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Effect of Gender Difference in CABG Surgery Patients and its Impact on Outcome in Patients of Bangladesh – An Observational Study

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Abstract

Background: Global studies indicate that women face increased early mortality and postoperative complications following coronary artery bypass graft (CABG) surgery compared to men. Complex preoperative conditions and delayed access to specialized cardiac care contribute to this disparity. This study aimed to evaluate gender-based differences in risk factors, clinical outcomes, and socio-demographic barriers among patients undergoing CABG in Bangladesh.

Methods: This prospective observational study was conducted at the Cardiac Center over a one-year period from January 2009 to December 2010 in Bangladesh. A total of 33 patients (26 males and 7 females) aged 40–70 years who underwent CABG were included. Patients with prior cardiac surgery or more than four risk factors were excluded. Baseline clinical parameters, socio-demographic variables, and post-operative outcomes (mortality, morbidity, return to normal activity, disease-free state) were analyzed using descriptive statistics and chi-square tests.

Results: Despite having fewer female patients, the study revealed that women presented at an older age and had delayed access to diagnosis and surgical intervention due to financial dependence and social constraints. However, post-CABG outcomes at both 6 months and 1 year showed significantly lower mortality ($p = 0.043$) and comparable or better recovery rates among females. Socio-demographic analysis highlighted gender disparities in treatment access, family role, and time to surgical correction.

Conclusion: Although females in Bangladesh face delayed access to cardiac care due to socio-cultural factors, those who undergo CABG demonstrate outcomes equal to or better than males. The findings emphasize the need for gender-sensitive healthcare policies and improved access to cardiac services for women.

Keywords: Coronary artery bypass graft, gender disparity, cardiac surgery, outcome analysis, socio-demographic factors

Introduction

In third world countries, there is always a gender predisposition regarding the approach to health care, nutrition and other facilities. Women's right of entry to healthcare is a subject of argument in the medical literature. In the case of revascularization for coronary artery disease (CAD), it has been recommended that women may not always receive unbiased treatment[1]. As part of a wider study designed to establish the suitability of percutaneous transluminal coronary angioplasty (PTCA) and coronary artery bypass graft surgery (CABG) in Spain, it was discovered that the proportion of asymptomatic women undergoing

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coronary revascularization was significantly lower than that of asymptomatic men[1].Literatures show that gender is an independent risk factor for complications after both CABG and PCI (Percutaneous coronary invasion) [2]. These studies were mostly done in European and American continent. But in a third world country like Bangladesh, this sort of study has never been performed before. It is as well a study of the Asian race where specifically the socio-economic and socio-cultural bias between the genders is obvious. In a study in United States for CABG patients, findings suggested that gender differences both within and across the races may be greater than the differences among racial groups[3]. There are also reports that, in-hospital mortality is greater for women after CABG[4-7]. There has been less research also on this ground in Bangladesh.

This present study was aimed at observing and comparing the effects of gender difference on male and female patients who were undergoing CABG (Coronary artery bypass graft) surgery. Gender influenced variables does not include only anatomy or physiology of the subject but also socio-cultural factors that influence the patient outcome. This study was done to find out and compare the outcome of CABG (Coronary artery bypass graft) surgery in the male and female patients based on the socio-economic and cultural discriminations between genders in Bangladesh. The after-effects were examined by the mortality, morbidity and other outcomes. Adjustments were done in disease severity, socio-demographic conditions and cardiac risk factors. The study targeted to match gender dependent anatomical or physiological variables of the subjects. The study also aimed to identify socio-cultural factors influencing patient outcomes and to examine how these outcomes—such as mortality, morbidity, and other complications—vary by gender. It specifically explored whether the observed gender differences in CABG outcomes could be attributed to delayed healthcare-seeking behavior and late diagnosis of coronary artery disease (CAD), potentially reflecting gender-specific disparities in socio-demographic access to healthcare services.

