

Department of Cardiovascular Surgery

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General Summary

The major achievements in our department included both clinical studies and experimental animal studies. The clinical studies include those establishing excellent surgical performance, investigating new techniques, and evaluating alterations in cardiac performance and long-term results after cardiac surgery. In addition, analysis based on the JCVSD (big database for Japanese cardiac surgery) is becoming new projects. We are also continuously performing several experimental studies with in-vivo models. The major activities in adults and congenital sections are described below.

Research Activities

Echocardiographic Evaluation of postoperative coaptation geometry of Left Atrioventricular Valve (LAVV) in Complete Atrioventricular Septal Defect (cAVSD)

Postoperative echocardiographic assessment was performed in 18 patients who underwent cAVSD repair to analyze LAVV function.

Clinical investigation on myocardial protection during a pediatric heart surgery

In the infants who underwent open heart surgery for VSD, AVSD or the other congenital malformations with a various cardioplegic strategy, biochemical marker for myocardial injury (troponin T) and oxidative stress (8-iso-prostane) were evaluated.

Experimental study on myocardial protection by a single dose Del Nido cardioplegia

An experimental study in an in-vivo piglet model was performed to test the effects of del Nido cardioplegia (Lidocaine supplemented hypo Calcium blood cardioplegia) on the left ventricular function recovery after prolonged (90~120 min) of global ischemia.

Visualization of the cardiac conduction system in human heart specimens by the high-resolution phase contrast CT imaging

The visualization of the AV conduction axis within whole heart specimens was feasible with the use of a synchrotron radiation phase-contrast CT (PCCT) and verified by subsequent histological examination.

Clinical study of adult cardiac surgery

1. Choice of Aortic Valve Prosthesis in a Rapidly Aging and Long-living Society

Purpose: The aim of this study was to evaluate the long-term results of aortic valve replacement (AVR) with mechanical (M) and bioprosthetic (B) selected based on the current Japanese guidelines that recommend a B valve in patients aged more than 65 years. **Methods:** From April 1995 to March 2014, 366 adult patients underwent AVR or combined AVR/coronary artery bypass grafting. Of these, 127 (35%) patients received M valves and 239 patients (65%) received B valves. A retrospective analysis of the entire population and the selected 124 patients aged 60 to 70 years was carried out in order to compare the results between the two groups. **Results:** The 15-year overall survival was $87\% \pm 4\%$ for the M group and $40\% \pm 29\%$ for the B group. Freedom from reoperation at 15 years was $98\% \pm 2\%$ for the M group and $82\% \pm 9\%$ for the B group. Among propensity score matching of the subgroup in patients aged 60 to 70 years, there was also no significant difference in the 15-year survival and freedom from reoperation between the M and the B valves. **Conclusion:** The age criteria of 65 years for choosing an aortic bioprosthetic has been suitable.

2. Structural valve deterioration of a Carpentier-Edwards aortic pericardial bioprosthesis
In a recent aging society, patients who require valve operations have been getting old and the frequency of using mechanical valves has decreased extremely. That is because tissue valves have demonstrated satisfactory long-term durability and younger population who likes to live without anticoagulation has a tendency to increase despite a risk of reoperation due to structural valve deterioration (SVD). Moreover, the transcatheter valve-in-valve procedure has proven feasible for SVD as an alternative to surgical procedure. Although SVD is still an inevitable and most common cause for reoperation of tissue valves, it can be sometimes difficult to assess an appropriate timing of redo operation in asymptomatic young patients under careful echocardiographic follow-up. In any case, we have to follow the patients carefully so as not to lose an appropriate timing of a redo operation under stable condition and it is also important to monitor the outcomes of these patients who underwent bioprosthetic aortic replacement in young age.

3. Japanese Study of Bidirectional Evaluation of Surgical Performance on Cardiovascular Surgery (jBLADE Study-0)

Background: The cardiac surgery procedure consists of meticulous steps including: (1) opening the chest; (2) establishment of cardiopulmonary bypass (CPB); (3) harvesting saphenous vein graft; (4) harvesting the internal mammary artery for coronary artery bypass grafting (CABG), (5) main procedures, such as aortic valve replacement, mitral valve replacement, and mitral valvuloplasty; (6) cessation of CPB; and (7) closing the chest. Every trainee should become familiar with and, finally, gain expertise in each step of these procedures. Scheduled to elucidate the logistics of the study and the standardized evaluation form.

Purpose: The purposes of the study were (1) to establish, objective, generalize, and standardize then evaluation system and (2) to elucidate the logistics of obtaining informed consent, evaluation of surgical performance, data acquisition, data transfer and management, and final analysis.

Method: Included in this study were board-eligible and board-certified trainees before their first renewal who agreed to participate in the jBLADE-0 study.

Technical skills of these participants were monitored with video recording. Video records

of each case were blinded and evaluated by members of the evaluation committee. As a pilot study, 5 cases of each of 5 modules, including (1) opening chest, (2) establishment of CPB, (3) harvesting saphenous vein graft, (4) harvesting the IMA, and (5) closing chest in 6 institutions, were evaluated, and standardized evaluation was confirmed with over 90% consistency.

4. Japanese Study of Impact of Body Mass Index on Morbidity and Mortality in Geriatric Patients. Part 1: Coronary Artery Bypass Grafting

Objective: We sought to determine the effect of preoperative nutritional status determined by the body mass index on early mortality and morbidity after CABG in Japan.

Methods: We retrospectively identified 35,674 elderly patients (age ≥ 60 years) who had undergone CABG from January 1, 2008, to December 31, 2012, and had been registered in the Japanese Adult Cardiovascular Surgery Database. These patients were divided into 4 groups on the basis of body mass index. The primary endpoint was defined as early mortality, and the secondary endpoints were defined as composite endpoints, including stroke, transient ischemic attack, new dialysis, mediastinitis, and prolonged ventilation (≥ 24 hours). The results indicated that emaciation was associated with an increased risk of operative mortality while obesity was the primary risk for morbidity for elderly patients who underwent CABG.

Publications

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