Current Status of Surgical Treatment of Acquired Valvular Heart Diseases in Hong Kong

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Before I start, I would like to take the opportunity to thank Professor Nakamura and the Japanese Society for Cardiovascular Surgery for inviting me to participate in this "International Symposium on the Current Status of Acquired Valvular Heart Diseases in Asia". This is indeed a privilege and an honour to me.

That part of Asia which I come from is a tiny island called Hong Kong situated on the coast of southeast China. In Chinese Hong Kong means fragrant harbour. Although it is small in size, it has a population of five and a half million. Over 90% of the population are Chinese. In spite of a low tax base of 16.5%, medical care including cardiac surgery is provided by government at very low cost. It costs a patient in a public ward US $3.00 per day. This includes the bed, food, medications and surgery. As the place is small and transportation from point A to B is easy and readily available, there is only one government funded open-heart unit. It is located at the Grantham Hospital on the south side of the Hong Kong island. The Grantham Hospital is a 625 bedded hospital built in the early 1950s for the treatment of tuberculosis. Because of the reduction in demand for tuberculosis beds, in 1967, 70 beds were made available for cardiac surgery and an open-heart surgical unit was set up in 1968. Currently we are doing over 600 open-heart procedures a year and our waiting time for elective open-heart surgery is under 3 months. With these background information, I would like to present to you "The current status of surgical treatment of acquired valvular heart diseases in Hong Kong".

First, I will give you an overview of valvular surgery in Hong Kong in the past 20 years to illustrate the patterns of diseases and surgery. Then I will mention some of our current thoughts on patient selection, choice of prosthesis and our anticoagulation policy. Finally, I will present our experience with aortic valve replacement in patients with grossly dilated left ventricle.

In the past 20 years, the relative incidences of congenital and valvular surgery remain more or less constant with an approximately 1 : 1 ratio. In the recent 2 years, there is an increase in incidence of coronary artery disease. However, it is comparatively low and currently coronary artery surgery takes up 10-15% of our work. A breakdown of the valvular surgery shows that there has been an increase in the number of valvular operations performed. The increase is related to an increase in both the diagnostic and surgical facilities and it is not a result of an increase in incidence of valvular heart disease. Although over 98% of our valvular pathology are rheumatic in origin, acute rheumatic fever had virtually disappeared in Hong Kong since the 1960s. The majority of our patients who underwent valvular surgery in the last 3 years were new immigrants from China. The number of conservative operations remained pretty much the same until the recent 3 years when we became more confident in
repairing valves. The pattern of valvular surgery in the past 20 years has been rather consistent; mitral valve disease is about 3 times as common as aortic or multiple valve disease. During this period of time, we used mainly mechanical valves, first the Starr Edwards 6120 and 1260 series, then the Björk Shiley followed by Medtronic-Hall. As Bioprosthesis was implanted only when anticoagulation was contraindicated or undesirable, throughout the years the number remained more or less unchanged. As rheumatic fever is disappearing and the life expectancy of the local population increases, there is an increase in the mean age of patients undergoing valvular surgery. As to the sex distribution, mitral valve disease is twice as common among the female as among the male. On the other hand, with aortic valve disease the reverse is true. It is twice as common among the male as among the female. Multiple valve disease is equally distributed among the sexes.

For a number of years, NYHA class III/IV symptom has been the classical indication for valvular surgery. Like others, we come to realize that mere clinical disability is of no value in selecting the time for safe and effective surgery in a sizeable cohort of patients with mitral or aortic regurgitation. However, we do not have any reliable method to balance the problems and complications of early valve replacement or repair against the inferior results of delayed surgery. It is disheartening to see a relatively symptom-free individual with severe mitral regurgitation and seemingly good left ventricle undergoing faultless mitral valve replacement do poorly postoperatively. Although the optimal timing for surgery in asymptomatic or mildly symptomatic patients with severe mitral and aortic regurgitation is largely unknown, in our practice, we have no hesitation in recommending surgery to those with severe mitral regurgitation whose left ventricular end-systolic echo dimension is 5.5 cm and above. For the borderline cases, we will put them to the treadmill and operate on those whose exercise performance is poor, or when the echocardiographic features of their mitral valves suggest that they can be repaired. It has been our experience that a mitral valve with dilated annulus and large, supple leaflets is readily amenable to valvuloplasty.

It is well known that in patients with severe mitral regurgitation where cardiomyopathy dominates, conventional surgery would no longer be of any significant value and may even be harmful. We think valvuloplasty with acceptance of mild to moderate residual regurgitation or replacement with preservation of the chorda tendineae may be of value and we are in the process of examining this approach.

Since we are not seeing too many patients with aortic valve disease, we have no view of our own on asymptomatic aortic regurgitation but to follow the current teaching from overseas centres.

What about the choice of prosthesis? The majority of Chinese patient would avoid surgery whenever they can, let alone repeated surgery. Thus, the majority of our patients prefer the mechanical prosthesis because they would avoid repeated surgery at all cost. On the other hand, on medical ground, mechanical prosthesis is also preferred because the majority of our patients with mitral valve disease are in atrial fibrillation and have a grossly dilated left atrium, and the average patient with aortic valve disease tend to have a small aortic root. Thus, in the past 20 years, bioprosthesis was inserted with specific indications, e.g. in young females who wanted to have children and in situations where anticoagulation is contraindicated. Up till now, we have been using mainly single leaflet mechanical prosthesis because it is much cheaper than the bileaflet valves. Our experience in the past 6 years suggests that the Medtronic-Hall valve is an excellent heart valve substitute provided the surgeon is meticulous in handling the mitral subvalvar apparatus, the orientation of the prosthesis and trimming.
We anticoagulate all our patients with mechanical valve. After surgery, if there is no excessive bleeding for 6 hours, a loading dose of 5 mg of warfarin is given. Then a daily dose of warfarin is administered to achieve an International Normalising Ratio of 2-3. In high risk patients, i.e. patients with giant left atria, massive left atrial clots, tricuspid valve replacement and low cardiac output state, if their prothrombin time and APTT are normal, 7200 units of heparin are infused daily in addition to the oral warfarin until an INR of 1.5 is achieved. The heparin infusion is then replaced with dipyridamole 75 mg 3 times daily.