Methodology & Materials

This was a prospective observational study conducted on patients undergoing coronary artery bypass graft (CABG) surgery at the Cardiac Center from January 2009 to December 2010 in Bangladesh. Patients were followed for up to one year postoperatively through regular communication via mail or phone. Clinical and socio-cultural data were collected during the hospital stay using a structured questionnaire administered after obtaining informed consent. The primary dependent variable was in-hospital mortality. Observations were recorded on various patient characteristics, including gender, age categories, the number of patients of each gender, and the presence of risk factors or comorbid conditions. These included history of smoking, tobacco use, chronic obstructive pulmonary disease (COPD), previous CABG or PTCA, insulin-dependent and non-insulin-dependent diabetes, conduction disorders, intracranial hemorrhage, chronic or unspecified renal failure, hypertension, acute or old myocardial infarction (MI), cardiomyopathy, congestive heart failure, peripheral vascular disease, unstable angina, acute liver necrosis, endocarditis, mitral valve disease, aortic valve disease, combined mitral and aortic valve disease, and chronic hepatitis.

Procedure-related characteristics included the number of vessels bypassed, use of diagnostic catheterization, intra-aortic balloon pump (IABP), hypothermia application, and use of the heart-lung machine (cardiopulmonary bypass or CPB). Medication usage, particularly aspirin and clopidogrel, was also recorded. However, some variables, based on relevance and completeness, were excluded from the final statistical analysis. The study included a total of 33 patients (both male and female), aged between 30 and over 50 years. Participants were stratified into three age groups: 30–40 years, 41–50 years, and over 50 years. Patients with a history of previous cardiac surgery or more than four high-risk factors—specifically hypertension, mild to moderate renal dysfunction, left main coronary artery disease, and diabetes mellitus—were excluded from the study.

Baseline risk factors such as age, indication for CABG, pre-operative ejection fraction or cardiac output, lung function tests, and post-CABG treatment were matched between groups. Socio-cultural factors such as tobacco use and dietary habits (e.g., rich food intake), as well as demographic data including body weight, height, and body surface area (BSA), were also collected and analyzed. Other patient-related variables, such as a history of unstable angina and prior PTCA, and procedure-related characteristics like number of vessels bypassed, use of diagnostic catheterization, IABP, hypothermia, and CPB were documented in the master data sheet. Patients with a history of COPD, prior CABG, conduction disorders, severe chronic renal failure, cardiogenic shock, cardiomyopathy, acute MI, congestive heart failure, endocarditis, valvular heart diseases (mitral and aortic), acute or chronic hepatitis, and intracranial hemorrhage were excluded from the study to maintain uniformity and reduce confounding variables. All collected data were entered and analyzed using SPSS software. Descriptive statistics were used to summarize patient demographics and clinical characteristics. Comparative analysis was performed to assess differences in outcomes (e.g., mortality and morbidity) between male and female patients. Chi-square tests and t-tests were used for categorical and continuous variables, respectively, and a p-value <0.05 was considered statistically significant. Results were presented in tabular form for clarity.

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Results

Table I: Statistical analysis of baseline clinical variables

Variables		Male (n=26)	Female (n= 7)	χ^2– ϖαλυε	P value
history of smoking / tobacco use		18	1	6.82	0.009
PTCA		2	0	0.573	0.449
IDDM / NIDDM		12	0	5.08	0.024
hypertension		18	6	0.755	0.385
Old MI		7	4	2.27	0.132
Unstable angina		9	3	0.162	0.687
Number of vessels bypassed	One	0	0		
	Two	8	2	0.091	0.957
	Three	12	3		
	> Three	6	2		
No. of blocks seen in Diagnostic catheterization /Angiogram	Single vessel	0	0		0.509
	Double vessel	11	2	0.436	
	Triple vessel	15	5		
Intra-aortic balloon pump		Nil	Nil	-	-
Hypothermia use (On pump CABG) 10		9	1	1.08	0.299
heart pump itself (Off pump CABG) 23		17	6	1.08	0.299
medications like aspirin, clopidogrel		24	6	0.29	0.59

Table I presents the statistical analysis of baseline clinical variables among male (n=26) and female (n=7) patients undergoing CABG surgery. A significantly higher proportion of males had a history of smoking or tobacco use compared to females (69.2% vs. 14.3%, $p = 0.009$), and insulin-dependent or non-insulin-dependent diabetes was observed only in males ($p = 0.024$). Other variables such as hypertension, history of old myocardial infarction (MI), unstable angina, number of vessels bypassed, angiographic findings, use of intra-aortic balloon pump (IABP), hypothermia (on-pump CABG), off-pump CABG, and use of antiplatelet medications (aspirin, clopidogrel) showed no statistically significant difference between the two groups ($p > 0.05$).

