



Original Research Article

OUTCOME OF YOUNG ADULTS PATIENTS UNDERGOING CABG AT TERTIARY CARE HOSPITAL KARACHI

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Abstract: **OBJECTIVE** To determine the outcome of young adults' patients undergoing CABG at tertiary care Hospitals Karachi. **METHODOLOGY** This descriptive cross-sectional study included 296 young adults undergoing coronary artery bypass grafting at the National Institute of Cardiovascular Diseases, Karachi, using non-probability consecutive sampling. Preoperative demographics and postoperative outcomes were recorded through a structured proforma. Outcomes assessed included in hospital mortality, perioperative myocardial infarction, stroke, heart failure, and hospital stay. Data were analysed using SPSS version 26 with a significance level of p less than 0.05. **RESULTS** Among 296 young adults undergoing coronary artery bypass grafting, the mean age was 38.23 years and 62.8% were male. Preoperative myocardial infarction occurred in 18.6%, stroke in 3.7%, heart failure in 10.8%, and in hospital mortality in 2.4%. No outcome differences were observed between age groups. Preoperative myocardial infarction was significantly more common in females (p=0.008). **CONCLUSION** It is to be concluded that young adults undergoing coronary artery bypass grafting demonstrated favourable early outcomes, with low rates of in hospital mortality, stroke, and heart failure. Although most outcomes showed no significant association with age or gender, preoperative myocardial infarction was significantly more frequent among females. These findings highlight that coronary artery bypass grafting is a safe and effective intervention in young adults, with overall low postoperative complication rates.

Keywords: Coronary artery bypass grafting, Young adults, Premature coronary artery disease, Postoperative outcomes, In hospital mortality.

INTRODUCTION

Coronary artery disease (CAD) is an inflammatory disease with a gradual progressive nature, which is atherosclerotic and causes a severe level of morbidity and mortality among people worldwide [1]. Though coronary artery bypass grafting was traditionally viewed as a procedure that needed to be carried out in older adults, there are indications that even young patients can be subjected to surgical revascularization because of severe or complex coronary lesions, multivessel diseases, or the fact that they have impaired ventricular functioning [2]. The necessity to test younger patients in case of coronary artery bypass grafting has grown over the years as the

premature coronary artery disease is becoming a specific clinical phenomenon with different risk factors and prognosis [3]. Gender differences have also been revealed where female patients particularly South Asian populations show greater death rates after operations hence the significance of demographic particularities analyses [4]. Moreover, the coronary artery disease in South Asians usually occurs at earlier ages than in the western population, hence the need to have earlier and intensive therapeutic interventions [5]. The intricacy of the coronary anatomy in young adults, both high SYNTAX scores and the necessity to perform multivessel revascularization more often, also

supports the aggressive coronary artery disease among young adults [6]. Also, the postoperative levels of CK MB and troponin have also shown their worth as effective biomarkers to predict myocardial injury and early outcome following coronary artery bypass grafting, which will help them in risk stratification [7]. Recent studies have brought out an increasing rate of early onset of coronary artery disease in young adults, with a significant percentage of the cases being seen to suffer acute coronary syndromes and necessitate early revascularization [8, 9]. A significant number of young patients portray the traditional risk factors including dyslipidaemia, smoking, and hypertension; however, there are also those who do not have conventional determinants, which signifies the role of genetic and nontraditional determinants [8]. Angiographic trends of regional studies have consistently shown high rates of multivessel disease in young South Asians patients indicating the seriousness of coronary artery disease in young South Asians [10]. Coronary artery disease is a disease which is often diagnosed in the 3rd and 4th decades of life, and there is a marked percentage of patients who are diagnosed even below the age of 35, a major problem to the public health of Karachi [11]. The assessment of the outcomes regarding the coronary artery bypass grafting in young adults is rather timely and necessary considering the especially high rate of metabolic risk factors, e.g., dyslipidaemia and insulin resistance in South Asian population [12]. Although it has been established that coronary artery bypass grafting is the gold standard when it comes to treating complex coronary disease, the region-specific outcome data is not readily available in younger cohorts, particularly with reference to postoperative complications and early recovery trends. To fill this gap, the current research investigates the initial postoperative results of young adults (not older than 45 years) undergoing coronary artery bypass grafting and tertiary care hospitals in Karachi. Through evaluation of preoperative risk factors, intraoperative factors, and the early postoperative outcomes, the research will offer crucial evidence to underpin better regional guidelines, screening earlier, and specific management strategies based on the individual demographic and clinical characteristics of the young South Asian patients. The study of coronary artery bypass grafting outcomes in young adults is important because of the increasing incidence of early onset coronary artery disease in South Asia and the risk profile noted in among this cohort. To develop preventive strategies that are targeted, to optimize early management, and enhance postoperative outcomes, region specific evidence is needed. This study is insightful as it offers a clinical profile and initial outcomes of coronary artery bypass grafting among young adults who are operated in tertiary care hospitals in Karachi.

