A successful treatment of a child with extracorporeal membrane oxygenation/continuous renal replacment therapy

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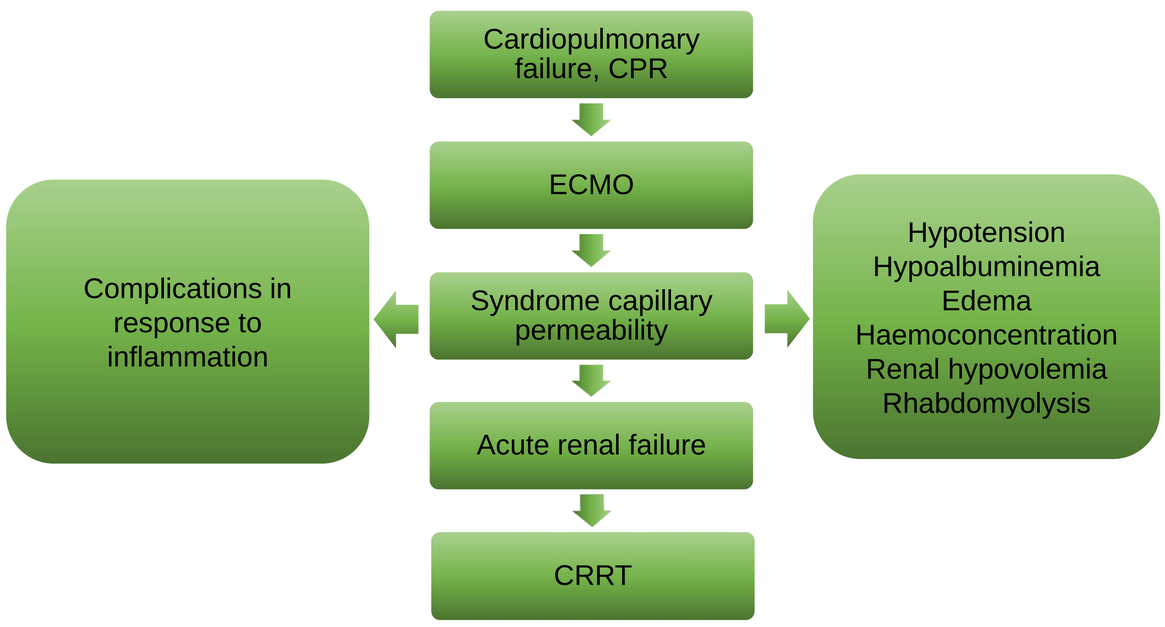
Background

Pediatric patients on extracorporeal membrane oxygenation (ECMO) whit acute cardiopulmonary insufficiency has a very high incidence of acute kidney injury (AKI) in 70-85% patient. Mortality in patients on ECMO is associated with the development of AKI. In pediatric patients, the continuous method of dialysis (CRRT) in combination with extracorporeal membranous oxygenation (ECMO) is very complex and requires skill and competence of dialysis nurses which is achieved by high-level educations.

Extracorporeal membrane oxygenation (ECMO) is an extracorporeal technique of providing both cardiac and respiratory support to persons whose heart and lungs are unable to provide an adequate amount of gas exchange to sustain life.

Continuos renal replacment therapy (CRRT) is dialysis modality used to treat critically ill, hospitalized patients in the intensive care unit who develop acute kidney injury (AKI).

