



I.R.C.C.S.  
POLICLINICO  
SAN DONATO

# ECMO in combination with CytoSorb in a woman with para-prosthetic leak following Mitral Valve Replacement, candidate to Percutaneous Treatment: A Case Report.

Andrea BALLOTTA<sup>1</sup>, Mohamed LAMTI<sup>1</sup>, Hassan KANDIL<sup>1</sup>, Alessandro VARRICA<sup>1</sup>, Fabrizio BETTINI<sup>1</sup>, Angela SATRIANO<sup>1</sup>, Giuseppe ISGRÒ<sup>1</sup>, Mauro COTZA<sup>1</sup>, Angelo MICHELETTI<sup>1</sup>, Marco RANUCCI<sup>1</sup>.

<sup>1</sup> IRCCS Policlinico San Donato, San Donato Milanese, Milan, Italy.



## BACKGROUND/AIMS:

Cytosorb is an adsorption column composed of highly porous biocompatible polymer beads, able to absorb molecules smaller than 55 kDa. Cytosorb can be used into any extra-corporeal circuits: CRRT, ECMO, CPB or isolated hemoperfusion. In patients with complex pictures near to Multi Organ Failure, characterized by cardio-pulmonary failure, that require ECMO support and with kidney and liver loss of function, Cytosorb is thought to be a valid support thanks to its capability to adsorb a very large quantity of inflammatory mediators and other molecules, like bilirubin, bile acids and ammonium.

## CASE PRESENTATION:

We report a case of a woman with a story of aortic coarctation and mitral valve dysplasia, subjected to decortectomy associated with multiple mitral valve replacements over the years. In 2017 we found a mitral para-prosthetic leak and severe tricuspid regurgitation, associated with increased haemolysis index, dyspnoea and asthenia. We decided to proceed with a percutaneous treatment of paravalvular leak. After the first attempt to repair the mitral valve paravalvular leak, we decided to postpone the procedure, due to a persistent severe mitral regurgitation. On the first postoperative day, the patient underwent **VA ECMO**, due to a cardiac arrest followed by return of spontaneous circulation. Thanks to ECMO support, we successfully performed the percutaneous treatment of paravalvular leak and the tricuspid valve substitution. After four days of hospitalization in ICU, during ventilator weaning, tachypnoea associated with ARDS occurred and we implanted **VV ECMO** in emergency.

After seven days, we decided to wean the patient off from VV ECMO therapy and we started **CVVHDF in association with CytoSorb** (in series to the haemofilter), due to worsening hyperbilirubinemia and liver and kidney failure. We performed 4 consecutive CytoSorb treatments, 24h each. The CytoSorb adsorber is able to remove from blood inflammatory mediators and is effective in reducing bilirubin.

| Data        | 7/10  | 8/10    | 9/10    | 10/10   |
|-------------|-------|---------|---------|---------|
| Ora         | 16:00 | 16:00   | 16:00   | 16:00   |
| Amilasi     | 224   | 154     |         |         |
| Bil Tot/Dir |       | 3.2/3.0 | 5.3/3.8 | 5.8/4.4 |
| SGOT        | 57    | 57      | 57      | 75      |

| Data             | 10/10 | 11/10    | 12/10  | 13/10   | 14/10   | 15/10    | 16/10     |
|------------------|-------|----------|--------|---------|---------|----------|-----------|
| Ora              | 16:00 | 16:00    | 16:00  | 16:00   | 16:00   | 16:00    | 16:00     |
| Glicemia         |       |          |        |         |         |          |           |
| Azotemia         |       | 60       | 39     | 26      | 26      | 20       | 19        |
| Na <sup>+</sup>  |       | 143      | 143    | 137     | 142     | 147      | 145       |
| K <sup>+</sup>   |       | 3.78     | 3.9    | 3.4     | 3.97    | 3.9      | 3.6       |
| Cl <sup>-</sup>  |       | 10.6     |        | 10.0    |         | 10.0     | 9.5       |
| Ca <sup>++</sup> |       | 1.12     |        | 1.0     |         |          | 1.38      |
| Amilasi          |       |          |        |         |         |          | 24        |
| Bil Tot/Dir      |       | 10.3/6.6 | 11.6/8 | 8.4/5.2 | 9.1/6.0 | 10.2/5.2 | 12.8/10.7 |
| SGOT             |       | 5        | 13     | 7       | 9       | 8        | 7         |
| SGPT             |       | 7        | 7      | 8       | 11      | 15       | 36        |
| LDH              |       | 417      | 423    | 426     | 388     | 420      | 587       |