When thromboembolism occurs, if the prothrombin time is below the therapeutic range, the dose of warfarin is increased. If it is within or above the therapeutic range, dipyridamole 400 mg daily is given in addition to warfarin.

When repeated significant bleeding occurs despite careful adjustment of warfarin dosages, we will consider giving the patient a combination of antiplatelet agents, either aspirin-dipyridamole or aspirin-pentoxifylline. We, in fact, have conducted a prospective randomized clinical trial to study the efficacy of platelet suppressant therapy in the prevention of mechanical valve thromboembolism. Since the study had been published in 1985 in Circulation (72: 1059-1063), I will not spend time on this aspect of thromboembolic prophylaxis.

It is generally accepted that patients with a dilated left ventricle undergoing aortic valve replacement are expected to have a higher incidence of operative deaths and irreversible left ventricular function. Now I would like to share with you our experience on this group of patients.

From July 1977 to May 1985, 256 aortic valve replacements were performed in 240 patients at the Grantham Hospital. Among these 240 patients there were 50 whose LV end systolic dimensions were 5.5 cm or above. There were 44 male and 6 female. Their age ranged from 15 to 70 years. The majority of them had pure aortic regurgitation. Associated lesions included infective endocarditis in 11 patients, and in 3 of them the infection was not under control; Marfan’s syndrome and aortic root aneurysm in 4 patients. 70% of the patients were in functional class III or IV. Their left ventricular echo dimensions measured at the level of the papillary muscles were as follows: end systolic dimension ranged from 5.5 to 7.5 cm and end diastolic dimensions from 7 to 9 cm. The fractional shortening was under 25% in 2/3 of the patients and only 4 patients had a normal fractional shortening of 30% or over. Among 34 patients who had right heart catheterisation, pulmonary arterial pressure was normal in 20 and the rest had either moderate or severe pulmonary hypertension. Among 37 patients who had left heart catheterisation, only 16 had a normal left ventricular end diastolic pressure and in 12 it was equal or over 25 mmHg.

46 patients underwent aortic valve replacement and 4 had aortic root replacement with a composite graft. The concomitant procedures performed included closure of VSD and/or sinus of Valsalva aneurysm in 7 patients, exploration of the mitral valve in 3 patients, and one patient each underwent concomitant mitral annuloplasty and coronary artery bypass grafting respectively.

A 59-year-old woman with severe pulmonary hypertension, very poor left ventricular function and congestive heart failure died giving an operative mortality of 2%.

4 patients with very poor left ventricular function, fractional shortening of 13, 14, 17, 20 and 24% respectively survived the operation and were symptomatically improved. However, they still died of
heart failure 15-16 months later. In addition, 5 other patients died 2 to 28 months postoperation. 2
died at reoperation for recurrent prosthetic endocarditis and paraprosthetic leak, 1 each died of ruptured
false aortic aneurysm, retroperitoneal haematoma and carcinoma of bronchus respectively.

40 long-term survivors were followed from 7 to 101 months with a mean of 3 years and a total
follow-up period of 120 patient-years. All except 1 were in functional class I or II and there was
regression of cardiomegaly. The exception was a 34-year-old man who underwent aortic valve replace-
ment for the 3rd time because of recurrent prosthetic endocarditis and paraprosthetic leak. Both condi-
tions recurred again afterwards and he has since been treated expectantly for 40 months and he is the
only patient with a significant residual lesion.

Serial echocardiographic measurements of the left ventricular dimensions showed that the diastolic
dimensions regressed much faster than the systolic dimensions and it took up to a year for the regres-
sion of systolic dimensions to catch up with that of the diastolic dimensions. In some patients the left
ventricular dimensions continued to regress up to two years. At the recent review, most of the left
ventricles appeared entirely normal echocardiographically. In 3 patients, even though they were symp-
tomatically improved, their left ventricular dimensions failed to return to normal, 4 years, 4 years and
5 years respectively after aortic valve replacement. Their preoperative fractional shortening were 14%,
24% and 15% respectively.

This slide shows that in the majority of patients their postoperative fractional shortening were within
normal.

Our review suggests that in patients with aortic valve disease and grossly dilated left ventricle, aortic
valve replacement can be performed with acceptable operative risk and symptomatic relief can be ex-
pected. For those with a preoperative fractional shortening greater than 25%, increased risk of late
postoperative death from persistent heart failure is unlikely and the converse is also true. Early reduc-
tion in diastolic left ventricular dimension and delayed reduction in left ventricular end systolic dimen-
sion can be expected. Finally, return of left ventricular dimensions to normal can be expected in the
majority of long term survivors.

Problems in the Management of Rheumatic
Heart Disease in India

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The most common cause of valvular heart disease in India is rheumatic fever. The prevalence and
epidemiology of this condition has been surveyed in various parts of the country and has been
estimated at 1.6 per thousand of population. Almost 30% of hospital admissions for cardiac ailments
are for rheumatic heart disease. Of the 1.2 million individuals who may have had rheumatic fever,

at least 250,000 can be assumed to have haemodynamically significant valve lesions needing surgery.