

Aortic Valve Replacement with or without Coronary Artery Bypass Grafting: Queen Alia Heart Institute Experience

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ABSTRACT

Objective: Our study was designed to compare the outcome of aortic valve replacement with or without coronary artery bypass grafting at Queen Alia Heart Institute with internationally published data.

Method: This was a retrospective single-center analysis which looked at patients who underwent aortic valve replacement with or without coronary artery bypass grafting at Queen Alia Heart Institute over a one year period from January 2011 till December 2011. Patients' demographic characteristics, risk factors for coronary artery disease, preoperative symptoms, left ventricular ejection fraction, hospital stay, complications (in hospital and at 30 days mortality) were reviewed.

Results: A total of 193 patients were included in this analysis. Age ranged from 12-75 years with a mean of 53.2 (SD 12.2) years. Eighty three patients had aortic valve replacement alone using a prosthetic valve, while 11 had a tissue valve. The average number of grafts was 2.5 per patient. Surgical on pump time was an average of 104 minutes. Patients who had only AVR had on pump time of an average of 60 minutes, while patients who had combined AVR with CABG had an average on pump time of 128 minutes ($P \leq 0.005$). Patients who only had CABG had an average of on pump time of 45 minutes. Hospital stay averaged 10.2 days. Patients who only had AVR stayed for an average of 7.2 days while patients who had AVR and CABG stayed for an average of 10.5 days ($P \leq 0.005$). Patients who had CABG stayed on average for 5.8 days, 29 (15%) developed post operative atrial fibrillation, 12 (6.2%) had wound infection, five (2.6%) had pleural effusion, two (1.0%) needed permanent pacemaker, one (0.5%) developed acute renal failure but did not need haemodialysis, nine (4.7%) needed re-opening and six (3.1%) had a thrombo-embolic event. Overall in hospital mortality was 4.1% (n=8). No deaths were recorded at 30 day follow up.

Conclusion: Aortic valve replacement alone or in combination with coronary artery bypass grafting surgery and/or other valve surgery remains a major challenging procedure and the more complex the procedure by combining (AVR and CABG and/or MVR) the longer the hospital stay with higher morbidity and mortality rate. Queen Alia Heart Institute data are similar to the internationally comparable published data.

Key words: Heart valve surgery, coronary artery bypass grafting, early mortality, morbidity

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Introduction

Life expectancy continues to improve worldwide, reaching 87 years for females and 81 years for males in developed countries, with Coronary Artery Disease (CAD) being the commonest cause of death.^(1,2) Thus Coronary Artery Bypass Grafting (CABG) and coronary intervention is on the increase. With the advancement in medicine, mortality and morbidity following CABG and/or Aortic Valve Replacement (AVR) worldwide continue to improve.^(3,4) This is due to advances in surgical and anesthesia techniques and earlier recognition of disease.⁽⁵⁾ The operative mortality with heart valve surgery has been reported between 1 to 15% depending on which valve is operated upon and whether it is associated with CABG.⁽⁶⁾ As expected aortic valve replacement especially concomitant with CABG has been performed much less frequently than CABG alone.

Our study was set up to look at outcome of AVR with or without CABG at Queen Alia Heart Institute (QAH) in comparison with internationally published data.

Method

This was a retrospective analysis which looked at all patients who underwent AVR with or without CABG at Queen Alia Heart Institute (QAH) over a one year period from January 2011 till December 2011. Demographic characteristics, risk factors for coronary artery disease, preoperative symptoms (New York Heart Association classification I-IV), Left Ventricular Ejection Fraction (LVEF) (Normal $\geq 50\%$, Mild - Moderate 50% -35%, Severe $\leq 35\%$), operative pump time, hospital stay, complications, in hospital and at 30 days mortality were recorded. These data was compared with internationally published data.

Results

We had a total a total of 193 patients. Their age ranged from 12-75 years with an average of 53.2 (SD 12.2) years. The male to female ratio in our study group was 2:1.

