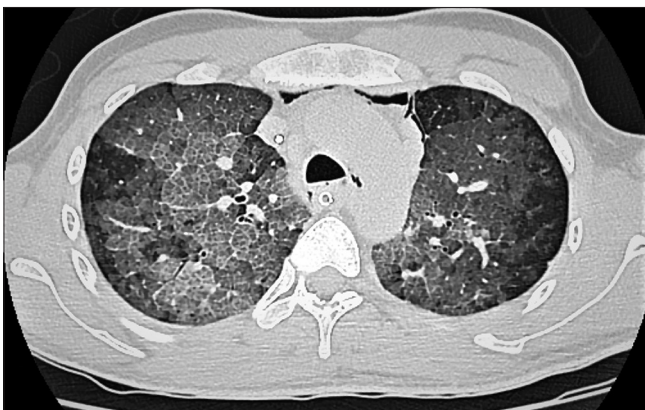


## Management of a case of oil drowning with whole lung lavage - Challenges and solutions

Sir,

Whole lung lavage (WLL) is a very specific procedure that uses saline to “wash out” the lungs.<sup>[1]</sup> WLL, typically reserved for pulmonary alveolar proteinosis, has proved successful in the treatment of certain types of exogenous lipoid pneumonia (ELP).<sup>[2]</sup> The occurrence of ELP in healthy adults is infrequent, occurring mainly in occupational accidents and can be fatal.<sup>[3]</sup>

A 29-year-old gentleman, with no significant past medical illness, presented with a history of fall into a tank of Alumol™ 145 (a lubricant oil) at his workplace. He remained in the tank for a few minutes and had aspirated the oil. He was shifted to our centre intubated from another centre. Worsening disorientation and hypoxia had warranted intubation. In the intensive care unit (ICU), he continued to have refractory hypoxia requiring a fraction of inspired oxygen (FiO<sub>2</sub>) of 1.0 and positive end expiratory pressure of 10 cm H<sub>2</sub>O to maintain oxygen saturation (SpO<sub>2</sub>) at 90%. Arterial blood gas showed pH: 7.402, pO<sub>2</sub>: 62 mmHg, pCO<sub>2</sub>: 41.9 mmHg and Lactate 1.1 mmol/L. High Resolution Computed tomography of chest findings were consistent with a radiological diagnosis of ELP [Figure 1]. An emergent bronchoalveolar lavage and its examination were consistent with ELP; oil-laden macrophages, staining positive for oil red O stain. With few options and



**Figure 1:** Computerised Tomography before whole lung lavage showing bilateral ground-glass appearance with Crazy-Paving pattern

hardly any precedents, WLL was planned given the refractory hypoxia.

Monitoring in the operating room included pulse oximetry, invasive blood pressure, electrocardiography, rectal temperature, serial blood gas analysis (2<sup>nd</sup> hourly) and urine output. Anaesthesia was maintained with TCI propofol infusion (Marsh Model with a target 3 µg/ml), fentanyl (0.7 µg/kg/hr) and atracurium infusion (0.01 mg/kg/min). The use of a double-lumen tube in our case was not possible due to persistent desaturation, and thick viscosity of the returning fluid. Veno-venous Extracorporeal Membrane Oxygenation (ECMO) was initiated. The pump settings were maintained to give a SpO<sub>2</sub> of 90% (FiO<sub>2</sub> 0.9, flow 4 L/min). A Karl Storz rigid bronchial barrel of size 12 mm (43 cm length) was used to selectively intubate either the left or right bronchus and lung lavage was performed in the supine position. Saline was instilled with the help of a TUR irrigation set from a height of 80 cm. The anaesthesia circuit was connected to the rigid bronchial barrel and ventilation was continued with an FiO<sub>2</sub> of 1.0 along with prolonged periods of apnoea. Prewarmed 0.9% saline to a total of 15 litres and 10 litres was used for right and left lung respectively. After each aliquot of 250–400 mL, the lung was allowed to drain using gravity and a chest percussion device. The initial lavage return was turbid [Figure 2]. Subsequent lavages were clearer such that by the final lavage, the returned fluid was reasonably clear.



**Figure 2:** The lavage fluid with the supernatant oil contrasts with pulmonary alveolar proteinosis where the sediment gravitates to the bottom (inverse PAP sign)

The rigid bronchial barrel was replaced with a size 8 single lumen endotracheal tube at the end of the procedure. Haemodynamics and gas exchange remained stable during the procedure. The patient was shifted to ICU with VV-ECMO. He was successfully weaned from ECMO in 2 days and extubated on the 3<sup>rd</sup> postoperative day. The clinical improvement was also mirrored by a near-complete radiological resolution on a chest X-ray. He was discharged home 22 days after the lung lavage.

Acute ELP is rare and is commonly due to the aspiration of a large quantity of a petroleum-based product. Published literature consists only of case reports of lipid pneumonia being successfully treated with corticosteroids, immunoglobulins, and whole-lung lavage.<sup>[4,5]</sup>

ECMO was required in our case to support the WLL as hypoxaemia on one-lung ventilation precluded WLL. In recent years ECMO is used as a safeguard during WLL and is known to reduce complications.<sup>[6]</sup> This promising therapy should be used as a bridge in challenging cases.<sup>[6]</sup> Our report is the first description of using a rigid bronchoscope for performing a WLL with ECMO support. Excellent communication between the operator and anaesthesiologist is paramount in avoiding hypoxaemia during WLL using a rigid bronchoscope. Our case report describes the anaesthetic challenges in performing WLL for ELP. ECMO is a promising technique in challenging cases and should be implemented in centres experienced in extracorporeal devices, using standardised protocols and in select patients.

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#### Conflicts of interest

There are no conflicts of interest.

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