

Early outcome of combined coronary artery bypass grafting and valve surgery

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ABSTRACT

Aims: Patients diagnosed with coronary artery disease requiring revascularization may also have valvular heart disease. Co-presentation with both and valve coronary diseases is growing as the age rises, the aim of this study is to evaluate the clinical outcome of patients underwent coronary artery bypass grafting combined with valve surgery. **Methods:** This is a retrospective case series study including patients who had operated on between January 2013 - January 2015 in the surgical department of the Iraqi center for heart diseases using the traditional on-pump technique. **Results:** The study included 55 patients; average age was 62 years, 20 cases (36%) were male, the average period of intensive care unit stay was 72 hours for those patients with uneventful post-operative period. The following morbidities complications were recorded: infection 2 (3.6%), arrhythmias 6, (11%), myocardial ischemia 1(1.8%), renal impairment 2(3.6%), cerebro-vascular accident 1(1.8%) and

bleeding 1 (1.8%). In hospital mortality was 8 patients (14.5%). **Conclusion:** When indicated, single session, combined coronary artery bypass grafting (CABG) and valve surgery is relatively safe with acceptable early outcome and complications. Arrhythmia and pneumonia are the two most common early adverse outcomes.

Keywords: Clinical outcome, Combined valve surgery, Coronary artery bypass grafting

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INTRODUCTION

Patients diagnosed with coronary disease requiring coronary artery bypass graft surgery (CABG) may also have valvular heart disease. Co-presentation with both valve and coronary disease is growing as the age of cases referred for CABG surgery rises [1].

Although several studies have reported the outcomes of patient undergoing combined CABG and valve operation, the conclusions are different among different centers. Although combined coronary grafting and valve surgery prolongs cross-clamp time and has the potential to induce perioperative myocardial infarction (MI) and early postoperative mortality compared with patients

without coronary artery disease (CAD) undergoing isolated valve surgery, in some series, combined CABG with valve operation had few or no negative effect on operative mortality [2]. Moreover, combined valve surgery and CABG decreases the rates of perioperative MI, operative mortality, late mortality, morbidity compared to patients with critical CAD who do not revascularized at the time of valve surgery. Incomplete revascularization is associated with greater postoperative left ventricular (LV) systolic dysfunction and reduced survival rates after surgery compared with patients who receive complete revascularization. For more than a decade, advanced techniques used in myocardial preservation have been associated with decreased overall operative mortality, and it has become standard practice to bypass all significant coronary artery stenosis when possible in patients undergoing valve surgery [2].

The aim of the current study is to evaluate the clinical outcome of patients underwent CABG combined with valve surgery and to record the risk factors that affect early outcome.

MATERIALS AND METHODS

Study design

This is a retrospective case series study that included those patients who had operated on between January 2013 - January 2015 in the surgical department of the Iraqi center for heart diseases using the traditional on-pump technique. Approval was taken from the department of surgery in the Iraqi center for heart diseases.

Inclusion criteria

All consecutive patients underwent combined CABG and valve surgery included in this study. Guidelines for combined operation was as the followings

Class I

1. Patients going through CABG who have at least moderate aortic stenosis (AS) should undergo concomitant aortic valve replacement (AVR) (Level of Evidence: B)
2. Patients subjecting to coronary revascularization who have severe ischemic mitral valve regurgitation impossible to resolve with the CABG should undergo concomitant mitral valve repair or replacement (MVR) during CABG operation (Level of Evidence: B)

Class IIa

1. Patients experienced CABG who possess moderate ischemic mitral valve regurgitation impossible to cure with the CABG, Concomitant MVR during the CABG is reasonable. (Level of Evidence: B)

Class IIb

1. Patients going through CABG who has mild AS may be considered for concomitant MVR when evidence (e.g., moderate-severe leaflet calcification) demonstrates that progression of the AS may be brisk and the risk of the linked procedure is acceptable. (Level of Evidence: C) [3]

The indications of CABG were symptomatic severe coronary artery stenosis with involvement of left main artery or three vessels disease, on - going ischemia, worsening heart failure and failed coronary artery angioplasty.

The approach was classical median sternotomy with cardiopulmonary bypass and cold cardioplegia. Valve replacement rather than repair was performed for all patients. Mechanical valve was put for all valve replacement.

RESULTS

The study included 55 patients, average age was 62 years (ranging from 55 to 70 years), 20 cases (36%) were male. The average period of intensive care unit stay was 72 hours. The most common co-morbidity was hypertension (Table 1). Twenty four patients (43.6%) had three vessel disease, 13 (23.6%) had two vessel disease, 18 (32.7%) patients had single vessel disease. One case (1.8%) underwent emergency operation.

Regarding valve replacement 30 (54.5%) patients had mitral regurgitation (MR), 2 (3.6%) patients had mitral stenosis, 16 (29%) had aortic valve regurgitation (AR), 15 (27.3%) cases had AS, 4 (7.3%) of them had aortic valve regurgitation (AR). Only 4 (7.3%) patients had double valve replacement (DVR).

