**Case Report**

**Veno-Venosus-ECMO support in a patient with ARDS after aortic dissection surgery: A novel double finding**


Department of Cardiovascular, Respiratory, Nephrological, Anesthesiological, and Geriatric Sciences, Policlinico Umberto I-Sapienza University of Rome, 00161 Rome, Italy

*Corresponding Authors e-mail: giovanni_truscelli@yahoo.it; luigitritapepe@gmail.com

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**Abstract**

Veno-Venosus-ECMO (vv-ECMO) represents a life support treatment in patients with an acute respiratory failure. The association between H1N1 and ECMO is reported. However, the correlation between vv-ECMO with post-operative acute respiratory failure, following aortic dissection was not found. So, we describe a double novel finding: a post-operative ARDS, after aortic dissection, treated with vv-ECMO in a patient with H1N1 infection.

**Keyword:** Vv-ECMO, H1N1, acute aortic dissection, ARDS, Sofa score, Oxygentation index, multiorgan failure, Sofa “delta score”.

**Case report**

A 68-years-old male was admitted to our department for an A-type acute aortic dissection, according to Stanford classification.

He was undergone, in emergency, to a corrective surgery consisting in the replacement of the ascending aorta with a vascular prosthesis (Hemabridge-Hemashield Platinum D: 30mm x 10mm L:50 cm). In the last days, the patient presented fever and cough.

In his clinical history, there was a previous aortic mechanical valve replacement and he was taking daily oral anticoagulants. The normalization of his coagulative pattern was obtained, before surgery, with 6 plasma bags. Furthermore, during the operation 10 more plasma bags and 6 units of packed red blood cells were infused.

The intra-operative transesophageal echocardiography (TEE) showed the prosthesis, the aortic dissection and a moderate reduction of ejection fraction (EF 45 %) (Figure 1).

After the procedure, the patient was transferred to our intensive care unit (ICU) where 6 more units of packed red blood cells were transfused.

The patient's clinical condition was very good and it remained stationary for the following hours.

Evaluation of respiratory and hemodynamic parameters was performed by blood gas analysis (PaO$_2$/ FiO$_2$ 158, SatO$_2$ 98%, pH 7.26, PCO$_2$ 66 mmHg, Lactates 3.7 mmol/L, Hb 8.1 g/dl), Swan-Ganz catheter (Cardiac Index 2.6) and chest X-rays.

However, thirty six hours later this revealed a progressive bilateral infiltrates with no evidence of left atrial hypertension (Figure 2).

According to Berlin Definition, an acute lung injury (severe ARDS) diagnosis was done (PaO$_2$/FiO$_2$ 38, pCO$_2$ 71 mmHg, SatO$_2$ 84%; pH 7.31, Lactates 4.7 mmol/L, SvO$_2$ 40 %, CI 3.6 mmol/L, Wedge Pressure 17 mmHg).

Furthermore, microbiological examination highlighted a
coexistent H1N1 infection. Although conventional therapy was administered, clinical condition worsened in a short time. The Sofa score (14) and Oxygenation index (65,8) was calculated.

Therefore, veno-venous-ECMO (vvEcmo) cannulation was inserted in the right internal jugular vein and right femoral one (Edwards 24 Fr) with a settings support of: FiO$_2$ 100%, 3070 RPM (rotation per minutes), FGF (free flow gas) 7 l/min, CO (cardiac output) 5,1 l/min, with reduction of FiO2 until 40%. Patient was sedated with DEXMEDETOMIDINE 0,7 γ/kg/h and remained ventilated during the whole period of ECMO treatment, with a positive pressure support of 12 mmHg, until his extubation.

The procedure lasted about six days and there was a reduction of both Sofa score (8) and Oxygenation index (6,9).

However, the course was complicated by acute kidney injury, treated for 20 days with dialysis (CVVH; continuos veno-venous hemofiltration).

There was an improvement of the patient’s clinical condition and he was transferred to a rehabilitation hospital.

**DISCUSSION**

The H1N1 infection here reported represents a very unusual association with acute aortic dissection and, as during H1N1 pandemia, the ECMO was indicated for the improvement of sudden hypoxemia (Martinez and Vuylsteke, 2012). Few published articles are present in literature regarding the vv-ECMO cannulation and postoperative acute respiratory failure, following cardiac surgery (Fukushima et al., 2002; Nakamura et al., 2013; Pieri et al., 2013).

However, authors emphasize this case report as a very unusual finding being the first one that highlights the association between aortic dissection and vv-ECMO use. The evaluation of clinical condition through scores helped us to choose the best management for this patient. In particular, Sofa score has provided us the risk connected with the critical conditions, while Oxygenation index gave us the indication for extra-corporeal membrane oxygenation. So, authors recommend their routine and simultaneous use in order to better evaluate the critically ill patient as a global index, especially in ICU.
According to the evidence based medicine, in our patient we have found a largely increased mortality rate (99%) related to the first 48 h (Ferreira et al., 2001; Vincent et al., 1996) and caused by the multiorgan failure (MOF).

However, this critical setting decreased with ECMO support. The Sofa “delta score” described a ‘wonderful’ evolution response and a dynamic daily progress connected to our mechanical circulatory assistance.

CONCLUSION

Vv-ECMO represents a life support treatment in patients with an acute respiratory failure.

The association between H1N1 and ECMO is reported. However, the correlation between vv-ECMO with post-operative acute respiratory failure, following aortic dissection was not found.

So, we describe a double novel finding: a post-operative ARDS, after aortic dissection, treated with vv-ECMO in a patient with H1N1 infection.

Authors emphasize the routine and simultaneous use of Sofa score and Oxygentation index as a “global index” for the best management for this patient.

Sofa “delta score” represents a ‘wonderful’ evolution response and a dynamic daily progress connected to our mechanical circulatory assistance.

The severe ARDS, as the one described, despite the ECMO has a high mortality. The association of ARDS and aortic dissection surgery could represent a 100% of mortality if clinicians wait for aggressive treatment.

We recommend immediate institution of ECMO therapy to avoid a progressive deterioration of clinical conditions, thinking of the ECMO as “extreme ratio” therapy.

REFERENCES


