# Impact of semi-closed cardiopulmonary bypass in right mini-thoracotomy aortic valve replacement

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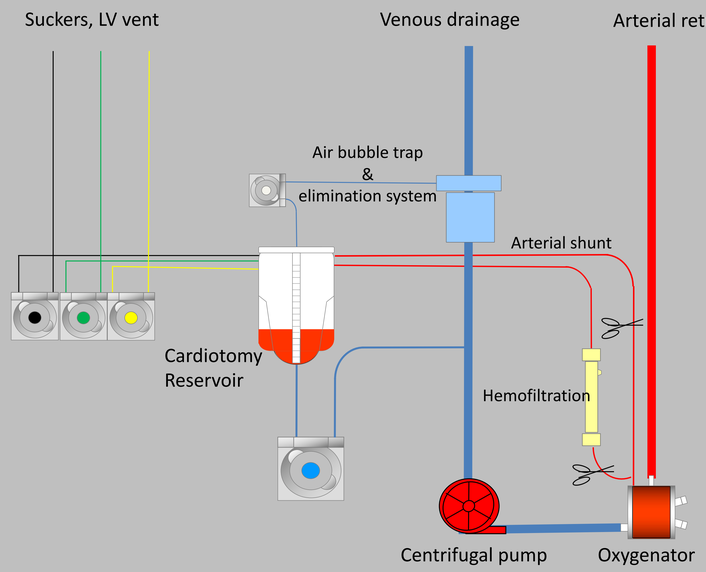
## BACKGROUND

Minimally invasive aortic valve replacement through the right mini-thoracotomy (MIAVR) has proved to be a safe approach, however drawback of MIAVR is longer cardiopulmonary bypass (CPB) time when compared to conventional AVR through median sternotomy. We have introduced a novel semi-closed cardiopulmonary bypass (SC-CPB) for MIAVR since 2014 to obtain further less invasiveness in MIAVR.

## OBJECTIVE

The aim of this study to evaluate impact of the SC-CPB by comparing conventional open cardiopulmonary bypass (O-CPB) in MIAVR.

## SEMI-MINI-CLOSED CPB




## METHOD

SC-CPB circuit includes the functions of oxygenation, filtration, and air elimination in a compact manner in connection with a centrifugal pump. The venous line was directly connected to a centrifugal pump via air elimination system without open venous reservoir. A reservoir only for a vent and suckers was connected on the circuit. We retrospectively reviewed 203 isolated MIAVRs performed from March 2014 to February 2020 and compared the outcomes of patients undergoing MIAVR using SC-CPB (Group S, n=144) with MIAVR using O-CPB (Group O, n=59).

### Patients' characteristics

| Clinical Variable | SC-CPB (144) | O-CPB (59) | p value |
|---|---|---|---|
| Age | 73 +/- 10 | 74 +/- 13 | 0.21 |
| Female/Male | 80/64 | 26/33 | 0.21 |
| Height | 159+/- 10 | 157+/- 10 | 0.06 |
| Weight | 57 +/- 10 | 54+/- 14 | 0.48 |
| EuroSCORE | 2.0 +/- 2.1 | 2.9 +/- 3.8 | 0.56 |
| Hemoglobin | 12.5 +/- 1.6 | 12.1 +/- 1.5 | 0.06 |
| NYHA | 2.4+/- 0.4 | 2.1 +/- 0,5 | 0.44 |

## RESULTS

### Intraop. Data

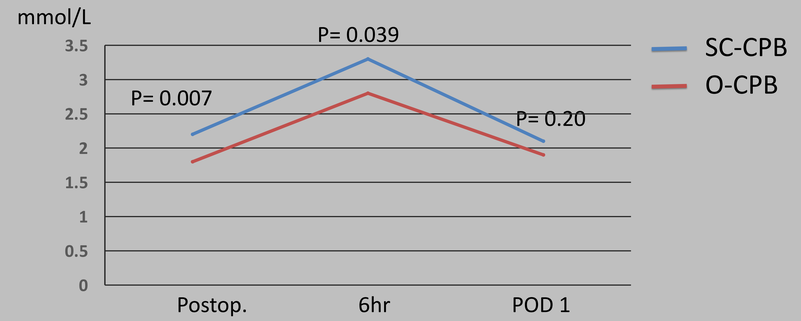
| Clinical Variable | SC-CPB (144) | O-CPB (59) | p value |
|---|---|---|---|
| CPB time (min) | 130 +/- 29 | 127 +/-28 | 0.28 |
| Cross clamp time (min) | 97 +/- 22 | 94 +/- 22 | 0.18 |
| Priming volume (ml) | 833+/-27 | 1396+/-145 | <0.001 |
| Dilution rate (%) | 17+/-3 | 26+/-5 | <0.001 |
| RCC transfusion rate | 28/144 (19.4%) | 25/59 (42.4%) | 0.09 |
| Volume of RCC transfusion (unit) | 0.14+/-0.1 | 0.9+/-2.3 | 0.14 |
| Volume of FFP transfusion (unit) | 0.6+/-1.4 | 2.1+/-6.8 | 0.24 |
| Perfusion index (L/min/m2) | 2.4 +/-0.2 | 2.3 +/- 0.5 | 0.16 |
| DO2 (ml/min/m2) | 312.6 +/- 35.8 | 312.6 +/- 30.5 | 0.16 |

### Postop. clinical Data

| | SC-CPB (144) | O-CPB (59) | p value |
|---|---|---|---|
| Hospital mortality | 0 | 0 | - |
| Intubation time (hour) | 9.1+/-6.7 | 10.2 +/-10.2 | 0.21 |
| Reambulation over 150 m (days) | 2.8+/-1.1 | 3.5+/-1.6 | 0.045 |
| Chest tube output | 182 +/ 157 | 227 +/- 164 | 0.041 |
| Volume of RCC transfusion | 0.8+/-1.9 | 4.1+/-3.4 | 0.003 |
| Volume of FFP transfusion | 0.4+/-1.6 | 3.6+/-3.3 | 0.002 |
| Hemoglobin (mg/dl) | 10.1 +/- 1.4 | 10.2+/-1.3 | 0.15 |
| Reexploration | 1 | 0 | 0.16 |
| Acute Kidney Injury | 18/144 (13.5%) | 10/59 (18.9%) | 0.32 |
| Lactate (mmol/L) | 2.2 +1.1 | 1.8+/-1.1 | 0.010 |
| Creatine kinase (IU/L) | 450 +/- 421 | 509 +/- 607 | 0.25 |
| Hospital stay (day) | 10 +/- 6 | 12 +/- 8 | 0.028 |

## DISCUSSION

### Change of Lactate level




## CONCLUSION

SC-CPD contributed to reduce blood transfusion rate, chest tube output and hospital stay. SC-CPD should be considered in patients undergoing MIAVR.