

**TITLE:** LOCATIONS OF RETAINED INTRACARDIAC AIR IN CORONARY ARTERY BYPASS GRAFTING USING TRANSESOPHAGEAL ECHOCARDIOGRAPHY

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**INTRODUCTION:** In 1985, we reported that air was detected in the left side of the heart in 11% of patients undergoing coronary artery bypass grafting (CABG) by M mode transesophageal echocardiography (TEE)<sup>1</sup>. In this study, using the long-axis view of the heart by two-dimensional TEE, we attempted to find out the exact location of retained intracardiac air in CABG patients.

**SUBJECTS AND METHODS:** TEE was performed in 35 patients undergoing CABG (27 males and 8 females, ranging from 36 to 83 years old). After approval of institutional research committee, informed consent was obtained from all patients. A TEE probe (ESB-37LR, 3.75MHz, Toshiba) and an echocardiographic system (SSH-65A, Toshiba) were used. At weaning from cardiopulmonary bypass (CPB) following manual hyperinflation of the lungs, the long-axis view of the heart (the left atrium, left ventricle, and left ventricular outflow tract) was visualized. TEE finding of air was determined by: 1) strong echogenicity; 2) buoyancy in the heart. When air bubbles were detected, origin of the air bubbles was searched toward the upstream.

**RESULTS:** Retained intracardiac air was detected in 10 of 35 patients (28.6%). Locations of retained air were the right upper pulmonary vein (RUPV) in 3, left ventricular (LV) apex in 1, and both of those areas in 6 patients. The air appeared from RUPV into the left atrium after initiation of mechanical ventilation. The air at the LV apex was depicted as an area of strong echo on the endocardium. Unless the heart was shaken, the air tended to stay at the LV apex and only small amount of air bubbles appeared continuously in the left ventricle for a long period of time.

**DISCUSSION AND CONCLUSION:** Despite the routine maneuver to expel the entrapped air in the pulmonary circulation, high incidence of retained air was found at weaning from CPB. Locations of the retained air were found to be RUPV and LV apex. Long-axis view of the heart is the most suitable way for detecting retained air because the entire left heart including two locations of air retention can be observed in one view. Attention should be paid especially for the air retained at LV apex, because it suddenly appeared in the left ventricle and expelled to the aorta once the heart was shaken. This indicates that such retained air, if it is not removed, can be expelled to the aorta in the postoperative period and can cause a sudden onset of circulatory derangement.

#### Reference

1. Anesthesiology 63:109-113, 1985.

## A431

**TITLE:** ABNORMAL FINDINGS OF THE DESCENDING THORACIC AORTA IN PATIENTS UNDERGOING CORONARY ARTERY BYPASS SURGERY EXAMINED BY TRANSESOPHAGEAL ECHOCARDIOGRAPHY

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**INTRODUCTION:** Intraaortic balloon pump (IABP) is often used in patients undergoing coronary artery bypass grafting (CABG), and its complications are not uncommon<sup>1</sup>. Ischemia of the legs or peripheral embolism may be caused by dislodging of unrecognized mural thrombus in the aorta. However, no method has been available for such evaluation. The purpose of this study is to examine the pathological changes of the descending aorta in patients undergoing CABG, related to the use of IABP, by two-dimensional transesophageal echocardiography (TEE).

**SUBJECTS AND METHODS:** TEE was performed in 57 patients (41 males and 16 females, ages ranging from 36 to 83 years old). After approval of institutional research committee, informed consent was obtained from all patients. A TEE probe (ESB-37LR, 3.75MHz, Toshiba) and an echocardiographic system (SSH-65A, Toshiba) were used. The TEE transducer was directed posteriorly in the esophagus and short-axis view of the descending thoracic aorta was obtained. The aorta was examined for internal

projection from the level of diaphragm (40 to 45 cm from the incisor) to the level of aortic arch. The maximal area of each projection was measured. The orientation of the projection was described clockwise on the TEE image. IABP was used in ten of 57 patients, initiated preoperatively in four and during post-bypass period in six patients.

**RESULTS:** Projections were detected in 42 of 57 patients (73.7%). Projections larger than 0.5 cm<sup>2</sup> were found in 18 patients (31.6%). The largest one was 3.1 cm<sup>2</sup> and occupied 45% of the aortic lumen. Two of these 18 patients had a history of peripheral embolism. Large projections near the tip of IABP catheter were found in two of four patients IABP initiated preoperatively. Large projections (>0.5cm<sup>2</sup>) were located at 3 to 6 o'clock of the aorta in 15 of 18 patients. The tip of IABP catheter was also found in the area of 3 to 6 o'clock of the aorta in 6 of 10 patients.

**DISCUSSION AND CONCLUSION:** High incidence (31.6%) of large projection was found in the descending thoracic aorta. The tip of IABP catheter was often found in the same area where large projections were commonly located. These results suggest the possibility of dislodging the projections in advancing the IABP catheter. TEE is the only modality to visualize such pathological changes of the descending aorta and it can guide surgeons to perform insertion of IABP catheter safely.

#### References

1. Circulation 58(Suppl.I):124-132, 1978.