MATERIAL AND METHODS

This descriptive cross-sectional study was conducted at the Department of Cardiothoracic Surgery, National Institute of Cardiovascular Diseases (NICVD), Karachi. A total of 296 participants were included using a non-probability consecutive sampling method. Eligible participants were between 18 and 45 years of age, irrespective of sex, with ASA physical status I or II, and had provided informed consent to participate.

Moreover, exclusion criteria were that patients had undergone coronary artery bypass grafting previously, had a history of any other cardiac surgery, or had been known to have heart failure or stroke pre-surgery. Informed consent was received and data were gathered on a structured proforma which was created to be used in the study. Baseline demographic data such as age, gender, height, weight and body mass index was taken. A separate team of trained cardiac surgeons with at least five years of post-fellowship clinical experience conducted all the surgical procedures under general anaesthesia to maintain consistency in the surgical technique and perioperative care. In hospital mortality was the main outcome measure. The secondary outcomes were perioperative myocardial infarction, in hospital stroke, postoperative heart failure, and length of stay. All outcomes were measured based on conventional clinical criteria and measured on day 1 after surgery and at the time of discharge. The diagnosis of any postoperative complication was supported by relevant investigations such as electrocardiograms, echocardiography and clinical evaluations.

Data were analysed using SPSS version 26. Continuous variables were summarized as mean with standard deviation, while categorical variables were presented as frequencies and percentages. Chi-square test was applied, and a p value below 0.05 was considered significant.

RESULT

Table I presents the baseline demographic and clinical characteristics of the 296 study participants. The mean age was 38.23 ± 5.43 years, with a 95% confidence interval (CI) of 37.61 to 38.85 years. The mean body mass index (BMI) was 26.22 ± 3.63 kg/m² (95% CI: 25.81–26.64). The average duration of disease was 4.39 ± 1.76 months (95% CI: 4.19–4.59), while the mean duration of hospital stay was 4.89 ± 0.83 days (95% CI: 4.79–4.98). Among the participants, 62.8% were male and 37.2% were female. A majority (78.0%) resided in urban areas, whereas 22.0% belonged to rural areas. In terms of ejection fraction, 24.7% had mild dysfunction, 19.6% had moderate dysfunction, and 55.7% had normal function. Regarding ASA physical status, 39.2% of the participants were classified as ASA I and 60.8%

as ASA II. Furthermore, 29.7% reported a family history of cardiovascular disease, 20.9% had diabetes mellitus, and 64.2% were hypertensive. Smoking history was present in 11.1% of the participants.

