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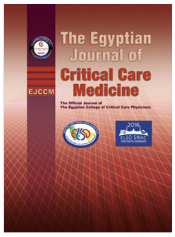

CASE REPORT

Veno-venous Extracorporeal Membrane Oxygenation in a case of organophosphorus poisoning

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KEYWORDS

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Abstract Extracorporeal Membrane Oxygenation (ECMO) is emergently used for long-term support of respiratory and/or cardiac functions. ECMO is most useful in cases when the primary lung insult is reversible. CESAR trial in 2009 showed survival benefits in severe ARDS patients when transferred to an ECMO center compared to those receiving standard care in their ICU.

Organophosphate (OP) compounds are large groups of chemicals used in domestic and industrial settings. These compounds are still used in different forms in developing countries. It can affect the respiratory system through causing: rhinorrhea, bronchorrhea, bronchospasm, cough and severe respiratory distress. Respiratory failure is the most life threatening condition and requires immediate intervention.

We present a case report of OP induced severe ARDS in which conventional lung protective ventilation failed to maintain adequate oxygenation that was accomplished by ECMO.

1. Introduction

Extracorporeal Membrane Oxygenation (ECMO) is used for respiratory function support. It is indicated for patients with severe ventilation and/or oxygenation failure who are unlikely to survive conventional lung protective mechanical ventilation [1,2]. ECMO is most useful when the primary lung insult is thought to be reversible [3].

Organophosphate (OP) compounds are diverse groups of chemicals used in both domestic and industrial settings [4]. These compounds are still used in different forms in developing countries in domestic uses [4]. It can affect respiratory

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system through causing: rhinorrhea, bronchorrhea, bronchospasm, cough, and severe respiratory distress. Respiratory failure and adult respiratory distress syndrome (ARDS) are the most life-threatening sequelae and require immediate intervention [5,6].

We here discuss a case report of a patient presented to our center after accidental ingestion of one of these compounds leading to development of severe ARDS.

2. Case report

A 14 year old female patient, actual body weight 50 kg with no relevant past medical history, presented to KasrEl-Ainy Toxicology Center, Cairo university, with a history of accidental ingestion of an organophosphorus compound (Chlorpyrifos). Routine management was initiated there in the form of general supportive measures, atropine and neostigmine. Two days after admission she complained of increasing respiratory distress coinciding with progressive hypoxemia and the appearance of bilateral lung infiltrates on CXR and CT chest (Fig. 1).

She was invasively ventilated on lung protective strategy using low tidal volume of 6 ml/kg, PEEP of 14 cm H_2O and an FiO_2 of 1, on an assisted volume control mode. She had an event of cardiac arrest in bradycardia that happened with progressive unresponsive hypoxia with successful resuscitation.

She was transferred to our center for the possibility of ECMO. When admitted she was sedated with propofol 0.05 mg/kg/min, paralyzed with atracurium 10 mcg/kg/min and maintained on vasopressors noradrenalin 0.1 μg/kg/min with her hemodynamic profile showing blood pressure 132/83 mmHg, heart rate 135 beat/min, temperature 36.8 °C and central venous pressure 8 cm H_2O. With sedation vacation, she regained consciousness after the cardiac arrest event.

Arterial blood gases showed pH 7.29, PCO_2 55 mmHg, PO_2 55 mmHg, HCO_3 26 mEq/L and O_2 Saturation of 75%. Prone positioning was tried with no improvement in oxygenation.

Murray Lung Injury Score was 3.25, PaO_2/FIO_2 ratio was 55, 3 quadrants affected in CXR, PEEP of 14 cm H_2O and lung compliance was 23 ml/cm H_2O.

Laboratory profile showed normal serum electrolytes and renal function. She was severely anemic with a hemoglobin level of 6.8 gm/dl, for which three units of packed RBCs were given. Cholinesterase level was almost not detected supporting the diagnosis of OP poisoning, H1N1 screen was negative, sputum and blood culture that yielded no growth.

Decisions were taken to initiate veno-venous (V-V) ECMO after taking the father's consent. Percutaneous cannulation was done via femoro-atrial approach using drainage right femoral Maquet cannula (23 f/38 cm) and return right internal jugular Maquet cannula (21 f/23 cm) and the cannula positions were verified with CXR and ultrasonography (Fig. 2). Rotaflow console from Maquet was used.

The patient RESP score [7] was 0 correlating with a survival of 40–60%. The flow during the first 24 h ranged from 80 to 100 ml/kg/min. Mechanical ventilation during ECMO was on assisted pressure controlled ventilation with peak inspiratory pressure of 15 cm H_2O, PEEP 10 cm H_2O and FiO_2 40% resulting in a tidal volume of 60–80 ml.

Anticoagulation using unfractionated heparin infusion was initiated, target a Partial Thromboplastin time (PTT) of 50–60 ms.

The ECMO run duration was 6 days. On day 5 there was dramatic improvement in oxygenation PaO_2/FIO_2 reached 250, lung compliance 55 ml/cm H_2O and that was coinciding with significant improvement of CXR (Fig. 3a and b).

Successful decannulation was done after weaning from ECMO on day 6 by decreasing FiO_2 on ECMO while contin-

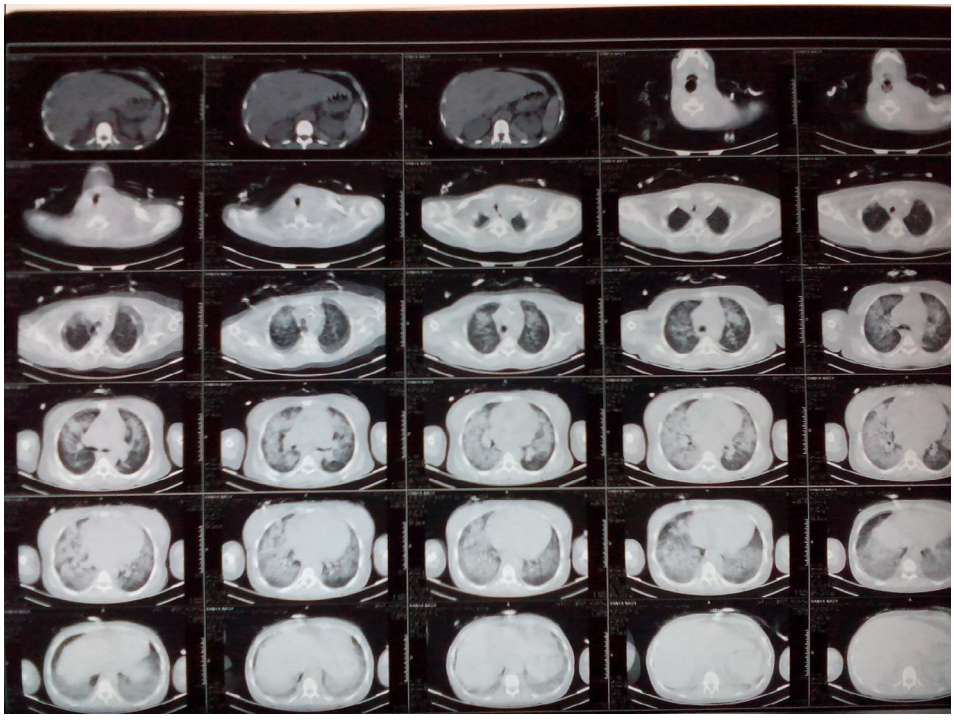

Figure 1 CT scan showing diffuse bilateral lung infiltrates.