## EGA pre VV ECMO

## EGA post VV ECMO

| 08.10.2017 11:52                  |              | 08.10.2017 13:57                  |              | 08.10.2017 14:38                  |              |
|-----------------------------------|--------------|-----------------------------------|--------------|-----------------------------------|--------------|
| Nome sistema TIPO 3               |              | Nome sistema TIPO 2               |              | Nome sistema TIPO 2               |              |
| ID sistema 0500-35402             |              | ID sistema 0500-35405             |              | ID sistema 0500-35405             |              |
| ID paz. 17D11880                  |              | ID paz. 885                       |              | ID paz. 8855                      |              |
| <b>ACIDO-BASE 37.0 °C</b>         |              | <b>ACIDO-BASE 37.0 °C</b>         |              | <b>ACIDO-BASE 37.0 °C</b>         |              |
| pH                                | 7.385        | pH                                | 7.326        | pH                                | 7.328        |
| pCO <sub>2</sub>                  | 41.2 mmHg    | pCO <sub>2</sub>                  | 46.0 mmHg    | pCO <sub>2</sub>                  | 41.0 mmHg    |
| pO <sub>2</sub>                   | 42.3 mmHg    | pO <sub>2</sub>                   | 206.2 mmHg   | pO <sub>2</sub>                   | 137.2 mmHg   |
| HCO <sub>3</sub> <sup>-</sup> act | 24.1 mmol/L  | HCO <sub>3</sub> <sup>-</sup> act | 23.5 mmol/L  | HCO <sub>3</sub> <sup>-</sup> act | 21.0 mmol/L  |
| HCO <sub>3</sub> <sup>-</sup> std | 23.5 mmol/L  | HCO <sub>3</sub> <sup>-</sup> std | 22.4 mmol/L  | HCO <sub>3</sub> <sup>-</sup> std | 20.6 mmol/L  |
| BE(B)                             | -0.9 mmol/L  | BE(B)                             | -2.4 mmol/L  | BE(B)                             | -4.6 mmol/L  |
| BE(ecf)                           | -0.9 mmol/L  | BE(ecf)                           | -2.5 mmol/L  | BE(ecf)                           | -4.9 mmol/L  |
| ctCO <sub>2</sub>                 | 25.4 mmol/L  | ctCO <sub>2</sub>                 | 24.9 mmol/L  | ctCO <sub>2</sub>                 | 22.3 mmol/L  |
| <b>CO-OSSIMETRIA</b>              |              | <b>CO-OSSIMETRIA</b>              |              | <b>CO-OSSIMETRIA</b>              |              |
| Hct                               | 30 %         | Hct                               | 23 %         | Hct                               | 22 %         |
| tHb                               | 10.2 g/dL    | tHb                               | 7.9 g/dL     | tHb                               | 7.6 g/dL     |
| sO <sub>2</sub>                   | 80.8 %       | sO <sub>2</sub>                   | 98.3 %       | sO <sub>2</sub>                   | 97.7 %       |
| FO <sub>2</sub> Hb                | 80.2 %       | FO <sub>2</sub> Hb                | 97.2 %       | FO <sub>2</sub> Hb                | 96.2 %       |
| FMetHb                            | 0.1 %        | FMetHb                            | 0.2 %        | FMetHb                            | 0.3 %        |
| FHHb                              | 19.1 %       | FHHb                              | 0.9 %        | FHHb                              | 1.2 %        |
| nBili                             | 4.5 mg/dL    | nBili                             | 4.2 mg/dL    | nBili                             | 2.3 mg/dL    |
| <b>OSSIGENAZIONE 37.0 °C</b>      |              | <b>OSSIGENAZIONE 37.0 °C</b>      |              | <b>OSSIGENAZIONE 37.0 °C</b>      |              |
| BO <sub>2</sub>                   | 14.1 mL/dL   | BO <sub>2</sub>                   | 10.9 mL/dL   | BO <sub>2</sub>                   | 10.4 mL/dL   |
| p50                               | 24.6 mmHg    | p50                               | 23.1 mmHg    | p50                               | 21.2 mmHg    |
| ctO <sub>2</sub> (a)              | 11.5 mL/dL   | ctO <sub>2</sub> (a)              | 11.3 mL/dL   | ctO <sub>2</sub> (a)              | 10.6 mL/dL   |
| <b>ELETTROLITI</b>                |              | <b>ELETTROLITI</b>                |              | <b>ELETTROLITI</b>                |              |
| Na <sup>+</sup>                   | 135.8 mmol/L | Na <sup>+</sup>                   | 137.1 mmol/L | Na <sup>+</sup>                   | 136.4 mmol/L |
| K <sup>+</sup>                    | 4.02 mmol/L  | K <sup>+</sup>                    | 3.54 mmol/L  | K <sup>+</sup>                    | 4.12 mmol/L  |
| Ca <sup>++</sup>                  | 1.29 mmol/L  | Ca <sup>++</sup>                  | 1.22 mmol/L  | Ca <sup>++</sup>                  | 1.26 mmol/L  |
| Ca <sup>++</sup> (7.4)            | 1.28 mmol/L  | Ca <sup>++</sup> (7.4)            | 1.18 mmol/L  | Ca <sup>++</sup> (7.4)            | 1.22 mmol/L  |
| Cl <sup>-</sup>                   | 103 mmol/L   | Cl <sup>-</sup>                   | 104 mmol/L   | Cl <sup>-</sup>                   | 103 mmol/L   |
| <b>METABOLITI</b>                 |              | <b>METABOLITI</b>                 |              | <b>METABOLITI</b>                 |              |
| Glu                               | 137 mg/dL    | Glu                               | 189 mg/dL    | Glu                               | 189 mg/dL    |
| Lac                               | 2.00 mmol/L  | Lac                               | 5.40 mmol/L  | Lac                               | 5.40 mmol/L  |

## CONCLUSION:

We present the use of combination therapies in a patient with a complex clinical picture. ECMO therapy associated to CVVHDF with CytoSorb, has proved to be an efficient method to support cardiac and lungs function and to support the kidney and liver failure. In particular, CytoSorb cartridge seems to be a promising therapy, able to control and modulate worsening hyperbilirubinemia, allowing progressive liver function recovery.