Table II summarizes the socio-demographic characteristics of the study population stratified by gender. Notably, there was a significant gender disparity in family role, with all female patients being dependent compared to only 19.2% of males ($p = 0.0001$). Additionally, preference for treatment of other family members over self was reported more frequently by females (71.4% vs. 26.9%, $p = 0.030$), indicating gender-based household prioritization. Although no significant differences were found in the rural/urban distribution, remoteness from health facilities, or delay in availing treatment/surgery, a trend toward higher disease severity (NYHA Class III/IV) was observed in females (57.1% vs. 57.7% in males, $p = 0.095$), and marital status showed borderline significance with more female patients being widowed ($p = 0.050$).

Table III displays gender-based outcome comparisons post-CABG at 6 months and 1 year. At the 1-year follow-up, mortality was significantly higher in females (28.6%) compared to males (3.8%), with a statistically significant difference ($p = 0.043$). Although morbidity rates were higher in males than females at both follow-up points, these differences were not statistically significant ($p > 0.05$). The proportion of patients achieving a disease-free state and those who returned to normal work did not differ significantly between the groups. However, a higher percentage of females returned to normal work at 6 months compared to males (71.4% vs. 30.8%), showing a borderline significance ($p = 0.051$), though this difference was not sustained at 1 year.

Table IV presents a comparison of personal characteristics between male and female CABG patients. The mean height was significantly greater in males (157.76 ± 5.76 cm) than in females (146.64 ± 3.98 cm), with a highly significant difference ($p = 0.0001$). While mean weight was also higher in males (54.26 ± 6.37 kg vs. 50.79 ± 6.98 kg in females), this difference was not statistically significant ($p = 0.2188$). The distribution across age strata (30–40, 40–50, >50 years) did not significantly differ between genders ($p = 0.693$). Additionally, baseline ejection fraction (EF) was comparable between groups (45% ± 5.5 in males vs. 45% ± 2.6 in females), indicating matched cardiac functional status at baseline.

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Table II: Socio-demographic profile on the basis of gender

Parameters		Male(n=26)	Female(n=7)	χ^2– ωαλυε	P value
Age of the patient					
Life pattern	Rural	R=15	R=4	0.0068	0.979
	Urban	U=11	U=3		
Disease severity	NYHA I	NYHA I=	NYHA I=		
	NYHA II	NYHA II=11	NYHA II=	4.71	0.095
	NYHA III	NYHA III=8	NYHA III=3		
	NYHA IV	NYHA IV=7	NYHA IV=4		
Marital status	Married	M=26	M=6		
	Unmarried	U	U	3.83	0.05
	Widow	W	W=1		
	Divorced	D	D		
Position in the family	Dependent	D=5	D=7	15.5	0.0001
	Independent	I=21	I=0		
Remoteness of the house from health facility	1 km	14	4		
	2 km	3	2	2.72	0.437
	5 km	6			
	>10 km	3	1		
Time to avail first treatment after attack.	24 hr	14	4		
	7days	3	1	1.82	0.403
	>1 month	9	1		
Time to avail surgical correction after attack	6 month	9	1		
	1 yr	8	2	1.47	0.479
	> 1 yr	9	4		
Cause of delay	Financial	13	3		
	Familial	2	1		
	Social	9	3	0.963	0.81
	No delay	2			
Complain of negligence from family	Yes	2	1	0.29	0.59
	No	24	6		
Preference to other family members	Yes	7	5	4.72	0.03
	No	19	2		