Graphic 1. The course of development of ECMO to CRRT



Graphic 2. The possibility of survival

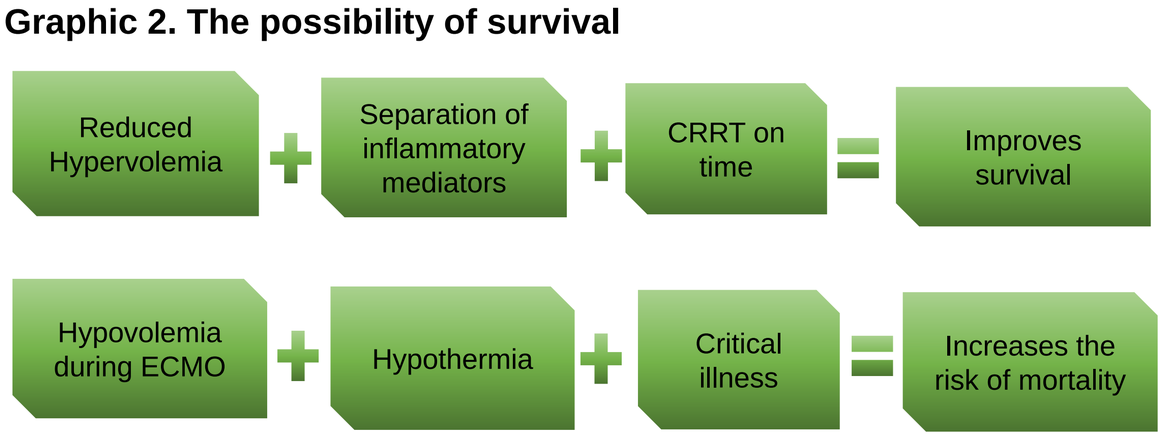


Chart 1. Patients on the ECMO treatment

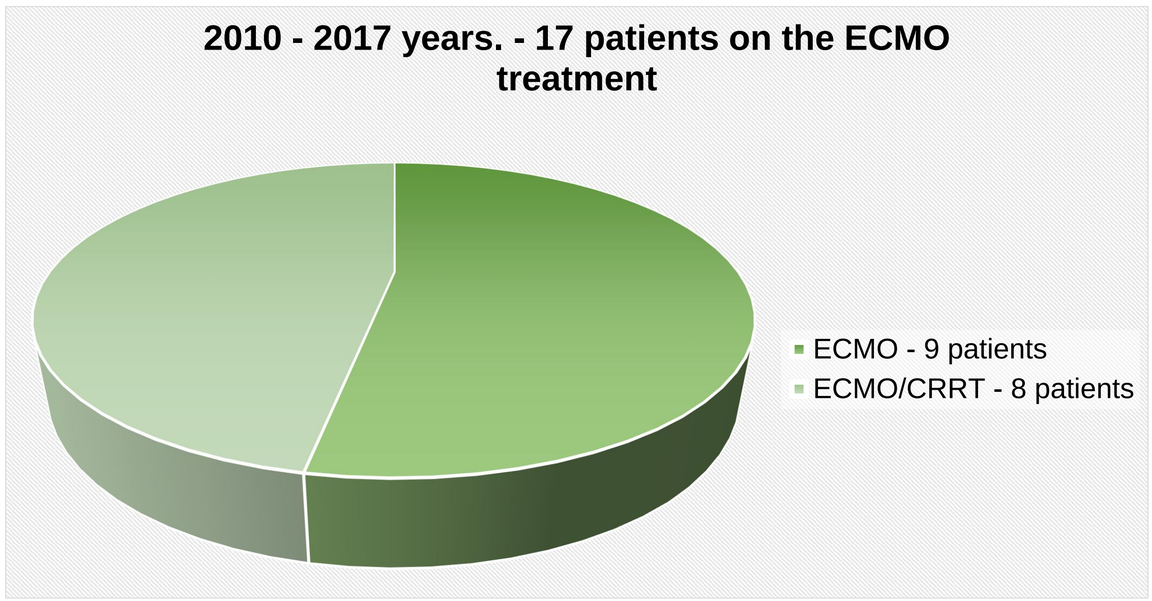
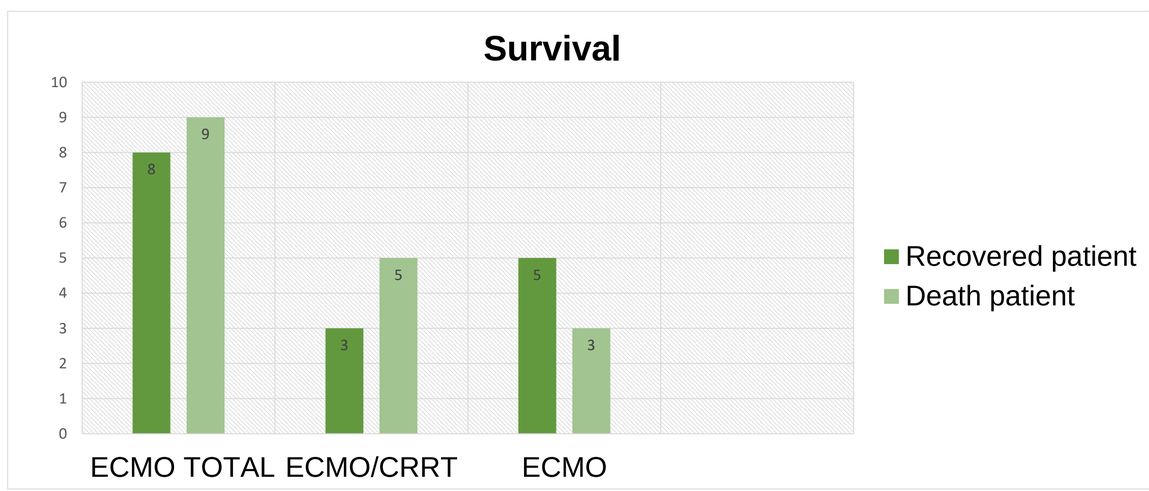


