

Female Gender is not a Risk Factor for Early Mortality after Coronary Artery Bypass Grafting

Abstract

Background: The female gender is considered as a risk factor for morbidity and mortality after coronary artery bypass grafting (CABG). **Aim:** In this analysis, we assessed the impact of female gender on early outcome after CABG. **Study Design:** This is a retrospective analysis of data from our center situated in South India. **Statistical Analysis:** Patients were categorized according to gender and potential differences in pre-operative and post-operative factors were explored. Significant risk factors were then built in a multivariate model to account for differences in predicting gender influence on surgical outcome. **Methods:** 773 consecutive patients underwent first time CABG between January 2015 and December 2016. 96.77% of cases were performed using off-pump technique. 132 (17.07%) patients were females. These patients formed the study group. **Results:** The in-house/ 30-day mortality in females was similar to that of males (3.03% vs. 3.12%, p value 0.957). Mediastinitis developed more commonly in females (5.35% vs. 1.30%; p value 0.004) compared to males. There were more re-admissions to hospital for female patients (21.37% in females vs. 10.14% in males, p value <0.001). In multivariate analysis using logistic regression; there was a significant association between age (OR 1.08), chronic obstructive airway disease (OR 4.315), and use of therapeutic antibiotics (OR 6.299), IABP usage (OR 11.18) and renal failure requiring dialysis (OR 28.939) with mortality. **Conclusions:** Early mortality in females was similar to that of males. Females were associated with higher rate of wound infection and readmission to hospital.

Keywords: 30-day mortality, coronary artery bypass grafting, gender, outcome, risk stratification

Introduction

Coronary artery bypass grafting (CABG) surgery has gained widespread acceptance as an effective treatment option for coronary artery disease. Observational studies have provided some comparative outcome data on women and men after CABG surgery, and there are concerns that women may have worse outcomes.^[1] Most studies have shown that the female gender is an independent risk factor for morbidity and mortality after CABG.^[2-4] Moreover, women appear to have a more difficult recovery after CABG surgery compared with men.^[5] Blankstein *et al.* found that even after adjusting for all of the identifiable risk factors including low BSA, female gender remained an independent predictor of perioperative mortality. The increased CABG mortality was explained by increased incidence of comorbidities in female patients.^[6] Older age, smaller body size, and coronary artery diameters, as well as higher incidence of comorbidities

such as diabetes, arterial hypertension, and hypercholesterolemia were found to be responsible for these gender-specific differences in outcome after CABG.^[7-9] Thus, the risk model for cardiosurgical procedures in Europe, the EuroSCORE^[10] as well as enhanced models such as the German CABG Score^[11] and society of thoracic surgery (STS) score^[12] identifies female gender as a key variable for adverse outcome. A recent study showed that the temporal differences in clinical outcomes between women and men were slowly diminishing after CABG.^[13]

Many studies were designed to find the differences in clinical outcomes between men and women and determine whether it is gender or associated comorbid conditions in women that lead to higher morbidity.^[14] However, studies have suggested no difference in major or minor adverse outcomes between men and women when off-pump CABG (OPCAB) procedures were used.^[15] In India, the vast majority of CABG is performed by OPCAB

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technique, and there is paucity of data with respect to the impact of gender in postoperative outcomes.

Due to the need for increased understanding of the difference in outcomes between men and women, we evaluated data of isolated CABG from our hospital cardiac surgery database. The intent of this study was to examine the outcomes by gender in patients who underwent CABG.

Materials and Methods

Population and data sources

This is a retrospective analysis of data from our center. Seven hundred and seventy-three successive patients who underwent first time isolated CABG between January 2015 and December 2016 (24 months) were included in the study. Patients were divided into two groups based on gender; 132 (17.07%) were females, and these were compared with male patients. Variables included in the study are given in Table 1. The major outcome measured was 30-day/in-house mortality. The other outcomes that were analyzed include postoperative complications, inotropic usage >24 h, length of ventilator hours, length of Intensive Care Unit (ICU) stay, length of hospital stay, postoperative atrial fibrillation (PoAF), postoperative stroke, intra-aortic balloon pump (IABP) usage, re-exploration for bleeding/tamponade, surgical site infection (SSI), bloodstream infection (BSI), usage of therapeutic antibiotics, renal complications, and hospital readmission. Mediastinitis was diagnosed if the patient presented with one of the following criteria: (1) an organism isolated from culture of mediastinal tissue or fluid; (2) evidence of mediastinitis seen during operation; or (3) presence of either chest pain, sternal instability, or fever (>38C), and purulent drainage from the mediastinum, or isolation of an organism present in a blood culture or a culture of the mediastinal area; by the center for disease control and prevention guideline. The left ventricular function was denoted by a scoring system: 1-normal (ejection fraction [EF] >60%); 2-mild dysfunction (EF 50%–60%); 3-moderate dysfunction (EF 35%–50%); and 4 for severe dysfunction (EF <35%).

