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Predictors, complications and outcome of coronary artery bypass surgery in patients attending the cardiac center of Arar City, Northern Saudi Arabia

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ABSTRACT

Background: The increased incidence of cardiovascular disease between patients nowadays led to upsurge in the number of cardiac operations. After coronary artery bypass surgery, most patients remain free of symptoms for up to 15 years. The surgery also reduces the risk of heart attack and improves survival. **Objective:** to determine the predictors and outcome of coronary artery bypass surgery in patients attending the cardiac center in Arar, KSA all over the study period. **Methods:** The current study is a cross sectional study conducted during the period from September 2017 to March 2018. The current study included 72 individuals attending the cardiac center in Arar City. Collecting patients' data was conducted through interviewing the patients included in the study and reviewing their medical files. A predesigned questionnaire was used for data collection. **Results:** We found that 81.9% of cases were males, 61.1% aged from 30 to 39 years old, 34.4% of cases have a myocardial infraction as a clinical diagnosis before the operation, 25% had angina pain, and 50.0% were smokers. Hyperlipidemia, chronic kidney disease, and chronic obstructive lung disease were found in 59.7%, 83.3% and 77.8% respectively. There were 41.6% who had postoperative arrhythmia, 13.9% had bacterial infection in the site of operation and another 13.9% had hypotension, 11.1% re-operated due to bleeding, and 6.9% got postoperative acute myocardial infarction. After 6 month of the operation, 69.4% of cases were quite good while recurrence of chest pain found in12.5%, heart failure in 2.8% and 8.3% died. There was significant association between outcome of cases after 6 months of operation and patients age ($P<0.05$) and all the dead cases were males. **Conclusion:** Our findings indicated that, among cardiac patients attending the cardiac center in Arar, KSA, the preoperative characteristics are suggestive of 30 to 39 years old males with myocardial infraction, angina pain, smokers, have hyperlipidemia, chronic kidney disease, and chronic obstructive lung disease is undergoing coronary artery bypass surgery. The death rate was low and 69.4% of cases were quite good.

Key words: Coronary artery bypass surgery, Indications, Complications, Outcome, Cardiac center of Arar City, Northern Saudi Arabia.

INTRODUCTION

As a result of continually improving surgical strategy and the technology which supports it, cardiac surgery is now possible in an increasingly high-risk population [1] . Crude mortality rates have often been used as an indicator of quality of care, but their value is limited without knowledge of the risk profile of the patients [2].

Coronary artery bypass grafting (CABG) surgery performed for "Heart Attack", is the most common open-heart operation [3] . CABG is a technique that involves using an artery or vein from elsewhere in the body to bypass the blocked vessels, restoring adequate blood flow to the heart. The artery or vein is attached around the blockage, so that there is a new pathway for oxygenated blood to reach the heart muscle [4].

The outcomes of CABG are excellent. Most patients remain free of symptoms for up to 15 years following surgery. The surgery also reduces the risk of heart attack and improves survival [4].

As with any type of surgery, coronary artery bypass grafting (CABG) has risks in both short and long-term results. The risks of CABG include wound infection and bleeding, reactions to anesthesia, fever, pain, stroke, heart attack, or even death [5].

Coronary artery surgery is now safer than ever before, owing to modern surgical techniques and pharmacological breakthroughs. Elderly patients, compared with patients of a younger age group, present for surgery with a greater burden of risk factors and reduced functional levels [6].

In a study carried out by **Weisel *et al.*** [7] to identify the predictors of outcomes in patients undergoing CABG. It was found that the preoperative risk factors were history of heart failure, increasing age, history of peripheral vascular disease and receiving aspirin before coronary artery bypass grafting; which was protective.

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In another study conducted by **Escabí-Mendoza *et al.*** [8] to describe the perioperative characteristics of the patients undergoing coronary artery bypass grafting in San Juan, Veterans Affairs Medical Center, and to determine the in-hospital and 30-day morbidity and mortality following CABG and identify adverse predictors for postoperative complications. It was reported that the associated illnesses included: hypertension (95.6%), diabetes (57%), past smoking (61%), COPD (26%), chronic renal insufficiency (11.5%), cerebrovascular disease (CVD-20.6%), disabling angina (78%), 3-vessel coronary disease (75.8%), significant left main stenosis (20%), and non-elective surgical intervention (54%). The most frequent primary complications were postoperative myocardial infarction (MI-4.8%) and congestive heart failure (4.8%). The 30-day mortality was 1.2%.

The aim of the study was to discuss the predictors and outcome of coronary artery bypass surgery in patients attending the cardiac center in Arar, KSA.