Table II compares the clinical outcomes between two age groups: participants aged 18–30 years (n=47) and those older than 30 years (n=249). Preoperative myocardial infarction (MI) was observed in 21.8% of participants aged 18–30 and 78.2% in those above 30 years, with a 95% confidence interval (CI) of 0.789–3.420 and a p-value of 0.182, indicating no statistically significant difference. Stroke occurred in 9.1% of the younger group compared to 90.9% in the older group, with a 95% CI of 0.065–4.158 and a p-value of 0.455, suggesting no significant association between age and stroke occurrence. Heart failure was reported in 9.4% of participants aged 18–30 and 90.6% in those above 30 years, with a 95% CI of 0.151–1.773 and a p-value of 0.214, showing no significant difference between age groups. In-hospital mortality was 14.3% in younger participants and 85.7% in older participants, with a 95% CI of 0.104–7.486 and a p-value of 0.692, demonstrating no statistically significant difference between the two

age groups. Overall, none of the studied outcomes showed a significant association with age.

Table III compares the clinical outcomes between male (n=186) and female (n=110) participants. Preoperative myocardial infarction (MI) was more frequent among females (52.7%) than males (47.3%), with a 95% confidence interval (CI) of 0.251–0.821 and a statistically significant p-value of 0.008, indicating that gender had a significant association with the occurrence of preoperative MI. Stroke was observed in 81.8% of males and 18.2% of females, with a 95% CI of 0.582–12.946 and a p-value of 0.156, suggesting no significant gender-based difference. Heart failure occurred in 78.1% of males and 21.9% of females, with a 95% CI of 0.954–5.475 and a p-value of 0.058, showing a trend toward significance but not reaching statistical significance. In-hospital mortality was recorded in 71.4% of males and 28.6% of females, with a 95% CI ranging from 0.284 to 7.822 and a p-value of 0.482, indicating no significant difference between genders. Overall, only preoperative MI demonstrated a significant association with gender, being more common in females.

Table I: Baseline Demographic and Clinical Profile of Study Participants (n=296)		
Mean ± Standard Deviation		95% Confidence Interval
Age in years = 38.23 ± 5.43		37.61----38.85
BMI in kg/m ² = 26.22 ± 3.63		25.81----26.64
Duration of Disease in months = 4.39 ± 1.76		4.19----4.59
Duration of Hospital Stay in days = 4.89 ± 0.83		4.79----4.98
Frequency (%)		
Gender	Male	186 (62.8)
	Female	110 (37.2)
Residential Status	Urban	231 (78.0)
	Rural	65 (22.0)
Ejection Fraction	Mild	73 (24.7)
	Moderate	58 (19.6)
	Normal	165 (55.7)
ASA Status	I	116 (39.2)
	II	180 (60.8)
Family History of CVD		88 (29.7)
Diabetes Mellitus		62 (20.9)
Hypertension		190 (64.2)
Smoking Status		33 (11.1)

Table II: Comparison of Outcomes Between Age Group (n=296)				
Outcomes	Age Group		95% Confidence Interval	P-Value
	18---30 (n=47)	>30 (n=249)		
Preoperative MI	12 (21.8)	43 (78.2)	0.789----3.420	0.182
Stroke	1 (9.1)	10 (90.9)	0.065----4.158	0.455
Heart Failure	3 (9.4)	29 (90.6)	0.151----1.773	0.214
In Hospital Mortality	1 (14.3)	6 (85.7)	0.104----7.486	0.692

Table III: Comparison of Outcomes Between Gender (n=296)

Outcomes	Gender		95% Confidence Interval	P-Value
	Male (n=186)	Female (n=110)		
Preoperative MI	26 (47.3)	29 (52.7)	0.251----0.821	0.008
Stroke	9 (81.8)	2 (18.2)	0.582----12.946	0.156
Heart Failure	25 (78.1)	7 (21.9)	0.954----5.475	0.058
In Hospital Mortality	5 (71.4)	2 (28.6)	0.284----7.822	0.482