Sixty six patients (34.2%) were diabetics, more than half (n=109, 56.5%) were hypertensive, 61 (31.6%) had family history of premature coronary

artery disease, 61 (32%) had hyperlipidaemia and 68 (35.2%) were smokers. Fifty eight patients (30%) had aortic regurgitation, 102 (52.8%) had aortic stenosis while the rest had combined aortic valve disease. Normal Left Ventricular function accounted for the majority of cases (83.5%) while 11.2% had moderate left ventricular dysfunction.

Prosthetic valves were used in 83 patients who had only aortic valve replacement (AVR), while 11 patients underwent tissue valve replacement. One patient had AVR with septal myomectomy; two patients had AVR with sub-aortic membrane resection (SAM). Seventy one patients had combined AVR and CABG together. Eleven patients underwent AVR and Mitral Valve Replacement (MVR); another nine patients had AVR with MVR and bypass surgery. One patient had redo AVR, one patient had Bentall procedure (Graft replacement of the aortic valve, aortic root, ascending aorta with re-implantation of the coronary arteries into the graft) and three patients had AVR with aortoplasty (Table I). The average number of CABG was 2.5 per patient. The mean logistic EuroSCORE was 9.2 (\pm SD 4.5).

Surgical on pump time ranged from 30–220 minutes with an average of 104 minutes. Patients who had AVR alone had on pump time of 30–180 minutes with an average of 60 minutes, while patients who underwent combined AVR with CABG had an average on pump time of 128 minutes ($P \leq 0.005$). Patients who underwent CABG alone had an average of on pump time of 45 minutes. Hospital length of stay ranged from 5–50 days with an average of 10.2 days. Patients who had AVR alone, length of stay was an average of 7.2 days while patients who had AVR combined with CABG stayed in the hospital for an average of 10.5 days ($P \leq 0.005$). Patients who had CABG stayed on average for 5.8 days. Post operative atrial fibrillation occurred in 29 patients (15%). Wound infection was noticed in 12 patients (6.2%), five patients (2.6%) had pleural effusion, two patient (1.0%) required permanent pacemaker. One patient (0.5%) developed acute renal failure but did not need haemodialysis, nine patients (4.7%) needed re-opening, six patients (3.1%) had thrombo-embolic event (five had strokes and one had lower limb embolization) (Table II).

Overall in hospital mortality was 4.1%, 4 patients (4.2%) who had AVR, 4 patients (5.6%)

Table I: Number of patients per type of procedure. (SAM = Sub-Aortic Membrane).

Type of surgery	Number of patients
AVR	94 (Prosthetic 83, tissue valve 11)
AVR & septal Myomectomy	1
AVR & SAM resection	2
AVR & CABG	71
AVR & MVR	11
AVR, MVR & CABG	9
Redo AVR	1
Bentall procedure	1
AVR & Aortoplasty	3
Total number of patients	193

Table II: Complications

Type of complication	Number of patients
Atrial fibrillation	29 (15 %)
Wound infection	12 (6.2%)
Pleural effusion	5 (2.6%)
Permanent pacemaker	2 (1%)
Acute renal failure	1 (0.5%)
Wound re-opening	9 (4.7%)
Thrombo-embolic event	6 (3.1%)

who had AVR combined with CABG (P non-significant)). No deaths were recorded at 30 day follow up.

Discussion

The combination of CABG with another valvular procedure requires longer procedure time with longer on pump time. This usually translates into longer hospital stay with more complications and higher mortality rate.

The age of our population is statistically younger when compared to the international literature (53.2 ± 12.2 compared with 65.1 years) ($P \leq 0.005$).⁽⁷⁾ This is a reflection of the longer life expectancy of people in developed countries when compared with ours.⁽⁸⁾ This is also reflected in our lower Logistic EuroSCORE. The male to female ratio in this study group was 2:1 which is comparable to internationally published data.⁽⁹⁾

Normal Left Ventricular function accounted for the majority of cases (83.5%) while 11.2% had moderate left ventricular dysfunction. The former group had a shorter hospital stay of 7.3 days ($P \leq 0.05$). The indication for AVR was mainly for aortic stenosis in 53% of patients, 30% had aortic regurgitation, while the rest had combined aortic valve disease. This reflects the fact that aortic stenosis is related to degenerative valve disorder.

