USE OF CYTOSORB IN A CARDIOPATHIC PATIENT SUFFERING FROM SEPTIC SHOCK, MULTIPLE ORGAN FAILURE AND ACUTE RESPIRATORY DISTRESS SYNDROME. THE CASE OF A CENTER IN CATANIA (ITALY)

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ABSTRACT

Introduction: *Sepsis and septic shock are severe disorders, often with a high rate of mortality. In these conditions, hemadsorption devices can be important adjuvants to support conventional therapy.*

Case presentation*: In this work, we describe the case of a critical patient with severe comorbidities and suffering from septic shock caused by multiresistant Klebsiella pneumonia.*

Conclusion*: In this case, such device helped in weaning the patient from vasopressors, stabilizing the haemodynamic, and in reducing circulating proinflammatory cytokines levels, leading to an early discharge. rocess and EBV/CMV infection.*

Keywords: *Hemadsorption, Cytosorb, septic shock, ARDS, Klebsiella.*

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Introduction

Sepsis is an organ dysfunction caused by a dysregulated host response to infection and is often associated to high mortality and morbidity[1]. This is particularly accurate in critical patients in intensive care unit. A mild multi-organ dysfunction is enough to increase the rate of mortality by 10% circa, while patients with severe comorbidities have an even higher rate of mortality. Septic shock is a subset of sepsis in which circulatory and cellular abnormalities lead to an increase in mortality[2].

Cytosorb is a hemadsorption device able to remove proinflammatory cytokines (IL-1, IL-6, IL-10 and TNF-α) produced in excess in sepsis and septic shock. Cytosorb is also able to remove free hemoglobin, bilirubin, and myoglobin. It is used not only as adjuvant to treat sepsis and septic shock, but also in cases of extracorporeal membrane oxygenation, cardiac surgery, severe burns, rhabdomyolysis, hepatitises and liver failure, and pancreatitis to avoid organ damage and improving the prognosis of critical patients. Cytosorb is composed of biocompatible porous polymer beads able to absorb, substances in a 5-55 kDa molecular weight range.

It has been proved that Cytosorb is well tolerated in patients with chronic renal failure and multiple organ failure[3].

The case here described shows how Cytosorb has helped a cardiopathic patient suffering from acute respiratory distress syndrome (ARDS) caused by multiresistant Klebsiella pneumonia.

Case presentation

Male patient, 78 years old, admitted in intensive care unit due to respiratory failure and postoperative haemodynamic instability following a bowel obstruction surgery. The patient was initially diagnosed with left middle lobe pneumonia (Fig. 1). According to his medical history, he had a cardiac arrest due to occlusion of the anterior interventricular artery and underwent a stent insertion during coronary angiography six months prior. Broad-spectrum antibiotics, clarithromycin and cefepime, were administered as

treatment while inotropes and mechanical ventilation were weaned during the first days of the hospitalization. In the sixth day, after the clinical condition of the patient suddenly worsened (qSOFA 3+, SOFA score: 12, mortality > 95%), a sepsis that later evolved in septic shock and ARDS was diagnosed.

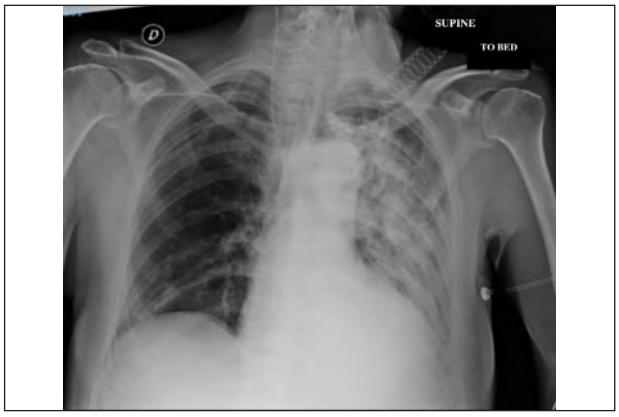
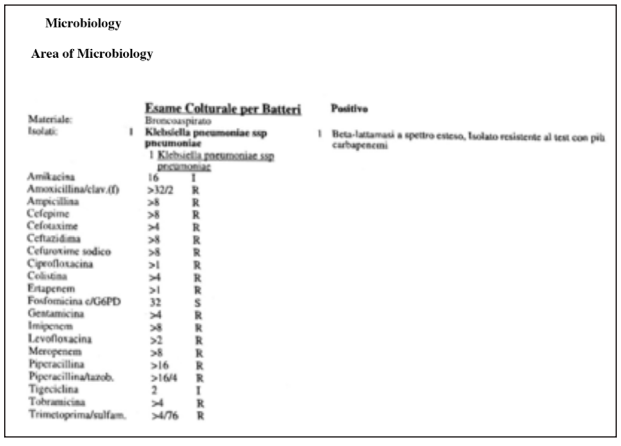


Figure 1: Left lung thickening.