Table III: Outcome parameters

Outcome parameter	After 6 month				After 1 year			
	Male (n=26)	Female (n=7)	χ^2 ωαλυε	P value	Male (n=26)	Female (n=7)	χ^2 ωαλυε	P value
Mortality	1	0	0.278	0.598	1	2	4.08	0.043
Morbidity	6	2	0.091	0.763	9	3	0.162	0.687
Disease-free state	19	5	0.008	0.931	16	2	2.42	0.12
Back to normal work	8	5	3.82	0.051	15	4	0.0007	0.979

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Table IV: Patients' personal data

Variables	Male n = 26	Female n = 7	χ²/T ϖαλυε	P value
Age strata	5	1		
1. 30-40 yrs				
2. 40-50 yrs	7	1	0.734	0.693
3. >50 yrs	14	5		
Ht. in cm	157.76±5.76	146.64±3.98	4.782	0.0001
Wt. in kg	54.26±6.37	50.79±6.98	1.2551	0.2188
BSA				
EF	45%± 5.5	45%± 2.6	-	-

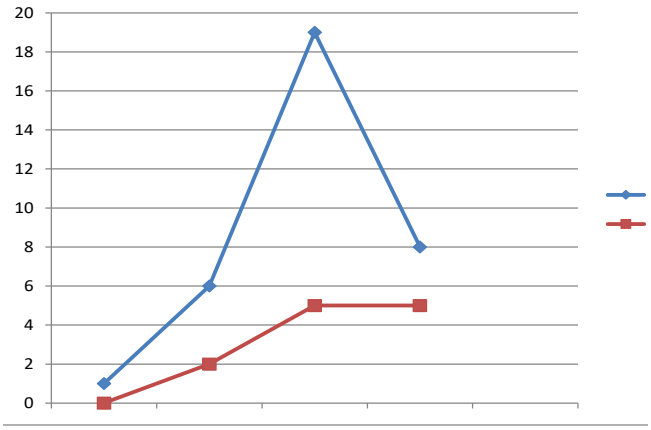

Figure 1: Graphical representation of Table III

Discussion

A healthy population is vital for sustainable economic development and eradication of poverty. All men and women have a basic right to health and well-being, but global statistics show serious breaches and inequalities in health status and access to health services. Progress and setbacks reflect national commitments to health. Gender inequalities are a major cause of discrepancy in health status, including nutritional status, and health care. Gender differences are evident in life expectancy and disease incidence; access to preventive and curative care; reproductive health, and HIV/AIDS incidence[8]. Prevention of ill health, treatment, and care; domestic violence against women and children; health at work; health in conflict situations; and even the health care administrations, are all characterized by significant gender inequality[8]. Some studies in Cardiac Surgery report that, women undergoing coronary artery bypass graft surgery have more co-morbidity at surgical presentation compared with men. The majority of studies noted greater in-hospital mortality in women than in men, with mortality differences resolving with longer follow-up[9].Women have more unadjusted mortality, which is confounded by the difference in age and body surface area. But, even after multiple adjustments, female gender is a predictor of higher morbidity in patients undergoing coronary artery bypass graft[10]. Some reports also demonstrated statistically significant differences between men and women in many preoperative demographic descriptors [11]. The American Heart Association has identified several risk factors. Some of them can be modified, treated or controlled, and some can't be[12]. The major risk factors that can be modified, treated or controlled by changing the lifestyle or taking medicine are – tobacco smoke, high blood cholesterol, high blood pressure, physical inactivity, obesity, overweight and Diabetes Mellitus. Two Bayesian Models exist to predict in-hospital mortality from the data on isolated CABG surgery: 9-factor and 5-factor Bayes models[13]. The nine factors contained in this model are: Age, Body Surface Area, Diabetes, Hypertension, Left main stem disease, Ejection fraction, Priority, Renal system and previous operations. Simple risk models can produce acceptable results, but more complex risk models may give better results. The present study included four (4) of the above referred factors for surgery, but not more than that.

