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Research Article

**SWINE INFLUENZA (H1N1) COMPLICATED WITH ACUTE
RESPIRATORY DISTRESS SYNDROME (ARDS)
SUCCESSFULLY TREATED WITH VENO-VENOUS
EXTRACORPOREAL MEMBRANOUS OXYGENATION
(VV-ECMO): A CASE REPORT**

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Abstract:

Acute respiratory failure is a lethal complication of H1N1 influenza if not managed early and duly. It is the most common cause of death in H1N1 patients, especially in high-risk groups. An example of high-risk group are pregnant women and young children with chronic respiratory tract diseases and other co-morbidities. The use of VV-ECMO in patients with respiratory failure shows a promising substitution to the standard conventional therapies. The main indication of VV-ECMO is respiratory failure that does not respond to mechanical ventilation and medications. Here, we describe a case of post-partum H1N1 influenza complicated by severe respiratory failure not improved by mechanical ventilation, followed by cardiac arrest for three minutes who was then placed on VV-ECMO, from which she was successfully continued for nine days.

Key words: VV-ECMO; ARDS; H1N1 influenza, Case report.

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INTRODUCTION:

Swine influenza infection, which was described in 1918, is caused by influenza A H1N1 virus. On June 11, 2009, WHO raised the pandemic alert level to phase 6, indicating a global pandemic. In December 2009, Saudi ministry of health reported 15850 cases of H1N1 infection, with 124 deaths. H1N1 now is in post-pandemic period, but regional outbreaks are still ongoing. A study of the first 100 cases in Saudi Arabia, stated that influenza A H1N1 mostly involved children and young adults as a characteristic feature.

According to WHO, most of deaths occur in young groups. People at higher risk are pregnant women and young people of chronic respiratory tract diseases and other co-morbidities. Signs and symptoms of H1N1 can cause a very severe respiratory distress and even failure. The most common cause of death from H1N1 is respiratory failure. Most people don't need treatment or hospitalizations, but others are at very high risk of even death, and this is what makes it needs more attention and experience. However, some patients develop a severe form of respiratory distress that needs lung protection techniques such as mechanical ventilation, and in some cases, VV-ECMO [1].

We report a dramatic case of severe post-partum H1N1 infection complicated by ARDS who underwent a successful VV-ECMO after cardiac arrest. She had one of the most risk factors, further complicated by the most common cause of death.

CASE PRESENTATION:

A 35-year-old post-partum female presented to the ER with severe respiratory distress, and hypoxia. She had a history of upper respiratory tract infection and fever few days prior to giving birth by C-section. On physical examination, respiratory rate was 33/min, SpO₂ was 54% with peripheral cyanosis, heart rate was 116/min, and blood pressure was 110/70. She had bilateral crackles, more on the left side. Arterial blood gas showed severe respiratory acidosis, thus decision of intubation was taken. However, she developed cardiac arrest immediately. After intubation, CPR was done, and return of spontaneous circulation after 3 minutes was achieved. The patient was kept on mechanical ventilation and transferred to ICU.

The patient required full ventilator support with FiO₂ increased to 100% without improvement in oxygen saturation and ABG. Nitric oxide was added to improve oxygen saturation without significant improvement. Chest x-ray and CT-scan showed extensive bilateral diffuse pulmonary infiltration

consistent with ARDS. Multi-disciplinary team decided to put the patient on VV-ECMO to correct hypoxia and acidosis. Percutaneous cannulation using VV-ECMO was started by cannulating the right femoral vein (cannula-size 23 Fr.) for inflow and the right internal jugular vein for outflow. VV-ECMO started by using CARDIOHELP system (Maquet). After further evaluation, the patient was diagnosed with influenza virus type A (H1N1) infection. She was on Tamiflu, Imipenem, Vancomycin, and Azithromycin. VV-ECMO continued for 9 days. She showed significant improvement on VV-ECMO clinically, radiologically, and confirmed by ABGs. After weaning her from ECMO, patient extubated and stayed 6 more days in ICU before transferring her to medical wards.

DISCUSSION:

Nowadays, studies discussing the role of ECMO in patients with H1N1 complicated by ARDS, stated that ECMO represents a promising substitution to the standard conventional therapy. H1N1 influenza needs the attention and appropriate intervention because of its high occurrence in young patients, and also because of its severity in elderly, pregnant and obese patients [2].

The main indication of VV-ECMO, in particular, is respiratory failure that does not respond to mechanical ventilation and medications [3,4]. Precise measurements have to be taken before deciding the use of VV-ECMO, such as age and organ dysfunction. Normal cardiac function is necessary, because the re-oxygenated blood is returned into the venous system. So, patient's own circulatory system should be able to maintain perfusion. VA-ECMO is the choice for those who have cardiac dysfunction. In addition, the reversibility of conditions is important for the indication of VV-ECMO. Patients in whom VV-ECMO is not a choice are those who have advanced and/or irreversible disease, such as sepsis, multi-organ failure, irreversible neurological injury, terminal illness, end stage malignancy, risk of systemic bleeding with anticoagulation or other life-limiting diseases [5].

The outcome after using VV-ECMO in ARDS after H1N1 infection, in general, is dependent on the patient's baseline, the interval period between the start of mechanical ventilation and the start of ECMO, the early use of antibiotics and the presence of multi-organ failure and other co-morbidities. However, although there is no enough data in the literatures that covers all aspects of ECMO and related

issues to the procedure, existing studies suggested that the advantages of VV-ECMO in ARDS after H1N1 infection outweigh the disadvantages [4].

In our case, the baseline of the patient was perfectly evaluated, ECMO was connected for 9 days. Also, the elevated standards of the center and the short interval period between the start of mechanical ventilation and the start of ECMO gave a positive impact on the patient.

CONCLUSION:

The use of VV-ECMO in ARDS is a promising procedure, it needs more attention and experience. The indications and contraindications should be assessed according to the relative risk and outcome. However, the prediction of outcome is relatively dependent of the patient's baseline, time taken before the intervention, the early use of antibiotics and the presence of multi-organ failure and other co-morbidities.

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Abbreviations:

ARDS

VA-ECMO

VV-ECMO