Orotracheal intubation and protective mechanical ventilation were performed, followed by haemodynamic support with noradrenaline 0.45 mcg/kg/min. Due to a positive bronchial aspirate culture for multidrug-resistant Klebsiella pneumoniae (Fig. 2), a specific antibiotic therapy based on antibiogram was administered. Meropenem and amikacin were also administered as they are ideal for the treatment of these infections.



Microbiology

Area of Microbiology

Materiale:	Esame Colturale per Batteri	Positivo
Isolati: 1	Klebsiella pneumoniae ssp pneumoniae	1 Beta-lattamasi a spettro esteso, Isolato resistente al test con più carbapenemi
	1 Klebsiella pneumoniae ssp pneumoniae	
Amikacina	16 I	
Amoxicillina/clav.(f)	>32/2 R	
Ampicillina	>8 R	
Cefepime	>8 R	
Cefotaxime	>4 R	
Ceftazidima	>8 R	
Cefuroxime sodico	>8 R	
Ciprofloxacina	>1 R	
Colistina	>4 R	
Ertapenem	>1 R	
Fosfomicina e/G6PD	32 S	
Gentamicina	>4 R	
Imipenem	>8 R	
Levofloxacina	>2 R	
Meropenem	>8 R	
Piperacillina	>16 R	
Piperacillina/tazob.	>16/4 R	
Tigeciclina	2 I	
Tobramicina	>4 R	
Trimetoprima/sulfam.	>4/76 R	

Figure 2: Bronchial aspirate positive for multidrug-resistant *Klebsiella pneumoniae*.

Continuous venovenous haemodialysis (CVVHD) was initiated together with a first cycle of Cytosorb. In the seventh day, haemodynamic support (noradrenaline 0.2 mcg/kg/min) was decreased and the second cycle of Cytosorb started. In the third day since the diagnosis of sepsis, due to the improvement of both the clinical condition of the patient and the laboratory values (Tab.1), haemodynamic support, mechanical ventilation and haemofiltration were weaned. A few days after, the patient was discharged.

	Fifth Day	Sixth Day	Seventh Day	Eight Day	Ninth Day
Leukocytes (10^3/μL)	11.04	20.03	33.83	28.25	18.18
CRP (mg/L)	213.3	255.7	399.4	187.9	64.5
PCT	1.77	2.41	4.68	3.17	2.87
Total bilirubin (mg/dL)	2	2.3	1.3	0.8	0.8
Noradrenalin (μg/kg/min)	0	0.45	0.2	0.05	0

Table 1: Markers of infection and dosage of vasopressors during recovery.

Conclusion

We report one of the first clinical case involving a cardiopathic patient suffering from sepsis, septic shock and multiple organ failure. In literature, an increased survival in patients affected with sepsis and treated with Cytosorb is not univocally recognized. Nonetheless, this system of hemoadsorption has been used successfully in several different clinical cases. Randomized controlled trials are currently in progress with encouraging preliminary results.

In a case reported by Dogan et al.[4], Cytosorb has been used successfully together with an extracorporeal membrane oxygenation in a patient with cardiac shock and bi ventricular failure. This resulted in an improvement of organ function and of the inflammatory condition of the patient.

Steltzer et al.[5] treated early a patient with severe septic shock and severe trauma with a combination of CVVHDF and Cytosorb, decreasing the systemic inflammatory reaction and preventing major or permanent organ damage, despite the impressive pathogen spectrum.

Kousoulas et al.[6] used Cytosorb as adjuvant in the treatment of a patient with septic shock and necrotizing fasciitis caused by nontraumatic renal rupture due to pyelonephritis. The combination of Cytosorb and conventional therapies allowed a rapid hemodynamic stabilization in the patient and preservation of the renal function.

After studying similar clinical cases, we decided thus for an early treatment with Cytosorb together with conventional therapies due also to the

sudden aggravation of the clinical condition of an already critical patient. This device has proven to be a great adjuvant and to have well-tolerated effects on both cardiovascular and renal functions, allowing us to quickly wean the patient from vasopressors and leading to an early discharge a few days after hospitalization without major organ damage.

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