Apheresis in Organ Donation After Cardiac Death (DCD): A Single Centre Experience.

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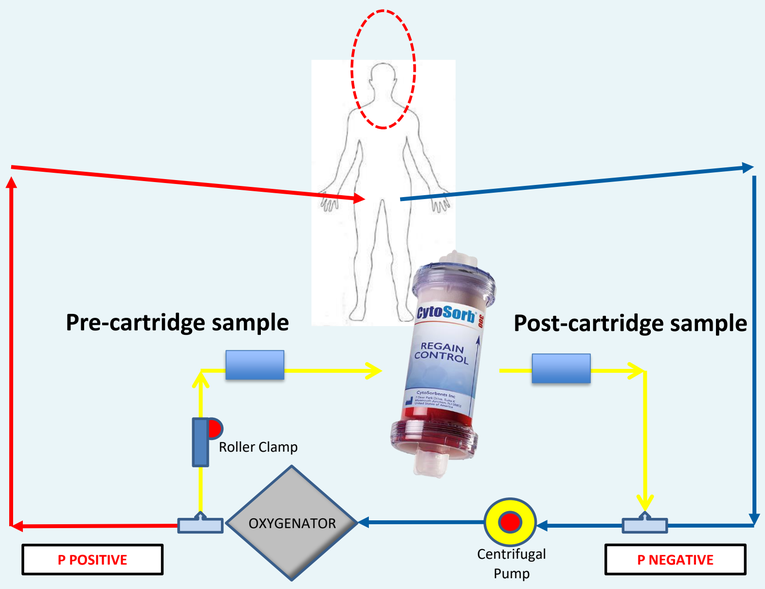
BACKGROUND

Organ transplantation is the life-saving treatment for patients with end-stage organ failure. However, the shortage of available organs compared to increasing waiting lists represents a significant problem. To expand the donor pool, selection criteria have been extended, including also Donors after Cardiac-Death (DCD). The main problem related to DCD is the extended Warm Ischemia Time and the uncontrolled production of inflammatory molecules, responsible of organ deterioration and Primary Graft Dysfunction (PGF). In-situ Normothermic-Regional-Perfusion (NRP) for abdominal circulation has been used to improve organ conditions and, the addition of CytoSorb, an extracorporeal cytokines adsorber, might be a potential solution to limit organ injuries.

METHODS

We report a case series of 3 DCD donors treated with NRP to maintain circulation before organ retrieval, in association with CytoSorb. After cardiac-death confirmation (20min) and informed consent, donors were transferred to the operation room with V-A Normothermic ECMO plus CytoSorb (in parallel).



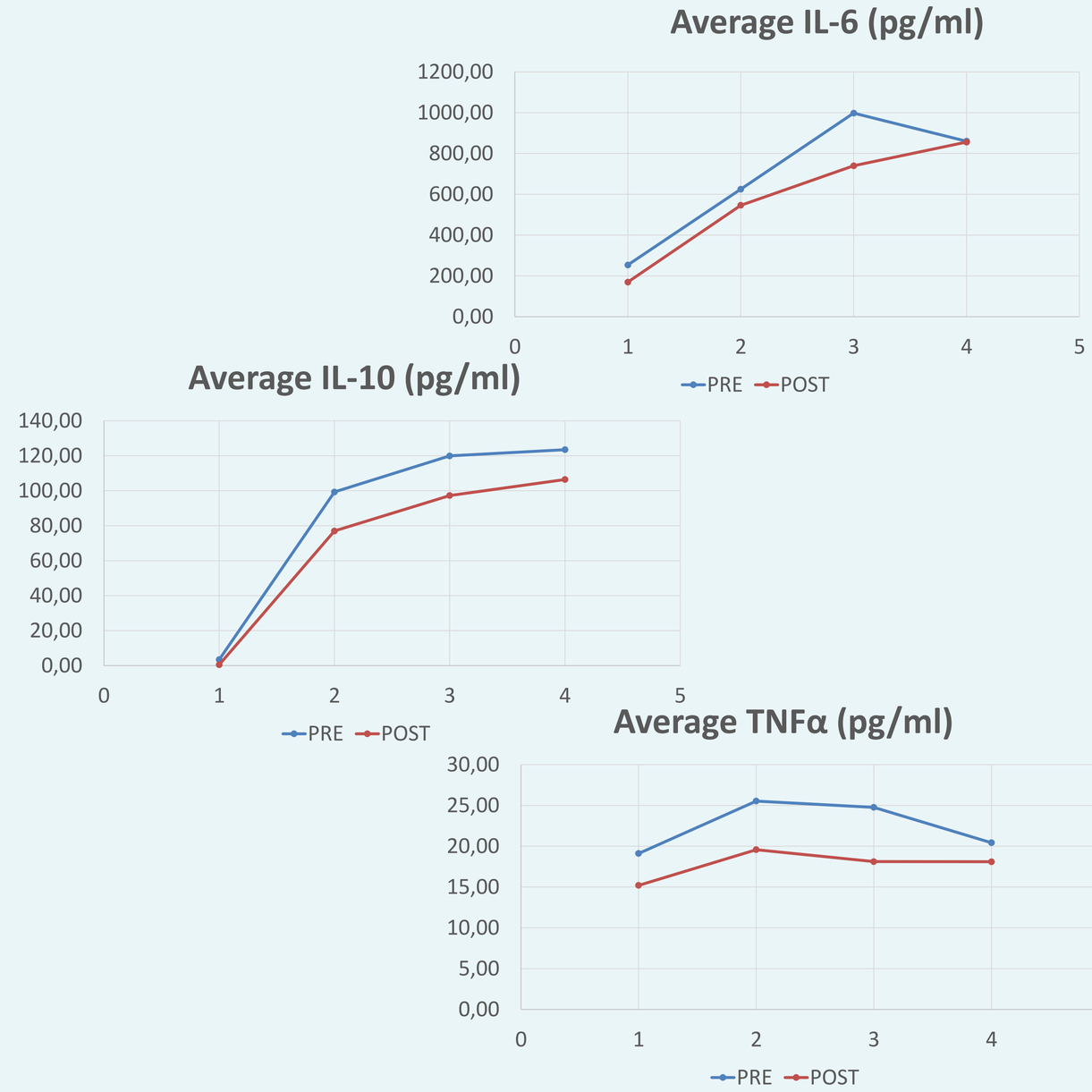
During perfusion, biological and metabolic parameters were monitored and pre and post CytoSorb cartridge blood samples were performed. NECMO was set at maximum flow rate, according to patient's BSA, to maintain an optimal abdominal organs perfusion and to prevent irreversible organ damage. Average temperature set-point was 37 °C. Liver, kidneys and tissues were procured in all DCD donors in a standard method.