Preoperative coronary angiography was performed on all patients who are 40 years or older and/or patients who had symptoms or risks to suggest CAD. Patients who underwent bioprosthetic (tissue) valves were either young women of childbearing age, or elderly patients

who were deemed high risk for lifelong anticoagulation. Our study showed that early mortality in the AVR group was comparable to internationally published data (4.2% compared to 3.3% - 4.8%), and for AVR combined with CABG (5.6 % compared to 4.9% - 7.1%).^(8,9)

Mortality and morbidity was influenced by preoperative heart failure with NYHA class I-II had an OR=1 while NYHA class III had an OR=2.2. This is comparable to published data.^(10,11) There were few patients who had other valves concomitantly operated upon to allow for clear statistical analysis. Our records show that the majority of our patients were assessed on several occasions by Echocardiography and when needed coronary angiography. Patients who were referred from other centers had one or two visits before undergoing cardiac surgery. Patients who underwent combined AVR and CABG noticed to have less severe aortic valve disease than those who underwent AVR alone. This is due to the fact that when CABG is indicated the concomitant valve replacement criteria for surgery is not as strict as valve replacement alone, thus avoiding chest reopening in the future.

Upon discharge all patients received warfarin with a target INR of 2.5 to 3.5. All patients who had concomitant AVR and CABG were given aspirin except three patients. Three patients were given Clopidogrel due to their intolerance to aspirin. Seventy five percent of patients were discharged on β -Blockers, while 65% were on Angiotensin Converting Enzyme Inhibitor. Sixty five percent were also taking diuretics.

Conclusion

AVR alone or in combination with CABG surgery and/or other valve surgery remains a major challenging procedure and the more complex the procedure by combining (AVR and CABG and/or MVR) the longer the hospital stay with higher morbidity and mortality rate. Queen Alia Heart Institute data are similar to the internationally comparable published data.

References

1. **Keogh B, Klinsman R.** Society of Cardiothoracic Surgeons of Great Britain and Ireland. *Fifth National Adult Cardiac Surgical Database Report* 2003.
2. **Bose AK, Aitchison JD, Dark JH.** Aortic valve replacement in octogenarians. *Journal of Cardiothoracic Surgery* 2007; 2:33
3. **Hellegren L, Kvidal P, Stahle E.** Improved early results after heart valve surgery over the last decade. *Eur J Cardiothorac Surg* 2002; 22(6):904-11.
4. **Shahian DM, O'Brien SM, Filardo G, et al.** The Society of Thoracic Surgeons 2008 cardiac surgery risk models: part 1 — coronary artery bypass grafting surgery. *Ann Thorac Surg* 2009; 88: Suppl: S2-S22.
5. **Holmes JS, Kozak LJ, Owings MF.** Use and in-hospital mortality associated with two cardiac procedures, by sex and age: national trends, 1990-2004. *Health Aff (Millwood)* 2007; 26:169-77.
6. **Patel HJ, Herbert MA, Drake DH, et al.** Aortic Valve Replacement: Using a Statewide Cardiac Surgical Database Identifies a Procedural Volume Hinge Point. Accepted 24 May 2013. Published online 03 September 2013. *Ann Thorac Surg* 2013 Aug 30.
7. **Hannan E, Racz M, Jones R, et al.** Predictors of mortality for patients undergoing cardiac valve replacements in New York State. *Ann Thorac Surg* 2000; 70:1212-1218.
8. **Brunvand H, Offstad J, Nitter-Hauge S, Svennevig JL.** Coronary artery bypass grafting combined with aortic valve replacement in healthy octogenarians does not increase post operative risk. *Scand Cardiovascu J* 2002; 36(5):297-301.
9. **Finks JF, Osborne NH, Birkmeyer J.** Trends in Hospital Volume and Operative Mortality for High-Risk Surgery. *N Engl J Med* 2011; 364: 2128-2137.
10. **Tribouilly C, Enriquez-Sarano M, Schaff H, et al.** Impact of preoperative symptoms on survival after surgical correction of organic mitral regurgitation: rationale for optimizing surgical indications. *Circulation* 1999; 99:400-405.
11. **Rosenhek R, Binder T, Porenta G, et al.** Predictors of outcome in severe, asymptomatic aortic stenosis. *N Engl J Med* 2000; 343: 611-617.