30-Days Readmission after cardiac surgery in elderly patients

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Abstract

Background: Readmissions are a common problem in cardiac surgery. As cardiac operations being common major elective operations in older adults and older adults representing an increasing portion of surgical candidates. Data regarding prevalence of readmission and its risk factors in such population is needed.

Aim: To assess the frequency and risk factors associated with hospital 30 days readmissions for elderly patients undergoing cardiac operations..

Methods: A prospective observational cohort study was conducted from the first of March, 2017 to the end of March, 2018, where 180 patients aged ≥60 years undergoing elective cardiac operations in Ain Shams university hospital were included. Participants were subjected to full history taking and physical examination. Type of operation and thirty days readmission following surgery were documented.

Results: 30 days readmission rate was 20.2% (number of readmissions, 36). When stratified by procedure type, readmission rates were isolated coronary artery bypass grafting (CABG), 66.7% (n = 24); isolated valve, 8.3% (n = 3); CABG + valve, 25% (n = 9). Baseline patient characteristics associated with readmission included male gender, elevated creatinine, dementia, congestive heart failure and presence of multiple comorbidities "≥3".

Conclusions: 1 of 5 elderly patients undergoing cardiac operations requires readmission within 30 days after surgery. This outcome has significant health and economic implications. Further studies are needed to assess causes of readmission and to determine which readmission strategies are most effective for elderly patients undergoing cardiac surgeries.

Keywords: surgery in Elderly - coronary artery bypasses grafting - Cardiac surgery in elderly

Background

Hospital readmission rates following surgery are increasingly used as a marker of quality of care. However, studies on readmission rates in surgical patients are limited by the restricted number of procedures they examine, the exclusive age categories that are included, and the lack of distinction of elderly patients from other surgical patients [1.] It has been shown that outcomes in surgical patients, including readmission rates, vary significantly by patient age, procedure type, and surgical specialty [2].

Older adults are an increasing proportion of surgical care, greater than 35% of all inpatient operations being performed in adults 65 years or older, with cardiac operations being one of the common major elective operations in older adults [3]. However, literature on readmissions after cardiac operations is scant and additional data are needed to identify the prevalence, etiology and risk factors of readmissions in order to develop targeted quality initiatives.

The goal of this study was to assess the frequency and risk factors associated with hospital readmissions for elderly patients undergoing cardiac operations one

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month following surgery.

Methods

Study design: prospective observational cohort study

Setting: Ain Shams University Hospital.

Study group and endpoints: From the first of March, 2017 to the end of March, 2018, one hundred and eighty participants aged ≥60 years undergoing elective cardiac operations in Ain Shams university hospital were recruited. Patients undergoing urgent or emergency operations were excluded.

The study was approved by the ethical committee of the Faculty of Medicine, Ain Shams University. Written consent was obtained from every participant after explanation of the study aim and procedures. All subjects participating in the study were subjected to full history taking and physical examination. Type of operation and thirty days readmission following surgery were documented as well.

Statistical analysis: Statistical presentation and analysis of the present study was conducted, using the mean, standard error and Chi-square tests by SPSS 17.

Results

Among the 180 patients who underwent cardiac surgery, mean age was 64.68 ± 2.95 years, 23.9% (n = 43) were women and 39.4% (n = 71) were smokers either current or ex-smokers (Table 1). Hypertension was present in 81.7% (n = 147) of patients, 34.4% (n = 62) had diabetes mellitus, 33.9% (n = 61) had pulmonary disease or asthma and 29.4% (n = 53) had previous myocardial infarction (Table 2).

Table 1: Demography of the study population

		Mean / N	SD / %
Gender	Male	137	76.1%
	Female	43	23.9%
Age		64.68	2.95
marital status	Married	116	64.4%
	Single	16	8.9%
	Widow	39	21.7%
	Divorced	9	5%
Education	Illiterate	10	5.6%
	can read and write	17	9.4%
	below high school	34	18.9%
	high school	55	30.6%
	university or higher	64	35.6%
Smoking	Yes	71	39.4%
	No	109	60.6%
Smoker	Current	22	31%
	ex-smoker	49	69%

Table (2): preoperative co-morbidity

	N	%
MI	53	29.4%
CHF	25	13.9%
PVD or bypass	8	4.4%
CVA or TIA	25	13.9%
pulmonary ds or asthma	61	33.9%
DM only	62	34.4%
DM & end organ damage	32	17.8%
renal disease	14	7.8%
mild liver disease	14	7.8%
peptic ulcer	18	10%
non-metastatic cancer	2	1.1%
Dementia	5	2.8%
rheumatic or CT disease	15	8.3%
HIV or AIDS	2	1.1%
Hypertension	147	81.7%
skin ulcer or cellulitis	7	3.9%
Depression	8	4.4%
warfarin use	11	6.1%

The most common procedures performed were isolated CABG (71.7% [n = 129]) and isolated valve operations (22.2% [n = 40]). Patients exhibited thirty day readmission rate of 20.2% (n = 36) (Table 3). When stratified by procedure type, readmission rates were isolated CABG, 66.7% (n = 24); isolated valve, 8.3% (n = 3); CABG + valve, 25% (n = 9).