RESULTS

During NECMO perfusion, lactate levels progressively decreased (average value, from 10.3 mmol/l to 4.7 mmol/l), as sign of improvement in organs perfusion and quality. Parameters describing organs function maintained stable (average values: creatinine 0.77 mg/dl, bilirubin 0.59 mg/dl, haemoglobin 7.2 g/dl). CytoSorb blood flow maintained stable: average flow rate about 10% of NECMO flow. Transplantation outcomes have been positive: organs, during procurement, were judge transplantable and assigned to recipients, according to waiting lists. Six kidneys, three livers and tissues were overall transplanted. During a median of 2 days of stay at ICU, the 3 liver recipients were released after an overall average recovery of 13 days (average values: bilirubin 0.92 mg/dl, AST 30 U/l, ALT 186 U/l, creatinine 0.86 mg/dl, INR 1.07). During follow-up (180-30gg) no functional decline was seen in the donated organs.

	CASE 1				CASE 2				CASE 3			
	T0 15'	T1 60'	T2 120'	T4 180'	T0 15'	T1 60'	T2 120'	T4 180'	T0 15'	T1 60'	T2 120'	T4 180'
NRP duration (min)	157				172				219			
Blood Flow (ml/min)	4980				4580				3805			
Gas Flow (L/min)	4				4.5				4.2			
Temperature (°C)	35.6				35.5				36.2			
Diuresis (ml/h)	65				80				40			
ALT (U/l)	78	122	162	/	17	/	18	/	43	/	112	121
AST (U/l)	67	107	148	/	25	/	28	/	38	/	51	54
Bilirubin TOT (mg/dl)	0.3	0.28	0.29	/	0.5	0.6	0.7	/	0.64	/	0.6	0.52
Creatinine (mg/dl)	0.75	0.78	0.83	/	0.69	0.72	0.78	/	0.62	/	0.9	0.88
pH	7.42	/	7.34	/	6.93	7.64	7.43	/	7.01	7.39	7.51	7.53
Lactates (mmol/l)	13	6.7	5.8	/	11	8	6.6	/	9.9	4.3	1.5	1.9
ORGANS FOLLOW-UP												
Liver	ALIVE				ALIVE				ALIVE			
Right kidney	ALIVE				ALIVE				ALIVE			
Left kidney	ALIVE				ALIVE				ALIVE			

Literature evidences underline the presence of the uncontrolled production of cytokine in DCD donors, where IL-6 peaks concentration are about 10.000 pg/ml. [1] The progressive increase of cytokine levels, shows the presence of an important inflammatory response in DCD donors. This was confirmed in our experience and the application of an extracorporeal cytokines adsorber seems to get the increased production of cytokines under control (Figure 2). In fact, pre and post Cytosorb blood samples show that the adsorber is able to effectively adsorb cytokines and seem to maintain a controlled situation, contrarily to what literature reports.



CONCLUSION

Organ donation from DCD has been widely used in many transplantation centers to expand the organs pool. In these donors, NRP in combination with CytoSorb, an adjunctive therapy to remove inflammatory mediators, responsible of organ deterioration, rejection and PGD, might help to successfully limit irreversible organ damages and improve transplantation outcome.

In the present case report, 9 major organs (six kidneys, three livers and tissues) were successfully donated. During follow-up all the recipients are still alive.

[1] Circulating Inflammatory Factors in Deceased Organ Donors Result in Innate Immune Activation. *T. Brennan, L. Lin, J. Pollara. 2017, American Transplant Congress*