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ABOUT COVER

Editorial Board Member of *World Journal of Clinical Cases*, Kai Zhang, PhD, Professor, Department of Psychiatry, Chaohu Hospital of Anhui Medical University, Hefei 238000, Anhui Province, China. zhangkai@ahmu.edu.cn

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Capillary leak syndrome: A rare cause of acute respiratory distress syndrome

Deven Juneja, Sahil Kataria

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Deven Juneja, Sahil Kataria, Department of Critical Care Medicine, Max Super Speciality Hospital, Delhi 110017, India

Corresponding author: Deven Juneja, DNB, MBBS, Director, Department of Critical Care Medicine, Max Super Speciality Hospital, 1 Press Enclave Road, Saket, Delhi 110017, India. devenjuneja@gmail.com

Abstract

Capillary leak syndrome (CLS) is a rare clinical syndrome associated with significant morbidity and mortality. Intensive care and supportive therapy constitute the mainstay of the treatment, along with judicious use of crystalloids and colloids such as dextran and starch during the leak phase. The advantages of proning, steroids, and intravenous immunoglobulins are worth contemplating in patients with such a presentation. Extracorporeal membrane oxygenation appears to be an excellent strategy to surmount the impediments of the leak and post leak phase of CLS, especially in patients with severe or refractory hypoxemia.

Key Words: Extracorporeal membrane oxygenation; Capillary leak syndrome; Organophosphorus poisoning; Hemodynamics

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Core Tip: Despite various studies on capillary leak syndrome (CLS) management, there is no consensus on its specific treatment measures. Intensive care with judicious fluid use is the mainstay of therapy. The outcome of patients with acute respiratory distress syndrome and refractory hypoxemia may be improved with proning and extracorporeal membrane oxygenation support. Steroid and intravenous immunoglobulin (IVIG) therapy may be helpful in the management of severe CLS. However, there is a clear need for clinical trials to determine the therapeutic efficacy of steroids, IVIGs, and other agents targeting the various pathophysiologic mechanisms for severe CLS. Determining the optimal dosage and duration of therapy will facilitate the establishment of treatment guidelines.

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TO THE EDITOR

We read with interest the case report by Nong *et al*[1], describing a rare case of severe capillary leak syndrome (CLS) in organophosphorus (OP) poisoning and the use of veno-venous extracorporeal membrane oxygenation (V-V ECMO) for the treatment. An extensive literature review on PubMed did not reveal any other reported cases of CLS in OP poisoning. It was a commendable effort on the part of the treating team to treat a rare case of CLS. This letter is intended to discuss and address the dilemmas in the case report by Nong *et al*[1].

The antimuscarinic agent atropine, oximes (to reactivate acetylcholinesterase), neuroprotective drugs, and intensive care remain the mainstay of treatment for OP poisoning. Haemodialysis with hemoperfusion was used for detoxification in the reported patient. This has shown promising results in treating patients with OP poisoning, preventing multi-organ dysfunction and improving the prognosis of patients[2]. However, the purpose of phencyclidine hydrochloride administration in the case study needs clarification.

The patient further developed acute respiratory distress syndrome (ARDS) with intra-abdominal hypertension (IAH) due to severe CLS, and V-V ECMO was initiated in view of refractory hypoxemia. Prone ventilation could be a promising option before initiating ECMO as it may improve oxygenation in ARDS, even in the presence of IAH, by suspending and off-loading the abdomen[3]. A patient with ARDS and IAH has been reported to be successfully prone after suspension and abdominal unloading, with a progressive reduction of IAP from 24 mmHg to 14 mmHg, and reduction of peak airway pressures from 44 cm H₂O to 22 cm H₂O[4]. However, further studies are required to prove the benefit of prone positioning in patients with IAH and severe hypoxemia.

In the case report, the patient was managed with judicious use of crystalloids, colloids, and plasma [1]. The type of colloid used needs a mention. Substances with a molecular weight of less than 200000 Da can pass through the leaky capillaries into the interstitial space in CLS, as would albumin with a molecular weight of 69000 Da[5]. A meta-analysis comparing crystalloids with colloids in intensive care settings concluded that among different colloids (dextrans, albumin, gelatins, and hydroxyethyl starch), starch was associated with an increased mortality[6]. Nevertheless, in the event of refractory shock in CLS, the potential benefits of administration of high molecular weight colloids like dextrans and starch may outweigh the risks of renal dysfunction and mortality[5]. However, further research is warranted to determine the optimal fluid therapy.

In addition to fluid therapy, steroids and intravenous immunoglobulin (IVIG) have demonstrated efficacy in a few cases of severe CLS. Steroids, by countering the inflammatory triggers of CLS can reduce the severity of capillary leakage. Promising results have been shown when IV methylprednisolone was used at a dose of 1-1.5 mg/kg, until resolution of signs and symptoms or for 2 d, and switched to oral prednisolone 40 mg once daily and then tapered off[5,7]. IVIG therapy, by its anti-inflammatory and anti-idiotypic effects, has shown dramatic improvement when used at a dose of 2 g/kg over 2-4 d, with some patients requiring a maintenance dose of 0.4-2 g/kg every month[5,8]. Nevertheless, its use should be considered cautiously in light of its potential nephrotoxicity, especially in patients with compartment syndrome. Although most of the above evidence of steroids and IVIG use is from chemotherapeutic drugs induced CLS and Clarkson disease, both of these could be compelling therapeutic options in patients refractory to the standard therapy in other causes of CLS. However, both their optimal doses and duration remain undetermined and warrant further research.

ECMO is an attractive choice as a bridge to spontaneous recovery of CLS in patients with refractory shock or hypoxemia[9]. The use of V-V ECMO and veno-arterial ECMO (V-A ECMO) is dependent on the hemodynamic profile, with patients with fluid overload or intact perfusion needing V-V ECMO and patients with fulminant hypovolemic shock requiring V-A ECMO. ECMO support should be continued during the post leak phase to avoid pulmonary overload, and the risk-benefit ratio should be considered as an increase in inflammatory mediators in some patients can worsen the clinical condition. In patients with acute intoxication having refractory hypoxemia or refractory cardiogenic shock, V-V or V-A ECMO should be considered, respectively, and in institutions that deliver effective extracorporeal cardiopulmonary resuscitation, it can also be considered in patients during a cardiac arrest[10].

FOOTNOTES

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search, and designed and edited the manuscript; Kataria S wrote and revised the manuscript; all the authors have read and approved the final manuscript.

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Country/Territory of origin: India

ORCID number: Deven Juneja 0000-0002-8841-5678; Sahil Kataria 0000-0002-0756-4154.

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