We have excluded the patients who had undergone CABG in combination with any other surgical procedure, including valve replacement, mitral valve repair, left ventricular aneurysm resection, carotid artery surgery, reoperative cases, and myxomas.

The study was approved by the Hospital Ethics Committee.

Operative technique

Out of 773 patients, 748 (96.78%) patients underwent OPCAB using midline sternotomy. Ten patients (1.3%) had intraoperative conversion to CABG using cardiopulmonary bypass (CPB). Fifteen patients requiring long open endarterectomy of the left anterior descending artery with onlay patch of saphenous vein were all performed using CPB. The left internal mammary artery (LIMA) was the

Table 1: Variables included in the study

Preoperative characteristics
Age
Gender
Emergency/elective/urgent
EuroSCORE II
DM
HTN
DLP
Hypothyroidism
Recent MI
Renal disease
COPD
PVD
Carotid stenosis
Stroke
Preoperative sinus rhythm
LV function
Intraoperative outcome variables
Mean grafts
LIMA graft usage
Postoperative outcome variables
Ventilation hours
Usage of inotropes
Re-exploration
IABP usage
Atrial fibrillation
ICU stay
Hospital stay
Stroke
Renal dysfunction
Mediastinitis
SSIs
BSIs
Usage of therapeutic antibiotics
Hospital readmissions

MI: Myocardial infarction, COPD: Chronic obstructive pulmonary disease, PVD: Peripheral vascular disease, IABP: Intra-aortic balloon pump, ICU: Intensive Care Unit, BSIs: Blood stream infection, SSIs: Surgical site infection, DLP: Dyslipidemia, HTN: Hypertension, DM: Diabetes mellitus, LV: Left ventricular, LIMA: Left internal mammary artery

preferred conduit for bypassing left anterior descending artery. All patients were monitored with pulmonary artery catheter and continuous cardiac output in the perioperative period as per institutional protocol.

Statistical analysis

Patients were grouped under mortality, and potential differences on pre- and post-operative variables were analyzed. Statistical analysis was done using IBM SPSS 20 (SPSS Inc, Chicago, USA). For all the continuous variables, the results are either given in Mean \pm standard deviation and for categorical variables, as percentage. To obtain the association of categorical variables, Chi-square

test was applied. To compare the mean difference of numerical variables between groups, independent two-sample *t*-test was applied. Univariate logistic regression was performed to detect possible risk factors for 30-day mortality. To assess the multivariate association, binary logistic regression was used. *P* < 0.05 was considered statistically significant.

Results

Overall, 773 patients underwent CABG between January 2015 and December 2016. Preoperative variables of the patients of two groups are given in [Table 2].

Table 2: Preoperative, intraoperative and postoperative variables and their distribution with gender

Variables	Gender		P
	Female (n=132), n (%)	Male (n=641), n (%)	
Urgent cases	9 (6.8)	31 (4.8)	0.349
DM	103 (78.03)	431 (67.24)	0.015*
HTN	96 (72.72)	450 (70.2)	0.539
DLP	68 (51.51)	244 (38.07)	0.004*
Hypothyroidism	16 (12.21)	19 (2.96)	<0.001**
COPD	11 (8.4)	52 (8.11)	0.933
PVOD	4 (3.05)	33 (5.14)	0.299
Carotid stenosis	2 (1.53)	19 (2.96)	0.351
Preoperative stroke	1 (0.76)	14 (2.18)	0.279
Preoperative renal dysfunction	6 (4.58)	51 (7.96)	0.172
Recent MI	51 (38.64)	204 (31.82)	0.13
Preoperative sinus rhythm	132 (100)	637 (99.37)	0.363
LIMA graft used	128 (96.97)	628 (97.97)	0.475
Mortality	4 (3.03)	20 (3.12)	0.957
Re-exploration	0	18 (2.81)	0.051*
Renal failure requiring dialysis	2 (1.53)	8 (1.25)	0.805
Ventilator associated pneumonia	0	0	-
Mediastinitis	7 (5.34)	9 (1.40)	0.004*
SSIs	30 (22.73)	75 (11.70)	0.001*
PoAF	22 (16.80)	114 (17.78)	0.759
Postoperative stroke	1 (0.76)	8 (1.25)	0.632
Usage of IABP	2 (1.53)	16 (2.50)	0.88
BSIs	5 (3.82)	21 (3.28)	0.766
Therapeutic antibiotics used	32 (24.43)	58 (9.05)	<0.001**
Readmissions	28 (21.37)	65 (10.14)	<0.001**
Usage of inotropes >24 h	53 (39.70)	262 (40.87)	0.633