PATIENT AND METHODS

Study design and participants:

The current study is a cross sectional study conducted in the cardiac center in Arar city in the Northern Borders Province of the Kingdom of Saudi Arabia, during the period from September 2017 to March 2018. The current study included 72 individuals attending that center. The center was reviewed regularly during the study period, and the participants were selected by systemic random sampling procedure, and were invited to participate in the study and included in the study after taking an informed consent. Each person was interviewed separately, and their files were examined to collect the needed data and fill out the questionnaires. The cardiac center provides services in an acceptable atmosphere of both privacy and confidentiality. Exclusion criteria included patients who refused to participate in the study.

Data Collection:

Collecting patients' data was conducted through interviewing the patients included in the study and reviewing their medical files. A predesigned questionnaire was used for data collection, and included inquiries about sociodemographic data of the studied patients, smoking, hyperlipidemia, obesity, hypertension, diabetes mellitus, chronic kidney diseases, chronic obstructive lung disease, clinical diagnosis before the operation, acute post-operative complications and outcome of the cases after 6 months of operation.

Ethical consideration:

Written informed consent after explaining the purpose of the study was obtained from all patients who participated in the study. The questionnaires used in data collection were anonymous and confidentiality of data was assured.

The statistical analysis:

The statistical analysis was carried out using SPSS version 15. Sample characteristics were summarized as numbers and percentages for qualitative variables. Chi-Square test was used for testing the association between sociodemographic characters of the studied cardiac cases and conducting the coronary bypass operation. To show also the association between outcome of cases after 6 months of operation and sex, age and conditions before operation of the studied coronary bypass operation cases. A 5% level was chosen as a level of statistical significance in all statistical tests used in the study.

RESULTS

Table (1) shows the socio-demographic characters of the studied coronary bypass operation cases. We found that 81.9% of cases were males, 61.1% aged from 30 to 39 years old, 68.1% were married, 51.4% reached university education and about 44.4% of them were working.

Table (2) illustrates the condition before operation of the studied coronary bypass operation cases. We found that most (34.4%) of cases had a myocardial infraction as a clinical diagnosis before the operation, 25% had angina pain, 50.0% were smokers. Hyperlipidemia, chronic kidney disease, and chronic obstructive lung disease; were found in 59.7%, 83.3% and 77.8% respectively.

Table (3) shows the acute post-operative complications and outcome of the cases after 6 months of operation of the studied coronary bypass operation cases, there were 41.6% who had arrhythmia, 13.9% had bacterial infection in the site of operation and another 13.9% had hypotension, 11.1% re-operated due to bleeding, 6.9% got acute myocardial infarction. After 6 month of the operation, 69.4% of cases were quite good while recurrence of chest pain was found in12.5%, heart failure in 2.8% and 8.3% died.

There was significant association between all sociodemographic characters of the studied cardiac cases and conducting the coronary bypass operation ($P<0.05$) except the age ($P>0.05$). (Table 4)

There was insignificant association between outcome of cases after 6 months of operation and sex and conditions before operation of the studied coronary bypass operation cases as angina pain, hyperlipidemia, smoking, obesity, hypertension, diabetes, family history of angina, renal insufficiency and COPD (P>0.05). While there was significant association between outcome of cases after 6 months of operation and patients age (P<0.05) and all the dead cases were males. (Table 5)

Table (1): Socio-demographic characters of the studied coronary bypass operation (with graft) cases in Arar, 2017 (N=72).

	No.	%
Sex		
Female	13	18.1
Male	59	81.9
Age group		
60 or more	9	12.5
30-39	44	61.1
40-49	13	18.1
50-59	6	8.3
Marital status		
Widow	1	1.4
Single	22	30.6
Married	49	68.1
Educational level		
Primary	5	6.9
Preparatory	5	6.9
Secondary	15	20.8
University	37	51.4
Illiterate	10	13.9
Working status		
Private	17	23.6
Governmental	32	44.4
Not working	17	23.6
Retired	6	8.3

Table (2): Condition before operation of the studied coronary bypass operation (with graft) cases in Arar, 2017.

	No.	%
Clinical diagnosis before the operation		
Peripheral arterial diseases	5	6.9
Myocardial Infarction	24	33.3
Unstable Angina pectoris is	8	11.1
Stable angina	19	26.4
Previous coronary artery grafting	8	11.1
Congestive heart failure	8	11.1
Angina pain		
No	54	75.0
Yes	18	25.0
Family history of angina pectoris		
No	50	69.4
Yes	22	30.6
Hyperlipidemia		
No	43	59.7
Yes	29	40.3
Smoking		
Non smoker	29	40.3
Smoker	36	50.0
Ex-smoker	7	9.7
Obesity		
No	42	58.3
Yes	30	41.7
Hypertension		
No	102	71.8
Yes	40	28.2
Diabetes mellitus		
No	111	78.2
Yes	31	21.8
Chronic kidney diseases		
No	60	83.3
Yes	12	16.7
Chronic Obstructive Lung Disease		
No	56	77.8
Yes	16	22.2

Table (3): Acute post-operative complications and condition of the cases after 6 months of operation of the studied coronary bypass operation (with graft) cases in Arar, 2017.

