PRESSURE SURVEILLANCE IN EXTRACORPOREAL CIRCUITS: RELEVANCE IN HAEMODIALYSIS AND HEMODIAFILTRATION

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Introduction

Pressure measurement in extracorporeal circuits is established as a standard surveillance technique during blood-based therapies (1). In the last years, pressure measurement based on simple threshold monitoring was replaced by intelligent algorithms that reduce false positive alarm. However, it is helpful to understand on a physical as well as physiological basis that changes in treatment settings lead to different types of pressure changes.

Methods

Detailed analysis of arterial pressure PA, venous pressure PV, dialyzer inlet pressure DIP, and transmembrane pressure TMP during haemodialysis was performed using a patient data base. Main causes of pressure changes were identified, analysed and replicated during simulated hemodialysis therapies with an FMC 6008 haemodialysis device with a patient simulator.

Results

Pressure variations during haemodialysis and hemodiafiltration are mainly the result of changes in blood flow QB, flow resistance R of the extracorporeal circuit and blood viscosity η. Higher blood flow is nonlinear correlated with PA and PV. Fast changes in blood viscosity η are directly related to changes in ultrafiltration setting. Long-term changes in η depend on the individual ability of the patient to refill blood volume from intracellular and extracellular fluid compartments. Isolated increase in DIP is a direct mirror of the flow resistance of the hemodialyzer.

Discussion

Slowly drifting pressure trends can be found in almost every haemodialysis and hemodiafiltration treatment (2). It is important to notice that any variation in extracorporeal pressures originate in both physiological and physical changes. Patient movements lead to symmetrical variations in PA and PV, whereas blood pressure plays only a minor role.

References

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