Extracorporeal Management of Acute Lung Disease

Claude Guérin

Service de Réanimation Médicale, Hôpital de la Croix-Rousse, Lyon, France

Any lung disease may have an acute presentation which challenges the pneumologist in both the diagnostic assessment and the management. The latter is performed by combining specific treatment and supportive therapy. Mechanical ventilation has a place of choice to support the lungs either non-invasively, as in COPD patients with hypercapnic acute ventilatory failure, or invasively, as is the case most of the time in patients with acute lung injury/acute respiratory distress syndrome (ARDS) [1]. Interstitial pneumonia (IP) of acute presentation is a cause of ARDS. In this situation, close cooperation with intensive care specialists is required.

However, the approach may be changing, with the reappraisal of various extracorporeal techniques to oppose acute respiratory failure. Extracorporeal membrane oxygenation has gained renewed interest with the recent pandemic (H1N1) 2009 influenza virus [2] and with the report of the CESAR randomized controlled trial [3] in the UK, suggesting that the technique, even though very aggressive, may have some benefit in patients with severe ARDS. The arterio-venous pumpless method is also available [4]. Extracorporeal removal of CO₂ by using veno-venous access and blood flow in the range of 300–400 ml/min has been set out in patients with ARDS in order to apply the low-volume ventilatory strategy and, hence, to keep the resulting respiratory acidosis in a safe range [5]. Such a technique could also be applied in COPD patients with respiratory acidosis and trials are close to starting in this field.

In this issue of *Respiration*, Hara et al. [6] report their experience of using hemoperfusion with immobilized

polymyxin B in 33 patients with primary and secondary rapidly progressive IP, a complex disease which has benefited from recent efforts to create a better definition [7]. At baseline, Hara et al.'s [6] patients were critically ill as indicated by median PaO₂/FiO₂ ratio less than 150 mm Hg, mechanical ventilation requirement in 20 of them (17 tracheal intubations) and median SOFA score of 4. Since specific treatment had failed, patients were receiving at least 1 session of hemoperfusion with polymyxin-B column at a very low blood flow of 80–100 ml/min. Over time, the authors found that oxygenation significantly improved, with a greater effect in secondary IP than in idiopathic IP, and some components of the systemic inflammatory response syndrome decreased. In addition, the baseline plasma level of monocyte chemotactic protein-1 was significantly lowered at the end of the hemoperfusion treatment. This preliminary report has obvious limitations, such as heterogeneity of patients, and the non-standardization of mechanical ventilation and hemoperfusion protocol. In specific septic patients, this intervention started soon after abdominal surgery was beneficial to patient outcome [8]. A small controlled study in patients suspected of Gram-negative bacilli-related sepsis [9] demonstrated that polymyxin B trapped circulating endotoxin and inhibited apoptosis via the caspase pathway.

The report by Hara et al. [6] holds promise and deserves further well-designed prospective trials in selected patients with IP in acute respiratory failure.

References

- 1 Bernard GR, et al: The American-European Consensus Conference on ARDS: definitions, mechanisms, relevant outcomes, and clinical trial coordination. *Am J Respir Crit Care Med* 1994;149:818–824.
- 2 Davies A, et al: Extracorporeal membrane oxygenation for 2009 Influenza A(H1N1) acute respiratory distress syndrome. *JAMA* 2009;302:1888–1895.
- 3 Peek GJ, et al: Efficacy and economic assessment of conventional ventilatory support versus extracorporeal membrane oxygenation for severe adult respiratory failure (CESAR): a multicentre randomised controlled trial. *Lancet* 2009;374:1351–1363.
- 4 Bein T, et al: A new pumpless extracorporeal interventional lung assist in critical hypoxemia/hypercapnia. *Crit Care Med* 2006;34:1372–1377.
- 5 Terragni PP, et al: Tidal volume lower than 6 ml/kg enhances lung protection: role of extracorporeal carbon dioxide removal. *Anesthesiology* 2009;111:826–835.
- 6 Hara S, et al: Direct hemoperfusion using immobilized polymyxin B in patients with rapidly progressive interstitial pneumonias: a retrospective study. *Respiration* 2011;81:107–117.
- 7 Cottin V, et al: Diffuse idiopathic interstitial pneumonias. International multidisciplinary consensus classification by the American Thoracic Society and the European Respiratory Society: principal clinicopathological entities, and diagnosis. *Rev Mal Respir* 2004;21:299–318.
- 8 Cruz DN, et al: Early use of polymyxin B hemoperfusion in abdominal septic shock: the EUPHAS randomized controlled trial. *JAMA* 2009;301:2445–2452.
- 9 Cantalupp V, et al: Polymyxin-B hemoperfusion inactivates circulating proapoptotic factors. *Intensive Care Med* 2008;34:1638–1645.