The average cardio-pulmonary bypass time was 114 minutes (ranging from 110 to 120 minutes) and the average cross-clamp time was 90 minutes (ranging from 80 to 100 minutes). Average hospitalization period was 7 days ranging from 5 to 10 days. The most common complications were pneumonia and arrhythmia occurring in 6 patients (11%) (Table 2). Eight patients (14.5%) died in hospital, 4 of them had CABG with AVR, 3 of them had CABG with MVR and one of the dead patients had CABG with DVR. Three patients (5.5%) died from renal failure, 2 (3.6%) from MI, 2 (3.6%) from heart failure and one patient (1.8%) from cerebrovascular accident.

DISCUSSION

The main indication for CABG procedure is to relieve symptoms like angina unresponsive to other types of management. Surgical intervention decreases the rate of life threatening events (death, MI, angina recurrence) more than other forms of treatment modalities [4].

Table 1: Patients' co-morbidities

Variables	Numbers	Percentage
Hypertension	27	41.6
Diabetes Mellitus	18	27.6
Peripheral vascular diseases	4	6.1
Chronic obstructive pulmonary disease	6	9.3
Arrhythmias	4	6.2
Renal impairment	4	6.2
Liver disease	1	1.5
Carotid Stenosis	1	1.5
Mean EJ	55%	----

Table 2: Early post-operative complications

Complications	Numbers	Percentage
Arrhythmia	6	9.2
Pneumonia	6	9.2
Renal impairment	4	6.1
Cardiac ischemia	2	3.0
Sternal wound infection	2	3.0
Mediastinitis	1	1.8
Cerebrovascular accident	1	1.8

Regarding mitral valve operation, all intervention included valve replacement rather than valve repair; this is due to superiority of valve replacement and lesser experience of the surgical team with repair procedure [5]. The mean age of patients underwent combined CABG and valve surgery varies across different population William and colleagues reported 68 years as mean age of their participants while in the series of Karimi et al the average age of the patients was 57 years [1, 6]. In the current study, an average age of 62 year was reported. This variation in mean age may be explained by difference in the educational level of the patients in various areas. In this study, the predominant gender was male; this is in concordance with other studies [6]. This may be explained by increased tobacco smoking among male gender. Mean ejection fraction was higher in the current study (54%) in comparison to other studies (48%) [6]. This may be due to younger age group prevalent in this study.

The hospital mortality was 8 (14%) patients, other studies reported 7 to 15% mortality rate for combined CABG and valve surgery. There are limited data comparing operative mortality from CABG alone with CABG plus AVR or MVR in the same institution and during the same time period. Reports of mortality risk from combined AVR and CABG vary widely (1.3-14.1%) but are generally higher than risk of CABG and valve surgery each alone (0.8-3.1 %, 3.7%) with certain exceptions [7, 8, 9].

Double valve replacement with CABG is regarded as a high risk factor for operative mortality. Previous studies reported in-hospital mortality of about 10 to 14%. Several researchers have reported increased early mortality in older patients with DVS. As highlighted previously, studies have also demonstrated that CABG surgery increases the mortality of isolated valve surgery, therefore, it is not astonishing that the inclusion of CABG to DVS rises the early adverse outcome rate compared with DVS alone [9, 10]. In this study, one patient (1.8%) died after combined CABG and DVR.

Acute myocardial infarction, ischemic mitral regurgitation, low ejection fraction, advanced heart failure symptoms, valve replacement surgery, failure to use internal mammary artery and emergency operations are crucial predictors of perioperative mortality [6].

The neurological complications have been reported to be as high as up to 3.8% [11]. In this study, adverse neurological outcome occurred in only one (1.8%) case, this mainly due to short time of cross clamping and routine carotid doppler examination for patients more than 50 years old.

Renal impairment occurring in this study was higher (5.4 %) than the others (1-3%) [6]. This is due to already borderline renal function in those patients developing impaired renal function. In the era of antibiotics and aseptic technique mediastinitis became a rare complication of sternotomy occurring in about one percent just like the current study [1].

There are several limitations for this study. First of all, the retrospective nature of the study caused missing valuable data. Secondly, the sample size is small. Third; the data derived from a single center vulnerable to bias.

CONCLUSION

When indicated, single session, combined CABG and valve surgery is relatively safe with acceptable early outcome and complications. Arrhythmia and pneumonia are the two most common early adverse outcomes. CABG when combined with double valve replacement increase risk of postoperative morbidities and mortality.

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Author Contributions

Okba F. Ahmed – Substantial contributions to conception and design, Acquisition of data, Analysis

and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Laith S. Al Kaabi – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Fahmi H. Kakamad – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

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Guarantor of Submission

The corresponding author is the guarantor of submission.

Source of Support

None.

Consent Statement

Written informed consent was obtained from the patient for publication of this study.

Conflict of Interest

Authors declare no conflict of interest.

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