# To: High-volume hemofiltration and prone ventilation in subarachnoid hemorrhage complicated by severe acute respiratory distress syndrome and refractory septic shock

*Para: Hemofiltração de alto volume e ventilação em posição prona em hemorragia subaracnóidea complicada por grave síndrome do desconforto respiratório agudo e choque séptico refratário*

## To the editor

We would like to discuss the publication "High-volume hemofiltration and prone ventilation".[1] Cornejo et al. reported the use of the combination of these two novel approaches for the management of subarachnoid hemorrhage that is complicated by severe acute respiratory distress syndrome.[1] As Cornejo et al. noted, these two techniques are very challenging and require case by case decision making. There must be consideration of the possible adverse effects of these techniques. A meta-analysis shows that there is "no clear overall beneficial effect" when high-volume hemofiltration is compared to standard volume hemofiltration.[2] Some reports mention the adjustment of cytokine biological processes as the possible responsible factor, whereas other reports do not agree with that hypothesis.[2] In the present case report by Cornejo et al., the reason for the occurrence of septic shock remains unclear. Based on the patient's available history, it seems that there is no laboratory confirmation of sepsis. Additionally, there is no evidence of cytokine biological process adjustment reported in the present article. In general, due to the uncertainties about the exact biological effect of high-volume hemofiltration, the beneficial effects of this procedure remain unconfirmed in septic shock.[3] Regarding prone positioning, the complication and side effect of the procedure can still be observed.[4] Cardiac arrest immediately after prone positioning is also reported.[5] In the present case report, the use of prone positioning might be valid, and the success of cardiac monitoring is established. Interestingly, 72 hours of prone positioning were required for adjustment of the pressure. This long period might be sufficient for self-adjustment of the patient's intracranial pressure, due to the neurological improvement after manipulation or other additional procedures for the management of pressure, without the need of a special positioning procedure. The improvement of the patient might be due to the successful control of the neurological problem and might not be related to the use of high-volume hemofiltration plus prone positioning.

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**Conflicts of interest:** None.

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## AUTHORS' RESPONSE

Regarding the recent letter from Tin and Wiwanitkit, we would like to clarify some points about the case reports presented.[1]

There is not strong evidence for the use of high volume hemofiltration (HVHF) in septic shock without renal failure, solely for hemodynamic management. Current available studies include trials that compare standard hemofiltration with HVHF, only in patients with renal failure, and for prolonged periods.[2,3] The optimal randomized controlled trial devised to definitively answer the question whether HVHF should be considered in severe septic shock remains to be conducted. Based on physiological data, experimental studies, and case series that report reduction in vasopressor requirements in patients with septic shock subjected to HVHF, this therapy is used in our center as adjuvant therapy for hemodynamic support in refractory septic shock, regardless of kidney failure. Because specific trials addressing this issue are lacking, we consider this approach only as a rescue therapy in carefully selected cases.[4]

Regarding the cases presented, both patients developed septic shock and the presence of gram-negative bacteria in the airway and blood was documented. The length of the case report did not allow us to communicate further details about laboratory results.

Prone position ventilation was considered an experimental, salvage therapy, almost as high-volume hemofiltration, but recently progressive evidence including a meta-analysis[5] and the paradigmatic paper PROSEVA[6] showed definite benefits in the survival of severe acute respiratory distress syndrome (ARDS) patients. In these two patients the hemodynamic and procedural risks of prone positioning were deemed lower than severe hypoxic respiratory failure. As prone position ventilation has been a standard of care in our center for many years, and all personel is trained to manage prone position ventilation (PPV), routine risks are minimal.[7,8] Accordingly, both patients showed oxygenation improvement. Blood pressure management was independent and no hemodynamic changes could be attributed to PPV.

PPV and HVHF were considered life support measures; they were used as rescue therapies in refractory septic shock and severe ARDS with the aim of maintaining hemodynamic stability and adequate oxygen exchange, favoring neurological recovery and avoiding further secondary injuries. The natural healing process of humans can explain the improvement of both patients; PPV and HVHF should not be considered curative.

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