*Significant *P*<0.05, ***P*<0.001. MI: Myocardial infarction, COPD: Chronic obstructive pulmonary disease, IABP: Intra-aortic balloon pump, PVOD: Peripheral vascular occlusive disease, LIMA: Left internal mammary artery, PoAF: Postoperative atrial fibrillation, BSIs: Blood stream infection, SSIs: Surgical site infection, DLP: Dyslipidemia, HTN: Hypertension, DM: Diabetes mellitus

Diabetes mellitus (78.03% vs. 67.24%; *P* = 0.015), dyslipidemia (51.51% vs. 38.07%; *P* = 0.004), and hypothyroidism (12.21% vs. 2.96%; *P* < 0.0001) were significantly more in females. However, there was no significant difference in EuroScore II value (*P* = 0.780) and EF (females 56.45±6.94; males 54.83±8.61. *P* =0.384) between the groups. Of the 773 CABG operations, 25 (3.23%) were on-pump cases, and rest (96.77%) were OPCAB cases. The frequency of LIMA use and the mean number of grafts placed per patients were similar in both groups [Table 3]. There was no significant difference in mortality 3.03%versus 3.12% (*P* = 0.957) between female and male patients, respectively. Mediastinitis (5.35% vs. 1.30%; *P* = 0.004) and incidence of SSI (22.73% vs. 11.70%, *P* = 0.001) were significantly more common in females. Readmission to the hospital (21.37% vs. 10.14; *P* < 0.0001) was more in females mainly due to SSIs. In 773 patients, 24 cases had 30-day/in-house mortality. In univariate analysis of the entire study group, four preoperative variables such as urgency in surgery (*P* < 0.001), dyslipidemia (*P* = 0.025), chronic obstructive pulmonary disease (COPD) (*P* = 0.002), and renal dysfunction (*P* < 0.001) showed significant association with mortality. Seven postoperative variables, such as usage of inotropes (*P* = 0.002), re-exploration (*P* < 0.001), IABP support (*P* < 0.001), PoAF (*P* < 0.001), renal

Table 3: Mean and standard deviation of preoperative, intraoperative, and postoperative continuous variables with gender

Variables	Gender	n	Mean±SD	P
Age	Female	132	61.7±8.26	0.901
	Male	641	61.6±8.75	
HbA1c	Female	101	7.84±1.88	0.32
	Male	378	7.47±1.88	
LV function	Female	132	1.5±0.84	0.32
	Male	641	1.59±0.9	
EF	Female	132	56.45±6.94	0.38
	Male	641	54.83±8.61	
EuroSCORE II	Female	132	2.8±3.82	0.78
	Male	527	2.65±5.57	
Mean grafts/patients	Female	132	3.48±0.77	0.139
	Male	641	3.59±0.84	
Length of ICU stay (days)	Female	131	3.49±2.31	0.407
	Male	640	3.75±3.49	
Length of hospital stay (days)	Female	130	11.63±6.5	0.693
	Male	634	11.89±6.91	
Usage of inotropes (days)	Female	104	1.4±1.71	0.51
	Male	508	1.56±2.23	
Ventilator hours	Female	132	15.44±24.02	0.758
	Male	640	16.51±38.38	