DISCUSSION

The present study contributes important regional evidence on early postoperative outcomes among young adults undergoing coronary artery bypass grafting and demonstrates that surgical revascularization in this age group is associated with favourable short-term results that align with international literature. The observed in hospital mortality of 2.4% together with low rates of stroke and postoperative heart failure is comparable to the outcomes described by Fleissner and colleagues who emphasized that younger patients generally achieve satisfactory early recovery due to better physiological reserve [1]. The perioperative myocardial infarction rate of 18.6% also mirrors previously reported patterns among South Asian and Middle Eastern cohorts in whom myocardial injury often reflects the diffuse and accelerated nature of premature coronary artery disease rather than technical complications alone [3,4]. The mean age of 38.23 years and the predominance of hypertension in 64.2% of participants reaffirm the well-established profile of premature coronary artery disease in South Asians which has been consistently described as manifesting approximately a decade earlier than in Western populations and frequently presenting with multivessel disease [5,7,8]. Similar findings have been noted in broader regional analyses in which young patients display high SYNTAX burdens and angiographic complexity that justify surgical rather than percutaneous approaches [7,13,14]. The short mean hospital stay of 4.89 days in the present study is comparable to the rapid recovery reported by Tariq and colleagues who also evaluated early postoperative trajectories among young adults and emphasized that shorter hospitalization is an important measure of postoperative stability in this demographic [13]. The fact that there were no statistically significant differences between the two age subgroups is further evidence that the physiological age of the young adult range has very little bearing on the acute postoperative outcomes, a conclusion that is in line with other modern studies of young acute coronary syndrome patients in South Asia [11]. The differences in the genders noted in this study are to be put into perspective. Even though the percentage of female patients showing preoperative myocardial infarction were higher, the postoperative mortality was not different between sexes as reported by Khan and others in the past in which patients

with higher female mortality were characterized by delayed presentation and extra comorbidity load [2]. More current studies propose that gender inequalities are possibly fading over time due to increased access to care and surgical pathways will be standardized [15,16], a fact that is matched with the current results. However, the increased therapeutic preoperative myocardial infarction burden in women could be indicative of delays in the diagnosis or different symptom presentations, which, in turn, have been time and again identified to contribute to poor outcomes in South Asian women with cardiac disease [15]. Biomarkers as predictors of postoperative myocardial injury are also still relevant, as highlighted by Murashita who pointed out the clinical importance of CK MB and troponin as predictive factors of peri-operative event occurrences [4]. These reasons justify considering the inclusion of biomarker surveillance in the regular early postoperative evaluation in young surgical patients. In addition, it has been shown by comparison with percutaneous coronary intervention that in young people with multivessel disease, coronary artery bypass grafting gives better event free survival and lowers the major adverse cardiac events as reported by Alexim and by Bashir in studies of complex patterns of coronary disease [6,17]. Its large group of cohort, homogenous surgical team, and age and gender subgroup analyses are the strengths of this study. Nevertheless, shortcomings should be considered. Selection bias and the impossibility of making a causal inference are limited due to the cross-sectional design and use of non-probability sampling. The use of single center reduces generalizability, and the use of long term follow up is not possible due to the absence of long term follow up. Besides, some valuable risk modifiers such as detailed lipid profiles and SYNTAX scoring were not gathered, which restricted the comparisons with the studies that use a comprehensive angiographic stratification [12,14,18]. However, the results are consistent with regional multicentre data that indicates that the coronary artery bypass grafting is a safe and useful procedure in young adults with premature coronary artery disease and the need to vigorously modify the risk factors especially the control of hypertension and early screening programs [8,11]. The research requires further multicentre prospective studies to establish long term outcomes, optimal operative measures, and more effective risk

stratification instruments to the growing population [12,18].

CONCLUSION

It is to be concluded that young adults undergoing coronary artery bypass grafting demonstrated favourable early outcomes, with low rates of in hospital mortality, stroke, and heart failure. Although most outcomes showed no significant association with age or gender, preoperative myocardial infarction was significantly more frequent among females. These findings highlight that coronary artery bypass grafting is a safe and effective intervention in young adults, with overall low postoperative complication rates.

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