	No.	%
Acute post-operative complications		
Re-operation due to bleeding	8	11.1
Bacterial infection in the site of the operation	10	13.9
Hypotension	10	13.9
Myocardial infarction	5	6.9
Arrhythmia	30	41.7
Irregular heartbeat, bleeding	6	8.3
Bleeding	9	12.5
Condition of the cases after 6 months of operation		
Died	6	8.3
Arrhythmia	5	6.9
Recurrence of chest pain	9	12.5
Quite good	50	69.4
Heart failure	2	2.8

Table (4): Relationship between coronary bypass operation and socio-demographic characters of the studied cardiac cases, Arar, KSA.

Variable	Coronary bypass operation		Total (n=144)	P value
	Yes (n=72)	No (n=72)		
Sex				
Female	13	27	40	0.009
	18.1%	37.5%	27.8%	
Male	59	45	104	
	81.9%	62.5%	72.2%	
Age				
30-39	44	49	93	0.434
	61.1%	68.1%	64.6%	
40-49	13	15	28	
	18.1%	20.8%	19.4%	
50-59	6	4	10	
	8.3%	5.6%	6.9%	
60 +	9	4	13	
	12.5%	5.6%	9.0%	
Marital status				
Widow	1	0	1	0.031
	1.4%	.0%	.7%	
Single	22	32	54	
	30.6%	44.4%	37.5%	
Married	49	36	85	
	68.1%	50.0%	59.0%	
Divorced	0	4	4	
	.0%	5.6%	2.8%	
Educational level				
Primary	5	0	5	0.042
	6.9%	.0%	3.5%	
Preparatory	5	4	9	
	6.9%	5.6%	6.2%	
Secondary	15	16	31	
	20.8%	22.2%	21.5%	
University	37	48	85	
	51.4%	66.7%	59.0%	
Illiterate	10	4	14	
	13.9%	5.6%	9.7%	
Working status				
Private	17	6	23	0.012
	23.6%	8.3%	16.0%	
Governmental	32	34	66	
	44.4%	47.2%	45.8%	
Not working	17	30	47	
	23.6%	41.7%	32.6%	
Retired	6	2	8	
	8.3%	2.8%	5.6%	

Table (5): Relationship between outcome of cases after 6 months of operation and sex, age and conditions before operation of the studied coronary bypass operation (with graft) cases in Arar, 2017 (N=72).

