ORIGINAL REPORT

Dose Impaired Relaxation of Left Ventricle Affect Early Outcomes in CABG Patients?

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Abstract- Although systolic dysfunction is revealed as a prognostic factor in cardiac surgery , the role of diastolic dysfunction as a predictive factor is less evaluated. In this retrospective study from 872 patients that underwent isolated coronary artery bypass graft(Jan 2008-Feb 2009),388 patients had normal left ventricular ejection fraction (>50%). These are divided in two groups, Group 1: 361 patients without diastolic dysfunction (impaired relaxation) and Group 2: 27 patients with diastolic dysfunction (impaired relaxation). Mean age in group 1 was 57.72 year and in group 2 was 61.16 year (*P* =0.07). Risk factors such as diabetes mellitus, hypertention and dyslipidemia were similar. Although overall complication rate was higher in group 2(11.1% vs 2.8% P value 0.05),but when each complication was studied individually no significant statistical difference was found. Also no significant statistical difference was found in mortality (2.2% in group 1 vs 7.4% in group 2 P =0.1). In conclusion, from clinical standpoint diastolic dysfunction can be an important factor in assessing surgical outcome in patients whom underwent coronary artery bypass grafting.

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Key words: Coronary artery bypass; heart failure, diastole; mortality; complications

Introduction

Although systolic dysfunction is revealed as a prognostic factor in heart failure (1),inotropic requirement after CPB (2),and mortality after cardiac surgery(3),diastolic dysfunction is a predictive factor of difficult weaning from CPB(4) and predictor of mortality in cardiac surgery(5). Left ventricular diastolic dysfunction can be defined as the inability of the LV chamber to adequately fill at low atrial pressures unrelated to intrinsic valve disease or pericardial pathology,this dysfunction can be result eather from an impairment in LV compliance (passive mechanism) or from an alteration in LV relaxation (active mechanism) (6). It is responsible for 30%-50% of hospital admission for heart failure. In patients with ischemic heart disease impairment of left ventricular diastolic dysfunction commonly occurs before systolic dysfunction (7).

There are no published studies to show the importance of diastolic dysfunction as an independent predictor to recommend it is incorporation in the preoperative risk scores available (8).

Although the role of diastolic dysfunction in patients with low LVEF that undergoing CABG is evaluated, but prognostic significance of diastolic dysfunction in patient with normal LVEF that undergoing CABG is not evaluated (9).

Patients and Methods

This is a retrospective study of 872 patients that underwent cardiac surgery (2007-2008) and registered in our hospital cardiac surgery database.

From this total, 388 patients underwent isolated CABG and had normal LVEF (LVEF ≥50%),on the base of echocardiographic finding these patients are divided in two groups:

Group 1: patients without diastolic dysfunction (361 cases) and Group 2: patients with diastolic dysfunction (impaired relaxation) (27 cases).

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Table 1. Patient comparison according to presence of diastolic dysfunction (demographics and risk factors)

Variable	No diastolic dysfunction	Diastolic dysfunction	P value
Total number, n(%)	361 (93)	27(7)	
Sex			
M, n(%)	241 (66.8)	23 (85.2)	0.05
F, n (%)	120 (33.2)	4 (14.8)	
Age yr (mean ±SD)	57.72±9.451	61.16±9.447	0.07
EF (mean±SD)	53.90±4.984	52.54±3.388	0.029
Hypertension, n(%)	160 (45.2)	11 (40.7)	0.65
Diabetesmellitus, n (%)	82 (23.1)	8 (29.6)	0.44
Smoke, n (%)	94 (26.1)	6 (22.2)	0.65
Addiction, n (%)	36 (10)	2 (7.4)	0.66
Hypertriglycridemia, n (%)	125 (35.4)	9 (33.3)	0.5
Hypercholesterolemia, n (%)	131 (38)	10 (41.7)	0.82
Myocardial infarction, (%)	99.7	100	0.89

EF: Ejection Fraction

Exclusion criteria were LVEF< 50%, CABG with valve surgery or AF ablation therapy.

Demographic characteristics as well as operative and postoperative variables were analyzed with independent t-test for age ,LVEF ,aortic cross clamp ,CPB time and number of grafted vessels and Chi-square for other variables (such as risk factors, morbidity and mortality) using SPSS software.

$P \leq 0.05$ was considered significant.

Results

Patients clinical data are presented in table 1.

872 consecutive patients underwent cardiac surgery during the study period.484 patients were excluded according to the criteria mentioned earlier and 388 patients underwent CABG alone and had normal LVEF (LVEF ≥ 50%).

From these, 27 patients had diastolic dysfunction.

Mean age, LVEF, history of MI and risk factors didn`t differ significantly between groups.