*Significant *P*<0.05. LV function was denoted by a scoring system: 1-normal (EF >60%); 2-mild dysfunction (EF 50%-60%); 3-moderate dysfunction (EF 35%-50%), and 4 for severe dysfunction (EF <35%). LV: Left ventricular, ICU: Intensive Care Unit, SD: Standard deviation, HbA1c: Hemoglobin A1c, EF: Ejection fraction

failure requiring dialysis ($P < 0.001$), BSIs ($P < 0.001$), and usage of therapeutic antibiotics ($P < 0.001$) were associated with mortality [Table 4]. Age ($P = 0.008$), EuroSCORE II ($P < 0.001$), length of ICU stay ($P < 0.001$), and length of hospital stay ($P = 0.037$) were also associated with mortality [Table 5]. Multivariate analysis using logistic regression showed a significant association between COPD (odds ratio [OR] = 4.315, $P = 0.025$, 95% confidence interval [CI]: 1.205–15.451), renal failure requiring dialysis (OR = 28.939, $P = 0.001$, 95% CI = 3.962–211.382), IABP usage (OR = 11.18, $P = 0.001$, 95% CI = 2.588–48.307), usage of therapeutic antibiotics (OR: 6.299, $P = 0.002$, 95% CI = 1.912–20.756), and age (OR 1.081, $P = 0.021$, 95% CI = 1.012–1.154) with mortality [Figure 1].

Discussion

We have demonstrated that there was no gender difference with regard to operative death and major complications, except for SSI, after isolated CABG. This is in variance to most studies that have shown women undergoing CABG procedures are at increased risk of death, stroke, MI, and the composite endpoint of death/stroke/MI compared with men.^[14]

In a multi-center, retrospective, cohort study of all patients who underwent isolated CABG from January 2008 to December 2012 in hospitals participating in the Texas quality initiative, showed increased mortality in women (3.36% for women vs. 2.38% for men, OR, 1.39) undergoing isolated CABG.^[16] Two other studies, a large cohort study using the STS database and a study encompassing a California statewide cohort, also reported risk-adjusted odds of women's isolated CABG short-term mortality in similar ranges (OR = 1.39; 95% CI = 1.14–1.70 and OR = 1.61; 95% CI = 1.40–1.84, respectively).^[17,18] A recent meta-analysis had also showed a similar trend (OR = 1.36; 95% CI = 1.04–1.78). The smaller diameter of coronary arteries and the less frequent use of LIMA grafts and bilateral internal mammary grafts were the reasons routinely hypothesized for this trend.^[19]

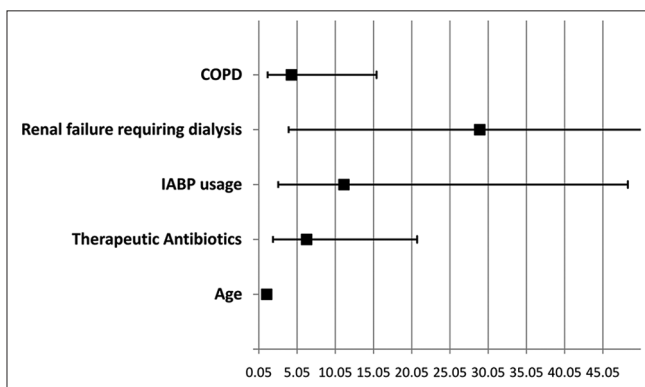


Figure 1: Multivariate analysis of categorical and continuous variables with mortality. Odds ratio with confidence interval is represented in Forest plot diagram

More extensive microvascular dysfunction, more frequent need for postoperative inotropic support and perioperative blood transfusions, and longer lengths of hospital stay were the other reasons implicated for the increased morbidity and mortality in women.^[20] Almost all studies have demonstrated that women are older at time of surgery, present at a more acute and symptomatic stage of disease and have a higher incidence of congestive heart failure and diabetes. These factors were associated with a poor outcome. However, this trend is also reported in coronary intervention and valve surgeries implicating other mechanisms, not currently known that may place the female gender as a risk for all cardiac procedures.^[21]

Our study results are in direct contrast with these reported studies. Other studies have also reported similar outcome in females. Koch *et al.* performed a propensity analysis and demonstrated that the preoperative profiles of women and men were markedly different. In well-matched cohort, female sex was not associated with increased mortality after CABG. The analysis included 74 variables for construction of propensity-matched pairs implying that in studies where female sex was implicated as a risk factor for CABG, insufficient information was collected to correct for variability.^[22] In another study, analysis of 21534 patients, including 4780 women, demonstrated a higher rate of 30-day mortality in women, compared with men on univariate analysis (2.2 vs. 1.4%; hazard ratio [HR] 1.54; 95% CI = 1.22–1.94; $P < 0.001$). After adjusting for confounding factors, however, this disparity did not exist (HR 0.93; 95% CI = 0.68–1.27; $P = 0.638$) in multivariate analysis.^[23]