	Outcome of cases after 6 months of operation					Total (n=72)	
	Died (n=6)	Arrhythmia (n=5)	Recurrence of chest pain (n=9)	Quite good (n=50)	Heart failure(n=2)		
Sex							
Female	0	1	0	11	1	13	0.265
	.0%	20.0%	.0%	22.0%	50.0%	18.1%	
Male	6	4	9	39	1	59	
	100.0%	80.0%	100.0%	78.0%	50.0%	81.9%	
Age							
30-39	3	3	7	31	0	44	0.008
	50.0%	60.0%	77.8%	62.0%	.0%	61.1%	
40-49	1	1	0	11	0	13	
	16.7%	20.0%	.0%	22.0%	.0%	18.1%	
50-59	1	0	1	2	2	6	
	16.7%	.0%	11.1%	4.0%	100.0%	8.3%	
60+	1	1	1	6	0	9	
	16.7%	20.0%	11.1%	12.0%	.0%	12.5%	
Angina pain							
Yes	2	2	0	14	0	18	0.316
	33.3%	40.0%	.0%	28.0%	.0%	25.0%	
No	4	3	9	36	2	54	
	66.7%	60.0%	100.0%	72.0%	100.0%	75.0%	
Hyperlipidemia							
Yes	3	0	5	20	1	29	0.335
	50.0%	.0%	55.6%	40.0%	50.0%	40.3%	
No	3	5	4	30	1	43	
	50.0%	100.0%	44.4%	60.0%	50.0%	59.7%	
Smoking							
Smoker	2	3	3	26	2	36	0.619
	33.3%	60.0%	33.3%	52.0%	100.0%	50.0%	
Non-smoker	4	1	5	19	0	29	
	66.7%	20.0%	55.6%	38.0%	.0%	40.3%	
Ex-smoker	0	1	1	5	0	7	
	.0%	20.0%	11.1%	10.0%	.0%	9.7%	
Obesity							
Yes	0	2	3	24	1	30	0.246
	.0%	40.0%	33.3%	48.0%	50.0%	41.7%	
No	6	3	6	26	1	42	
	100.0%	60.0%	66.7%	52.0%	50.0%	58.3%	
Hypertension							
Yes	3	3	5	21	0	32	0.603
	50.0%	60.0%	55.6%	42.0%	.0%	44.4%	
No	3	2	4	29	2	40	
	50.0%	40.0%	44.4%	58.0%	100.0%	55.6%	
Diabetes							
Yes	2	2	3	18	2	27	0.477
	33.3%	40.0%	33.3%	36.0%	100.0%	37.5%	
No	4	3	6	32	0	45	
	66.7%	60.0%	66.7%	64.0%	.0%	62.5%	
Family history of angina							
Yes	1	2	3	14	2	22	0.241
	16.7%	40.0%	33.3%	28.0%	100.0%	30.6%	
No	5	3	6	36	0	50	
	83.3%	60.0%	66.7%	72.0%	.0%	69.4%	
Renal insufficiency							
Yes	3	1	2	6	0	12	0.183
	50.0%	20.0%	22.2%	12.0%	.0%	16.7%	
No	3	4	7	44	2	60	
	50.0%	80.0%	77.8%	88.0%	100.0%	83.3%	
COPD							
Yes	2	1	3	9	1	16	0.646
	33.3%	20.0%	33.3%	18.0%	50.0%	22.2%	
No	4	4	6	41	1	56	
	66.7%	80.0%	66.7%	82.0%	50.0%	77.8%	

DISCUSSION

The increased incidence of cardiovascular disease between patients nowadays led to upsurge in the number of cardiac operations. The aim of this study was to determine the indications and outcome of coronary artery bypass surgery in patients attending the cardiac center in Arar, KSA all over the study period. Our study included 72 patients, more than 80% of them were males. In our study the number of males underwent coronary bypass operation was 59 (81.9%), which was much more than the number of females. Hypertension, diabetes mellitus and obesity were recorded in 44.4%, 37.5% and 41.7% of the cases presenting for coronary artery bypass operation respectively. **Elnazeer *et al.*** [10] found a higher percentage of diabetes mellitus (60%) and hypertension (55%) in their study. There is little doubt that our patients in Saudi Arabia differ in important respects from populations reported in western medical literature; as a much lower figures were reported than western populations [11, 12].

As regards the acute post-operative complications of cases, in our study, there were 41.6% who had arrhythmia, 13.9% had bacterial infection in the site of operation and another 13.9% had hypotension, 11.1% re-operated due to bleeding, 6.9% get acute myocardial infarction. It was reported that acute postoperative risks of CABG include wound infection and bleeding, reactions to anesthesia, fever, pain, stroke, heart attack, or even death [5]. While **Escabí-Mendoza *et al.*** [8] reported that the most frequent primary complications were postoperative myocardial infarction (4.8%) and congestive heart failure (4.8%).

Regarding the outcome of cases after 6 months of operation was death in 6 (8.3%) cases, arrhythmia in 5 cases, recurrence of chest pain in 9 (12.5%) cases, heart failure in 2 (2.8%) cases and the cases were stable and in improvement in 50 (69.4%) cases. We recorded a significant correlation (P = 0.009) between sex and coronary bypass operation, however; there was no significant correlation between sex and the outcome of cases. It's obvious from table (5) that the operation outcome of females was much better than males. It is striking to observe that the high number of male cases was associated with a trend of higher mortality when compared with female gender. In another studies, a higher mortality rates was found in females when compared with males as reported by others [7]. Also **Ascione *et al.*** [9] found a similar results in their study. We also found a significant correlation (P = 0.008) between the outcome of the operation and the age group of the patients. Regarding to mortality rate, a study examining predictors of hospital mortality in patients undergoing CABG in acute myocardial analyzed that

advanced age is a risk factor related to mortality [10]. Also **Escabí-Mendoza *et al.*** [8] reported that the 30-day mortality was 1.2%.

CONCLUSION AND RECOMMENDATIONS

Our findings indicated that, among cardiac patients attending the cardiac center in Arar, KSA, in coronary artery bypass surgery, the preoperative characteristics are; 30 to 39 years old males with myocardial infraction, angina pain, smokers, have hyperlipidemia, chronic kidney disease, and chronic obstructive lung disease. The death rate was low and 69.4% of cases were quite good.

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