Operative data which are presented in table 2, such as number of grafts , CPB time ,cross clamp time ,need for inotropic support and intra aortic balloon pump were not differ significantly.

Post operative complications are presented in table 3.

Overall complications were higher in group 2 (P = 0.05), but complications such as; renal failure, bleeding, infections , perioperative MI, neurologic deficit, pulmonary and gastrointestinal problems were not differ significantly.

Mortality in group1 was 2.2 % and in group 2 was 7.4 %, but was not important statistically (P = 0.1).

Table 2. Patient comparison according to presence of diastolic dysfunction (operative data)

Variable	No diastolic dysfunction	Diastolic dysfunction	P value
IABP, n (%)	12 (4.2)	3 (12.5)	0.02
Inotropic support, n (%)	109 (30.3)	5 (18.5)	0.14
Aortic cross clamp time, min (mean±SD)	42,62±13.56	48.28±14.7	0.03
CPB time, min (mean±SD)	79.08±22.72	83.88±30.2	0.03
CPB utilization, n (%)	257 (71.8)	23 (85.2)	0.16
Number of grafts (mean±SD)	3.08±0.81	3.45±1.03	0.19
Number of grafts, (%)			
2	23.9	12.1	0.01
3	47.8	48.5	
4	24.6	27.3	
5	2.9	9.1	
6	0.7	0	
7	0	3	

CPB time: Cardio pulmonary bypass time

Table 3. Patient comparison according to presence of diastolic dysfunction (mortality and post operative complications)

Variable	No diastolic dysfunction	Diastolic dysfunction	P value
Mortality, n (%)	8 (2.2)	2 (7.4)	0.1
Morbidity			
Post operative complication, n (%)	10 (2.8)	3 (11.1)	0.05
Renal failure, n (%)	2 (0.6)	1 (3.7)	0.02
Renal dialysis, n (%)	7 (1.9)	1 (3.7)	0.44
Bleeding, n (%)	13 (3.6)	1 (3.7)	0.64
Graft occlusion, n (%)	1 (0.3)	0.(0)	0.7
Operative preoperative MI, n(%)	4 (1.1)	0 (0)	0.74
Heart block need for permancent pacemaker, n (%)	20 (5.5)	3 (11.1)	0.24
Deep sterna infection, n (%)	2 (0.6)	1 (3.7)	0.1
Superfacial steral infection, n (%)	1 (0.3)	1 (3.7)	0.01
Leg infection, n (%)	1 (0.3)	0 (0)	0.89
Transient neurologic deficit (%)	4 (1.1)	1 (3.7)	0.3
Coma, n (%)	3 (0.8)	0 (0)	0.8
Delirium, n (%)	7 (1.9)	1 (3.7)	0.44
Depression, n (%)	1 (0.3)	1 (3.7)	0.1
ICU psychosis, n (%)	2 (0.6)	0 (0)	0.69
Prolonged ventilation, n (%)	23 (6.4)	4 (14.8)	0.03
Pulmonary embolism, n (%)	2 (0.6)	0 (0)	0.86
Pleural effusion, n (%)	1 (0.3)	0 (0)	0.7
Pneumothorax, n (%)	6 (1.7)	0 (0)	0.64
Gastrointestinal complication, n (%)	6 (1.7)	2 (7.4)	0.04

Discussion

Impairment of LV diastolic dysfunction is associated with a poor prognosis in patients with ischemic cardiomyopathy (10), congestive heart failure (11), or dilated cardiomyopathy (12).

It is also noticed that diastolic dysfunction is predictive in difficult weaning from CPB (4).

There is no study that assessed diastolic dysfunction in patients with good systolic function as a predictor of morbidity and mortality after CABG.

In study of Weterberg and coworker, diastolic dysfunction was studied in patients that underwent on-pump CABG and some of them had low LVEF (8).

In our study we compare patients that underwent either on-pump or off-pump CABG and had normal LVEF. In this study, overall complications were higher in group 2, but when each complication is compared in two groups there is no significant difference.

Although statistically there was no significant difference in mortality, but clinically 7.4% mortality in group 2 versus 2.2% in group 1 is important.

Similarly, renal failure (3.7% versus 0.6%) ,heart block (11.1% versus 5.5) ,superficial and deep sterna infection (3.7% versus 0.3%) ,prolonged intubation (14.8% versus 6.4%) and GI problems (7.4% versus 1.7%) that were higher in group 2 and from statistical standpoint had not significant difference but they are clinically important.

Limitations of our study were small sample volume, retrospective study and no comparison between all kind of diastolic dysfunction.

In conclusion, diastolic dysfunction should be assessed preoperatively and patients with diastolic dysfunction require more pre and postoperative care.

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