduced to 3.7 and sweep gas flow to 3L/min. Sedation was stopped and patient tolerated CPAP Psupp 12 PEEP 8. CXR showed B/L infiltration and NCCT chest showed B/L consolidation.

ECMO Day 7 flow was reduced to 2.9L/min with sweep gas flow of 2.5 L/ min. Negative fluid balance target of around 500 ml was achieved each day. Day 8 ECMO flow reduced to 2.5 L/min and sweep gas flow to 2L/min. Day 8 ECMO wean off trial was given, which patient tolerated well. On Day 9 of ECMO patient was decannulated uneventfully. All throughout patient was conscious and followed commands.

Discussion

The year 2015 is a watershed moment in the battle against tuberculosis (TB). It marks the deadline for global TB targets set in the context of the Millennium Development Goals (MDGs), and is a year of transitions: from the MDGs to a new era of Sustainable Development Goals (SDGs), and from the Stop TB Strategy to the End TB Strategy. TB mortality has fallen 47% since 1990, with nearly all of that improvement taking place since 2000, when the MDGs were set.

The mortality of ARDS patients with PTB requiring MV is relatively high compared with that of patients with ARDS from other causes. ECMO becomes a useful treatment option to have in these type of patients. Understanding the occurrence rate, Prevalence or Incidence rate in such a rare case is not possible. Many more reporting of such cases are needed in our country to understand the disease. Further it can

not be studies in western countries where Tuberculosis is not seen. Epidemiological discussion need to be understood when more studies are carried out in this direction.

In previous cases reported by Cogilandro et al in Italy patient underwent 3 months ECMO for PTB. In another case by Japanese author Omote et al ECMO for pulmonary TB went on for 52 days. In India this is the first case reported of Acute respiratory failure managed on ECMO, where we were able to wean of and remove ECMO by 10 day. As compared to the cases world over we were able to remove in short span of time. The use of systemic steroids early during ECMO support helped us in reducing the duration of ECMO and early weaning by reducing fibrosis and thus improving pulmonary reserve. By reducing the number of ECMO days we were able to avoid large numbers of unwanted complications. PTB patients have slow healing process which is the reason for prolonged cannulation during previous studies. The use of ECMO in PTB related severe ARDS is limited to few case studies with no major trials been to support its morality benefit. Ours may be the first of the cases in India who have successfully treated PTB with severe ARDS on ECMO.