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ECMO in the HIV population

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Pulmonary infection and respiratory failure are the most common causes of admission to the intensive care unit (ICU) in human immunodeficiency virus (HIV)-positive patients.[1,2]

In our experience, in a developing nation (despite the advent of HAART), the commonest cause of admission to ICU and mechanical ventilation still remains Pneumocystis jiroveci pneumonia (PJP). Most of these patients presenting with PJP have not been on antiretroviral therapy (ART) or been treated with PJP prophylaxis, and it is highly likely that this is their first time presentation to hospital.[3] The advent of highly active antiretroviral therapy (HAART) has allowed for more effective treatment of HIV-positive patients; however, despite this, PJP remains the most common acquired immunodeficiency syndrome (AIDS)-defining condition and is associated with much morbidity and mortality, in both developing and developed nations.[4] In developed countries, mortality may reach up to 85%, while, in developing countries, the mortality figure nears 100%.[3,5] In consideration of the above mortality figures, it may be said that conventional mechanical ventilation (CMV) has failed to improve outcomes (and reduce morbidity) in HIV-positive patients who present with severe acute respiratory failure (ARF), especially in cases caused by PJP.

This has opened the door to using extracorporeal membrane oxygenation (ECMO) as a treatment modality. We found that ECMO was used with good success in treating these patients, with a much improved survival rate (see Table 1). Most of our patients were newly diagnosed HIV positive, and were not on HAART at the time of admission. HAART was immediately initiated in the ICU once the HIV diagnosis was made. We found a 68% overall survival of our HIV-positive patients who received ECMO treatment and a 61% survival of the PJP subset of patients. Of note is the median duration of ventilation required: 9 days. This is significantly shorter than our

Table 1. Retrospective analysis of 22 HIV-positive patients requiring ICU admission to private healthcare facilities.

Variable	*N*	Mean	SD	Median
Age (Years)	22	40.6	9.6	38.5
CD4 count on admission cells (cells/μL)	20	51.6	43.5	*41*
Murray score pre-ECMO	17	3.3	0.2	*3.5*
Worst PF ratio pre-ECMO	22	95.6	56.4	*79*
Worst PaO_2 pre-ECMO (mmHg)	22	65.5	31.7	*53.35*
Worst pH pre-ECMO	22	7.3	0.1	7.33
Lowest systolic BP pre-ECMO	21	107.5	25.4	104
Duration of ECMO (days)	22	11.3	7.2	*9.5*
Duration of ICU stay (days)	22	23.1	15.0	*18*
MSOF score at the time of ECMO	21	2.0	0.9	2
Albumin level at the time of ECMO (g/L)	19	23.6	5.4	24
Duration of ventilation in the ECMO unit	22	8.7	6.6	*9*

Note: Permission to report this data was obtained from the administration of each hospital where these patients were treated, which was granted provided patient confidentiality was maintained.

pre-ECMO experience in severe ARDS PJP patients ($p = 0.020$), where most patients were ventilated for significantly longer than 9 days. Also noteworthy is that the median duration of ECMO was 9.5 days. While on ECMO, we identified two factors that were clearly associated with poor outcomes in our series of patients with PJP:

1. Duration of ECMO. Patients who survived had an ECMO run of 7 days on average and those who died were on ECMO for >13 days;
2. The need for inotropic support while on ECMO was a strong predictor of mortality.

We found that CD4 count was not a predictor of mortality.
This suggests that ECMO is a viable and effective treatment for HIV-positive patients who present with severe ARDS.

Keywords: HIV, ECMO, PJP, conventional mechanical ventilation, HAART, survival benefit

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