

CORONARY ARTERY BYPASS GRAFTING AFTER PRIMARY ISOLATED AORTIC VALVE SURGERY

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Aortic valve replacement is an established therapy for aortic valve disease, but survival is strongly related to the presence of coronary artery disease.^{1,2} In the past decade several less-invasive techniques have emerged in aortic valve surgery. These approaches are associated with reduced sternotomy-related morbidity, but some may cause injury to one or both internal thoracic arteries (ITAs). The latter could be detrimental to the patient who needs coronary artery bypass grafting (CABG) at an older age, since the ITAs no longer can be used. However, little is known about the need for CABG after primary isolated aortic valve surgery. The goal of the present study was to assess the need for CABG after primary isolated aortic valve surgery and to identify possible predictors of future CABG at the time of the primary operation.

Methods. We analyzed data of 1598 patients who had primary isolated aortic valve surgery between 1962 and 1997, excluding those with previous cardiac operations or concomitant procedures during the aortic valve operation that required a median sternotomy. The patient data from 2 centers, the Dijkzigt University Hospital in Rotterdam, The Netherlands (n = 1004), and Cedars-Sinai Medical Center in Los Angeles, California (n = 594), were combined to increase sample size and statistical power and to represent patients from different health care systems. The probability of long-term survival and of receiving a CABG operation were estimated by the method of Kaplan and Meier. In addition, the cumulative actual incidence of CABG was estimated, adjusting for the competing risk of death.³

Results. Preoperative and postoperative variables are displayed in Table I. Total follow-up was 11,102 patient-years. Survival was 97% at 1 month, 94% at 1 year, 85% at 5 years, 66% at 10 years (95% confidence interval [CI] 62%-69%), and 39% at 20 years (95% CI 33%-44%). Only 14 patients required CABG during follow-up. The median time to CABG was 8.8 years; median follow-up in those without CABG was 7.2 years. The actuarial probability of receiving a CABG

Table I. Comparison of preoperative and postoperative variables between Rotterdam and Cedars-Sinai

	Rotterdam	Cedars-Sinai	Total
No. of patients	1004	594	1598
Male	675	340	1015
M/F ratio	2.1	1.3*	1.7
Age (y ± SD)	55 ± 17	63 ± 17*	58 ± 17
Mean follow-up (y ± SD)	7.4 ± 5.9	6.2 ± 5.3*	7.0 ± 5.7
Cardiac reoperation (No.)	105	25*	130†
CABG reoperation (No.)	9	5	14†
Follow-up expiration (N)	250	209*	459†

SD, Standard deviation.

**P* < .001.

†Log-rank test.

Table II. Characteristics of patients who required reoperation for CABG

Sex (M/F)	Age at		Maximum follow-up (y)	Status
	primary operation (y)	Reop CABG (y postop)		
M	58	0.2	0.2	Dead
M	51	0.6	18.1	Dead
M	69	3.4	5.7	Alive
M	64	5.1	6.6	Alive
F	70	6.8	7.8	Alive
M	44	8.1	17.7	Alive
M	50	8.7	8.7	Dead
F	58	9.0	10.3	Alive
M	61	11.5	11.6	Dead
M	64	12.0	15.1	Alive
M	66	12.8	12.8	Alive
M	35	17.4	18.8	Alive
F	36	17.8	22.2	Alive
M	62	18.0	18.0	Alive
M/F ratio	Mean ± SD	Mean ± SD	Mean ± SD	
3.7	56 ± 11 y	9 ± 6 y	12 ± 6 y	

SD, Standard deviation.

operation was 1.0% at 10 years and 5.9% at 20 years (CI 3%-13%) and its cumulative actual incidence was 0.8% at 10 years and 3.1% at 20 years. Univariate analysis showed no statistically significant effect of age, sex, and surgical center on freedom from CABG. In patients older than 60 years at the time of primary aortic valve surgery, a trend toward more reoperations for CABG was noted (*P* = .11; log-rank test) with an actual cumulative risk at 20 years of follow-up of 5.5% in patients older than 60 years versus 2.6% in patients aged 60

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years or younger. Table II shows the characteristics of the 14 patients who required reoperation for CABG. Two of these 14 patients had CABG within 1 year after the primary isolated aortic valve procedure; 1 died immediately after the operation and the other 18 years later. The other 12 patients had CABG 3 to 18 years after the initial procedure; 2 died shortly after the procedure, and the other 10 are still alive.

Comment. In the era of new, less-invasive techniques for heart valve surgery, concern has been expressed regarding stretch injury or ligation of the ITAs.⁴ The use of the ITA graft in CABG improves survival compared with that provided by vein grafts alone. This advantage increases with time, suggesting that the use of the ITA is a more important predictor of survival than the progression of native coronary disease.⁵ However, our data suggest that the concern regarding the damage to the ITA that may occur in minimally invasive aortic valve operations is not justified, since CABG after an initial aortic valve operation is relatively uncommon.

Only 3% of our patients with primary, isolated aortic valve surgery needed CABG after 20 years of follow-up, comparable with other data published on this subject. Lytle and colleagues¹ analyzed short- and long-term results in patients with primary isolated aortic valve replacement. They reported 23 reoperations for CABG in 1689 patients who underwent primary isolated aortic valve replacement. Of note, 182 of these 1689 patients had coronary artery disease at the time of the primary operation and did not receive grafts to vessels with stenoses of 50% or more.

Two patients in our cohort had CABG within 1 year after the initial aortic valve operation. One of these patients was operated on in 1973, when it was customary in the Rotterdam center to apply continuous left coronary artery perfusion during the operation. This perfusion method most likely caused proximal left main coronary artery occlusion necessitating reoperation 6 months after the initial aortic valve replacement. In our patients, age at primary operation, sex, and surgical center did not clearly influence CABG incidence, although patients who were older than 60 years at the

time of primary isolated valve operation tended to have more CABG reoperations. Since the average age of patients requiring aortic valve surgery is steadily increasing,⁶ our results may underestimate the true CABG risk, and longer follow-up may yield a higher CABG risk estimate. Another limitation of our study is the absence of information on angioplasty procedures and untreated coronary artery disease. Also, further studies are necessary to identify other risk factors for CABG.

In summary, we have demonstrated that the need for CABG after primary isolated aortic valve operations is small, and new, less-invasive surgical techniques that may injure the ITAs can be applied in most patients. Given the evolution of arterial grafts (gastroepiploic, superior epigastric, and radial artery), the small number of patients requiring CABG after aortic valve operations may still benefit from total arterial revascularization.

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