Chart 2. Survival - recovered and death patient



Case report

The eight-month year old boy was febrile for 3 weeks with persistent symptoms of respiratory infection that is treated with antibiotics.

The boy experienced a deterioration in his health condition and a development of cardiogenic shock that was caused by rapid ventricular tachycardyia.

Because of unsuccessful attempts to stop of tachycardia, due to the application of medications and a cardioversion-defibrillation, the boy's reanimation took about 120 minutes, after which extracorporeal membranous oxygenation was established.

The patient's condition was complicated further by acute renal failure with hypervolemia. Implementation of continuous veno-venous hemodialysis (CVVHD) was introduced due to that.

Continuous dialysis method was carried out on an apparatus for acute dialysis with a filter M60.

Dialysis parameters: blood pumps' flow: 50 ml/min., dialysate flow rate: 350 ml/min, ultrafiltration extended: 10 - 100 ml/h.

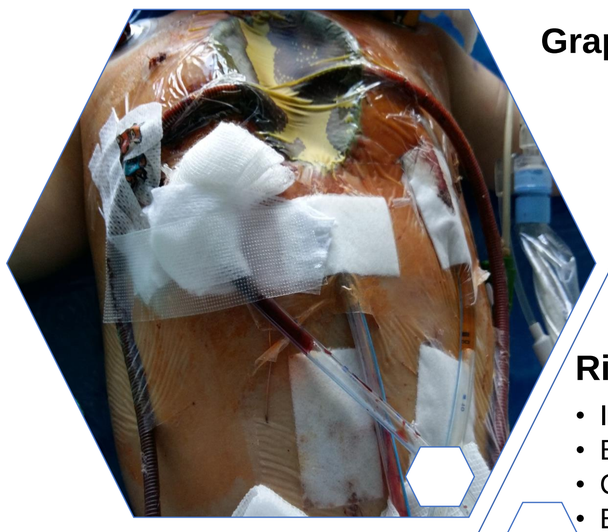
For anticoagulation, the patient was injected with continued heparin. Anticoagulant effect was controlled every 2 hours by ACT – appliances (Activated Clotting Time).

A gradual recovery of cardiac function occurred after six days. It allowed the separation of the patient from the ECMO machine.

CVVHD continued for 4 additional days, after which the function of patient's kidneys was recovered.

After the recovery of renal and cardiac function, the patient was discharged home in good general condition. The function of other organ systems is in the process of fully recovering.

Graphic 3. Risk and complications



Risk and complications

- Infection
- Bleeding
- Coagulation
- Embolism
- Relegation cannula
- Rupture cannula
- Inadequate from connecting
- Downtime apparatus for ECMO
- Oxygenator failure
- Failure dialysis

Conclusion

Access to the patient is multidisciplinary and necessary to monitor patients, not only in terms of dialysis but also beyond in order to maximize the effectiveness of the implementation of continuous dialysis method on ECMO. It takes knowledge and expertise in visitation and communication that will facilitate the cooperation of all members of the team because of dialysis nurses work closely with clinical perfusionists, the nurses in the ICU, nephrologists and intensivists, and other team members.