## SCA 67

## EFFECTS OF LEFT HEART BYPASS ON ARTERIAL OXYGENATION DURING ONE-LUNG VENTILATION IN PATIENTS UNDERGOING DESCENDING THORACIC AORTIC SURGERY

[1]Samejima C, [2]Niimi Y, [3]Yamamoto S, [4]Sakuramoto C, [4]Hoshino M, [1]Hoka S

*[1]Kitasato University, Sagamihara-shi , Kanagawa, Japan; [2]Teikyo University, Itabashi-ku , Tokyo, Japan; [3]Kawasaki Saiwai Hospital Aortic Center, Kawasaki-shi , Kanagawa, Japan; [4]Machida City Hospital, Machida-shi, Tokyo, Japan*

**Introduction:** Partial left heart bypass (LHB) is one of the useful circulatory support techniques for descending thoracic aortic surgery. Although the LHB can effectively unload the left side of the heart and increase the distal perfusion during cross-clamping of the descending thoracic aorta, hypoxemia during one-lung ventilation (OLV) is one of the major concerns of this technique. The purpose of this study was to determine the effect of LHB on arterial oxygenation during OLV in descending thoracic aortic surgery.

**Patients and Methods**: Fourteen consecutive patients undergoing descending thoracic aortic surgery were studied. A double-lumen endotracheal tube was inserted for OLV and mechanical ventilation with 100 % oxygen was applied at right lateral position.Mean arterial pressure(MAP), heart rate(HR), cardiac index(CI), cardiac output(CO), arterial oxygen pressure(PaO2), pulmonary artery oxygen saturation(SvO2), alveolar arterial oxygen difference(A-aDO2)were measured at 5 stages: control (two-lung ventilation), 15 min after initiating OLV, before LHB, 15 min after institution of LHB, and 15 min after termination of LHB. During OLV, a pulsed Doppler measurement of right upper pulmonary venous flow including velocity and velocity time integral(Vmax,Vmean,VTI) was obtained using transesophageal echocardiography. Values are expressed as means±SD. The data were analyzed with repeated measures ANOVA and with Bonferroni post hoc test for multiple comparisons. Difference was considered significant when P<0.05.

**Results:** During OLV, there was a significant decrease in PaO2 and a significant increase in A-aDO2(p<0.01).When LHB was instituted, these values improved significantly(p<0.01). During LHB, a significant increase in CO was observed simultaneously with an increase in the right upper pulmonary venous flow(p<0.01).

**Discussion:** During LHB, an active drainage from the left atrium by centrifugal pump and a concomitant increase in pulmonary arterial-venous pressure gradient in ventilated lung may increase blood flow in the ventilated lung. The increased blood flow in the ventilated lung can contribute to the improvement of arterial oxygenation due to a reduction of shunt fraction. A previous study1) showed that an increase in perfusion for the non-ventilated lung is a major cause for a decrease in oxygenation during OLV. Our results suggest that congestion of the ventilated lung is also attributable to hypoxemia during OLV at the lateral decubitus position.

Conclusion: LHB improves arterial oxygenation during OLV by increasing perfusion of the ventilated lung.

**Reference:**

1. Benumof JL: One-lung ventilation and hypoxic pulmonary vasoconstriction: implications for anesthetic management. *Anesth Analg* 64: 821-833, 1985

| | two-lung | 15min OLV | before LHB | 15min LHB | post LHB |
|---|---|---|---|---|---|
| PaO2 | 442±121 | 200±138** | 141±95** | 263±115** | 265±130** |
| A-aDO2 | 239±116 | 359±211** | 537±93** | 410±112** | 410±127** |
| MAP | 70.6±11 | 73.4±12.4 | 70.8±6.7 | 78.8±10.7 | 68.5±11.3 |
| HR | 59.8±15.9 | 68.8±19.5** | 67.9±14.2* | 71±15.6** | 75.2±17.8** |
| $SvO_2$ | | 73.8±8.4 | 70.9±6.3 | 76.7±5.4 | 71.4±10.8 |
| CI | | 2±0.7 | 2.4±0.7 | 2.8±0.7** | 2.2±0.8 |
| CO | | 3.4±1 | 4±1.2 | 4.8±1.2** | 3.8±1.2 |
| Vmax | | 50.2±18.9 | 50.7±15.9 | 92±25.1** | 56.5±12.7 |
| Vmean | | 24.7±7.6 | 27.9±10.8 | 48.1±18.9** | 29.7±6.9 |
| VTI | | 21.9±4.8 | 24.4±6.6 | 37.9±12.2** | 23.7±6.1 |

* p＜0.05 **p＜0.01