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# HOW TO CONECT A HAEMOFILTRATION THERAPHY TO THE EXTRACORPOREAL LIFE SUPPORT VENOUS LINE

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## ABSTRACT

Continuous renal replacement therapies are part of the usual treatment in patients with Extracorporeal Life Support for acute renal failure, in the context of postcardiotomy shock. We describe how to connect the continuous renal replacement therapy device to the Extracorporeal Life Support venous line, avoiding any recirculation of filtered blood and with optimal pressures for the hemofilter. Currently, by protocol, in our center, we previously modified the Extracorporeal Life Support circuit in anticipation that the subsequent connection of the hemofilter to the Extracorporeal Life Support would be

necessary, avoiding a new puncture, in an already heparinized patient; for the double lumen catheter required for continuous renal replacement therapy.

## OVERVIEW

Extracorporeal Life Support (ECLS) therapies are routinely used in cases of acute cardiac and / or pulmonary dysfunction, refractory to conventional treatment in which early recovery is contemplated, or as a bridge to transplantation, or a clinical decision. In these patients, the rate of acute renal failure requiring the establishment of continuous renal replacement therapy (CRRT) reaches 50%(1).

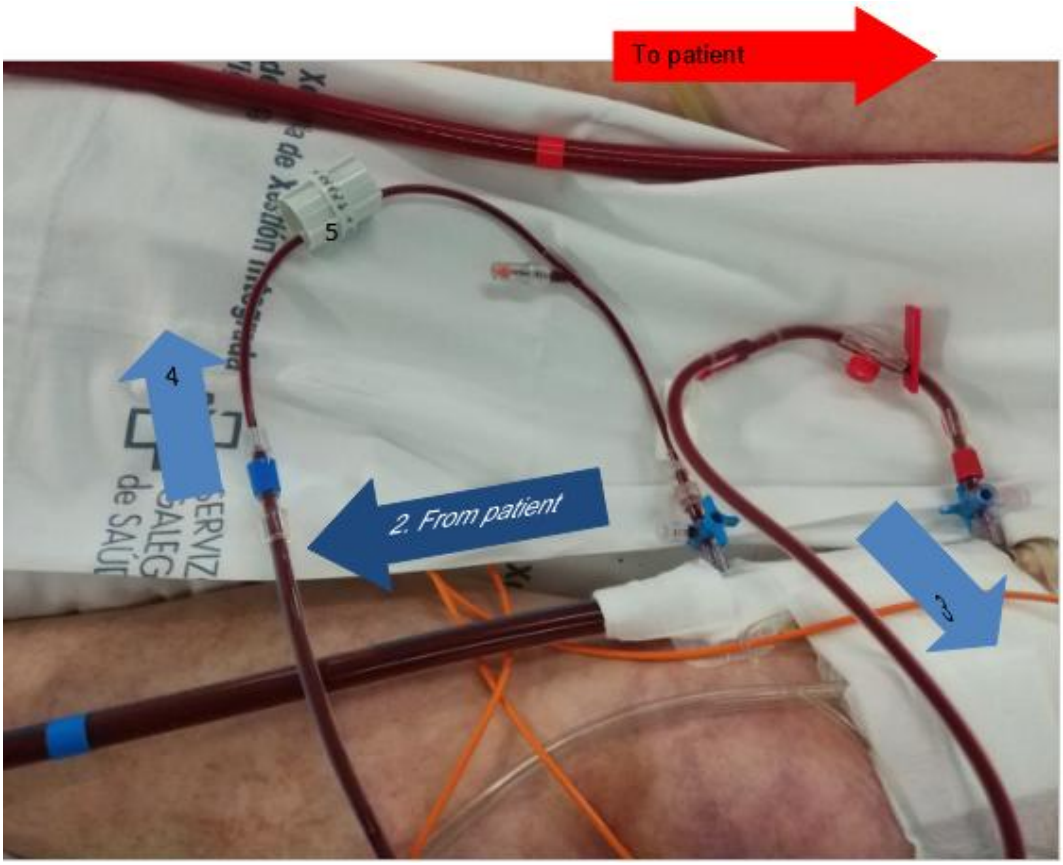
Classically, these therapies are carried out through a double lumen venous catheter, Shaldon Catheter of 6.5 to 11.5 Fr.(2,3) Regarding the connection of therapy to the ECLS circuit, different techniques have been described, each one with its advantages and disadvantages, such as the need to manipulate the arterial line, recirculation of part of the filtered blood and the impossibility of performing the CRRT due to the pressures detected in the CRRT device, due to the pressures generated by the ECLS (1,4–9). However, in our center we connect the hemofilter to the venous line of the ECLS to avoid puncturing an already heparinized patient and also avoid a new entry point for infections.