The incidence of diabetes was very high in our series (78% in females and 64% in males). When compared to the Western population, south Indian population who undergo CABG is usually younger and has high incidence of diabetes mellitus and ischemic cardiomyopathy.^[24] The coronary arteries most often show diffuse involvement in diabetes mellitus. They are also smaller in size compared to Western population making CABG more technically challenging. Khan *et al.* give an account of CABG performed in South Asian population with special attention to female gender. Females were found to have a significantly higher risk of mortality following surgery but the pattern of morbidity was comparable.^[25] However, all procedures were performed under CPB and cardioplegic arrest. Women may benefit more than men from avoidance of CPB.^[13]

OPCAB surgery has been widely used and adopted by many surgical groups due to increased experience of the surgeons and improved surgical techniques and stabilization devices. OPCAB proved to be feasible and even beneficial for various high risk groups of patients (elderly, redo-CABG, patients with renal disease, acute MI, low EF, and diabetic patients with cerebral or peripheral vascular disease).^[15] In

Table 4: Association of preoperative and postoperative variables with mortality

Variables	Category	Mortality		P
		Yes 24 (%), n (%)	No 749 (%), n (%)	
Gender	Female	4 (3)	128 (97)	0.957
	Male	20 (3.1)	621 (96.9)	
Urgency of surgery	Elective	17 (2.3)	716 (97.7)	<0.001**
	Emergency	7 (17.5)	33 (82.5)	
DM	Yes	17 (3.2)	517 (96.8)	0.85
	No	7 (3)	232 (97)	
HTN	Yes	21 (3.9)	524 (96.1)	0.064
	No	3 (1.3)	225 (98.7)	
DLP	Yes	15 (4.8)	297 (95.2)	0.025*
	No	9 (2)	452 (98)	
Hypothyroidism	Yes	0	35 (100)	0.278
	No	24 (3.3)	714 (96.7)	
Recent MI	Yes	12 (4.7)	243 (95.3)	0.072
	No	12 (2.3)	506 (97.7)	
Preoperative renal dysfunction	Yes	7 (12.3)	50 (87.7)	<0.001**
	No	17 (2.4)	699 (97.6)	
COPD	Yes	6 (9.5)	57 (90.5)	0.002*
	No	18 (2.5)	692 (97.5)	
PVD	Yes	2 (5.4)	35 (94.6)	0.408
	No	22 (3)	714 (97)	
Carotid stenosis	Yes	1 (4.8)	20 (95.2)	0.657
	No	23 (3.1)	729 (96.9)	
Preoperative stroke	Yes	23 (62.2)	14 (37.8)	0.422
	No	23 (3)	735 (97)	
HbA1c	Yes	7 (1.9)	366 (98.1)	0.25
	No	4 (3.8)	102 (96.2)	
Preoperative sinus rhythm	Yes	24 (3.1)	745 (96.9)	0.72
	No	0	4 (100)	
Inotropic usage	Yes	17 (5.4)	296 (94.6)	0.002*
	No	7 (1.5)	453 (98.5)	
Re-exploration	Yes	4 (22.2)	14 (77.8)	<0.001**
	No	20 (2.6)	735 (97.4)	
IABP usage	Yes	6 (31.6)	13 (68.4)	<0.001**
	No	18 (2.4)	736 (97.6)	
PoAF	Yes	11 (8.1)	125 (91.9)	<0.001**
	No	13 (2)	624 (98)	
Postoperative stroke	Yes	1 (11.1)	8 (88.9)	0.164
	No	23 (3)	741 (97)	
Postoperative renal failure requiring dialysis	Yes	5 (50)	5 (50)	<0.001**
	No	19 (2.5)	744 (97.5)	
Mediastinitis	Yes	1 (6.2)	15 (93.8)	0.464
	No	23 (3.1)	734 (96.9)	
SSI	Yes	2 (1.9)	103 (98.1)	0.446
	No	22 (3.3)	646 (96.7)	
BSI	Yes	4 (15.4)	22 (84.6)	<0.001**
	No	20 (2.7)	727 (97.3)	
Therapeutic antibiotics	Yes	11 (12.2)	79 (87.8)	<0.001**
	No	13 (1.9)	670 (98.1)	
Readmissions	Yes	3 (3.2)	91 (96.8)	0.959
	No	21 (3.1)	658 (96.9)	

*Significant $P < 0.05$, ** $P < 0.001$. DM: Diabetes mellitus, HTN: Hypertension, DLP: Dyslipidemia, MI: Myocardial infarction, COPD: Chronic obstructive pulmonary disease, PVD: Peripheral vascular disease, IABP: Intra-aortic balloon pump, HbA1c: Hemoglobin A1c, PoAF: Postoperative atrial fibrillation, SSI: Surgical site infection, BSI: Blood stream infection