Table 4 and 5 presents the significant risk factors for readmission. They included male gender (p = 0.018), congestive heart failure (p = 0.03), elevated creatinine (p = 0.035), dementia (p < 0.001) and presence of multiple comorbidities "≥3" (p = 0.002).

Table 3: Type of operation and thirty day readmission rate

		N	%
type of operation	CABG	129	71.7%
	CABG+valve replacement	11	6.1%
	valve replacement	40	22.2%
30 day readmission		36	20.2%

Table 4: Relation between demographic data and 30 days readmission

Demographic data		30 days readmission				Chi-Square test of significance	
		No		Yes			
		N	%	N	%	P-value	Sig.
Gender	male	79	54.86%	30	83.33%	0.018	S
	female	65	45.14%	6	16.67%		
Smoking	yes	53	36.8%	18	50%	0.15	NS
	no	91	63.2%	18	50%		

Table 5: Relation between comorbidity and 30 days readmission

Comorbidity	30 days readmission				Chi-Square test of significance	
	No		Yes			
	N	%	N	%	P-value	Sig.
MI	40	27.8%	13	36.1%	0.3	NS
CHF	16	11.1%	9	25%	0.03	S
PVD or bypass	7	4.9%	1	2.8%	0.58(F)	NS
CVA or TIA	20	13.9%	5	13.9%	1	NS
pulmonary ds or asthma	49	34%	12	33.3%	0.9	NS
DM only	51	35.4%	11	30.6%	0.58	NS
DM & end organ damage	22	15.3%	10	27.8%	0.07	NS
renal disease	7	4.9%	7	19.4%	0.035	S
peptic ulcer	15	10.4%	3	8.3%	0.7	NS
Dementia	1	0.7%	4	11.1%	<0.001 (F)	HS
rheumatic or CT disease	13	9%	2	5.6%	0.5	NS
HIV or AIDS	1	0.7%	1	2.8%	0.3(F)	NS
hypertension	114	79.2%	33	91.7%	0.08	NS
skin ulcer or cellulitis	4	2.8%	3	8.3%	0.12(F)	NS
Depression	7	4.9%	1	2.8%	0.58(F)	NS
≥ 3 comorbidities	89	61.8	32	88.9	0.002	S
< 3 comorbidities	55	38.2	4	11.1		

Discussion

Although advancements have been made during the past decade in improving outcomes after cardiac operations, readmission rates remain high ranging from 8.3% to 21.1% in patients undergoing coronary artery bypass grafting (CABG) operations [4]

In the current prospective cohort of elderly cardiac surgical patients, the thirty days readmission rate was 20.2%.Although a 30-days time point for examining readmissions has often been criticized as clinically arbitrary, a large, multicenter, prospective cohort of 5059 adult cardiac surgical patients demonstrated that the 30-days period captures most of the readmissions [5].

Similar findings were found by Price and associates while studying 1205 patients undergoing CABG with thirty days readmission rate of 13% and the majority readmissions occurred within 1 week of the primary

hours of discharge [6.]

Given the high volume of cardiac operations in older adults and the cost of such interventions, focusing interventions on high-risk populations might make readmission reduction strategies more applicable.

When demographic characteristics were studied, male gender, congestive heart failure, dementia, elevated creatinine and presence of multiple comorbidities ">3" correlated with an increased risk of readmission. Several of the risk factors observed in our analysis have been identified by other investigators and correlate with the most common etiologies for readmission [5, 6.]

Individuals with congestive heart failure and elevated serum creatinine are sensitive to fluid management and at higher risk for readmission for volume overload. These preoperative characteristics and its impact on readmission risk require further exploration.

In this study, male gender was found as a risk factor for thirty days readmission rate. On the contrary, female

gender was detected as a risk factor by studies conducted by **Iribarne et al., 2014** as regarding readmission and **Edwards et al., 1998** as regarding postoperative mortality [5, 7]

Our analysis has several limitations: First, data are representative of readmission rates at single academic medical center and do not include outcomes at multiple or nonacademic centers. Second, our analysis did not consider the effect of socioeconomic status because this information was not collected. Lastly, our analysis did not consider cause of readmission as it focused on preoperative risk factors rather than postoperative complications.

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