Rubin et al describe a classic problem when connecting the hemodiafiltrator to the ECLS circuit, which consists in repeatedly triggering the negative pressure alarm in the efferent line of the hemodiafiltrator, since the venous line of the ECLS has negative pressure (6). For this, Rubin et al, connect the afferent line to the venous line of the ECLS and the efferent line to the arterial line, which has positive pressure, solving the alarm problem, but as a counterpart, they result in partial recirculation of filtered blood and the fact having to manipulate the arterial part of the circuit. This article has been commented by Antoine P. Simons et al describing a different method, also trying to solve this same problem, also known to them (10). In our unit, we have also experienced this negative pressure alarm problem in the hemofiltrator, so we have devised a method for connecting both the afferent and efferent lines of the CRRT on the venous side of the ECLS circuit avoiding these two issues: manipulating the arterial line of the ECLS and solving the problem of negative pressure.

## DESCRIPTION

At the time of ECLS implantation, we modified the circuit by inserting two ⅜ - ⅜ luer-lock connections in the venous line, with a three-way stopcock in each of them, separated by 10 centimeters, in anticipation of connecting the hemofilter if necessary. In case of connection of the hemofilter, we connect the afferent line to the three-way stopcock most proximal to the patient and the efferent to the most distal, thus avoiding any recirculation of the filtered blood. Furthermore, at the end of the efferent line of the hemofilter we connect a flowrate controller (dial to flow) (figure 2) in order to generate a positive pressure in the efferent line because otherwise, the hemofilter return pressure alarm will continuously go off, to the point of making impossible to carry out the therapy as we have experienced as Rubin et al have also previously described (6).

In figure 1 you can see:




1. ECLS arterial line.
2. Venous line of the ECLS.
3. Afferent line of hemofilter.
4. Efferent line of the hemofilter.
5. Flowrate controller.

## DISCUSSION

Using the technique we describe, all manipulation is performed on the ECLS venous line, minimizing risks since any possible embolism would be prior to the oxygenator. Likewise, the pressures in the CRRT system are optimized due to the flowrate controller and the recirculation of filtered blood is avoided.

On the one hand, it is necessary to highlight the advantages of avoiding the risk of a new puncture in a heparinized patient and manipulation of the arterial line of the ECLS; on the other hand, it involves adding two connections to a closed circuit in the part where the pressure is negative. This is a technique that can be performed in non-emergent ECLS if the process is standardized and the systematic review of connections is included in the check-list to prevent air entrance.

Therefore, we consider that this is a technique in which the advantage of avoiding a new puncture outweighs the fact of having to monitor the circuit more closely, especially during patient mobilization.

The standardization of the process, the specific check-list and the training of nursing staff in circuit care, especially during patient mobilization, make this a safe and beneficial technique for patients undergoing ECMO.

## DECLARATIONS

The study followed international standards of good practice in research with human beings (Declaration of Helsinki, CONSORT, Oviedo Agreement) as well as current legislation (Biomedical Research Spanish Law 14/2007, Personal Data Protection Law).

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