Table 5: Association of continuous variables with mortality

Variables	Mortality (mean±SD)		P
	Yes	No	
Age	66.25±8.65	61.47±8.62	0.008*
EuroSCORE II	6.87±7.36	2.56±5.14	<0.001**
HbA1c	7.16±1.9	7.56±1.89	0.492
Length of ICU stay	7±8.83	3.6±2.94	<0.001**
Length of hospital stay	14.71±14.04	11.75±6.47	0.037*

*Significant $P < 0.05$, ** $P < 0.001$. SD: Standard deviation, HbA1c: Hemoglobin A1c, ICU: Intensive Care Unit

most studies involving OPCAB, female gender is not an independent predictor of adverse outcomes. In our series, majority of patients underwent OPCAB; this can explain the better results in female patients compared to conventional data. Further studies are required to understand why female patients experience more complications with on-pump CABG.

In the 2011, the American College of Cardiology Foundation/American Heart Association Guidelines for CABG surgery advocated the use of arterial grafts for anastomosis to the left anterior descending artery. The LIMA is the conduit of choice. LIMA is usually patent for many years after CABG (10-year patency >90%).^[26] Their early patency rates are also much superior to venous grafts reducing the incidence of postoperative MI, and its use was found to decrease the 30-day mortality (HR 0.480).^[27] In spite of these advantages, LIMA is under-utilized in women compared to men. Saphenous vein can be of poor quality in women leading to early graft occlusion. The high LIMA use (96.8% in women vs. 98.6% in men) is probably one of the reasons for favorable outcome in our series.

Most of the reported series, female patients coming for myocardial revascularization are usually older and have more comorbidities such as COPD, peripheral vascular occlusive disease, renal dysfunction, and carotid occlusive disease; these comorbidities may be the determining factor for perceived gender disparity in outcome.^[23] In our series, the female patients differed from male patients only in the incidence of diabetes mellitus and hypothyroidism. This is also reflected in the similarity in the length of hospital stay, ICU stay, inotropic usage, ventilator hours, and postoperative complication rates.

Mediastinitis was seen five times more in females than in males. Overall mediastinitis rate was higher compared to data from other literature. This is probably reflection of high incidence of diabetes mellitus in our patients compared to those reported western literature. Risk factors for mediastinitis are older age, obesity, chronic obstructive bronchopneumonia, diabetes mellitus, critical preoperative state, postoperative vasopressor support, transfusion, prolonged ventilation, and bilateral internal thoracic artery use in female patients. In female gender, tension of the breast on the skin wound may be an additional risk factor

for delayed wound healing and wound leakage, leading to mediastinitis.^[28]

The risk profile of patients with coronary artery disease (CAD) shows variation with age, gender, region, and race. In Indian population, CAD is the major cause of mortality, and the number of CABG surgeries performed is increasing every year. Differences in the risk profile might reflect on the postoperative short- and long-term outcomes.^[23] A study was done by Borde, *et al.* to validate European system for cardiac operative risk evaluation II (EuroSCORE II) and STS risk-score for predicting mortality and STS risk-score for predicting morbidity in Indian patients after cardiac surgery.^[29] This study showed EuroSCORE II and STS risk Scores have a satisfactory calibration power in Indian patients for predicting the preoperative risk, but their discriminatory power was poor. We followed EuroSCORE II for predicting preoperative risk in our patients. In our series, the mean EuroSCORE II for women was 2.8% and men was 2.65%. The observed mortality was higher than the expected mortality in both groups. Different population subset, inclusion of subjective variables and noninclusion of important variables, small sample size, changes in the standard of care between institutions and improvement in the quality of care over time, etc., are challenging in predicting preoperative risk significantly using scoring systems.^[30]

Study limitations

This study was done on a retrospective series from a single institution and also gives only in-hospital and early postoperative period outcomes. Another disadvantage of this study is an inadequate sample size to separate differences in rare clinical variables between the study groups. However, this is the first study examining the gender difference in outcome from India where close to 75% of CABG is performed using OPCAB technique, and no data exists in literature about the outcome to the best of our knowledge.

Conclusions

We found that compared to males, female patients are at increased risk of wound infection and readmission to hospital after CABG. Overall, both operative and 30-day mortality were similar in women and men.

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Conflicts of interest

There are no conflicts of interest.

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