As a less-developed country, Bangladesh has been observed to be full of oppressed female population who are lagging behind in every social right than their dominating male counterpart. There are many superstition and taboos about the preference of male concerning many aspects of social life. Male people are usually the chief earning person in a family, females are the dependent ones. So when the question of basic human rights comes, the weaker gender is always defeated. Even though the socio-economic environment owes a lot to this section of population, still when the question comes about the vital needs of food, clothing, health, and shelter – always the male gets the preference, which is a social practice. In educated and enlightened part of the society, this tradition is a bit discouraged. But where the 80% of total population lives, i.e. in villages and among them- where the percentage of education is near about 45% - the male dominance or demand outweighs the real need of or access to treatment for the female. World wide accepted studies showed females run an increased risk of early death and the development of postoperative complications after

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coronary artery bypass surgery as compared with males. The crude mortality rates for coronary artery bypass surgery for men and women were 3.08% and 5.43% respectively, in New York State in 1989[14]. Women have a more complex clinical preoperative presentation and are more likely to be readmitted with unstable angina and congestive heart failure after CABG but experience of survival similar to those seen in men[15]. One hypothesis that could explain these differences in outcomes is that women may be subject to delayed referrals or impaired access to specilized care for coronary disease. This may explain the differences observed in age and co-morbidity status between men and women. There is evidence to demonstrate that timeliness of invasive management with revascularization when presenting with an acute coronary syndrome has an effect on downstream outcomes for women, as it does for men[16].On the contrary, a study in Italy decided that the small body surface area is not a risk factor for female gender, rather large BSA in female who are presenting with obesity may give rise to complications[17].

This present study was on track with acceptance of the above mentioned truth that whether the difference of outcome of CABG in different gender is due to delayed approach of patient to the physician and delayed diagnosis of the CAD which indicates the gender-specific socio-demographic access to the health facilities in Bangladesh. This study was done to find out and compare the approach and initiation of the treatment schedule of female CABG patients of Bangladesh in regard to their life pattern, disease severity, position in their family, remoteness of the house from the nearest treatment facility etc. This study also included observation in any negligence, preference, fund relocation, lack of attention to the symptoms which made delay in diagnosis. We found that outcome parameters in females after 6 months and 1 year are significantly better than their male counterparts (See table 3). But the socio-demographic profile on the basis of gender (See Table 2) shows that the female patients had significant difference in health access in terms of time of availing the first treatment and availing the surgical correction after heart attack respectively. One study states that women have higher mean anxiety and lower mean confidence and activity levels in walking and lifting weights for 8 weeks after discharge[18]. But in our study, post-operative morbidity is significantly lower in female, and the disease free state and back to normal work percentage is higher in them (Table 3). In another study, Peri-operative complications were increased and recurrent angina more frequent in women[19]. Despite this, late survival was increased in women compared with men after adjustment for other risk variables [19]. This result about late survival justifies with that of the present study. The female population getting the access to health care had a lower percentage; their mean age is higher and percentage of baseline risk factors is higher which significantly reflects the unequal access of females to health care ($P<0.05$). Gender norms and values, however, also give rise to *gender inequalities* - that is, differences between men and women which systematically empower one group to the detriment of the other. Both gender differences and gender inequalities can give rise to inequities between men and women in health status and access to health care. In each of these cases, gender norms and values, and resulting behaviors, are negatively affecting health[20]. In a contemporary data set from 31 Midwestern hospitals, female gender was an independent predictor of perioperative mortality, even after accounting for all co-morbidities,including low BSA[21]. However, in another study, the rate of coronary death is twice higher in women than in men after myocardial infarction and revascularization procedures[22]. The goal of the present study is mainly to increase health professionals' responsiveness to the role of gender norms, principles, and inequality in perpetuating disease, disability, and death, and to uphold collective change with a view to eliminating gender as an obstacle to good health. From our collected data of one year, the number of male: female ratio deviates to the male side, but the age is greater in case of female. Female patients were observed to come in older age for treatment, and those female patients who came at younger age, were found to be with greater complication or in higher grades of matched risk factors. Social problems are higher in the group of females: such as delay in approaching the nearby GP or access to the cardiac specialists for her heart problem is delayed due to her dependence on the male population who are the earners. It was the convenience of the male counterpart, either financially (any other important family expenditure may come first in female patients) or socially (non-availability of time to take her to specialist), which may cause the delay in access to health-care and make the clinical condition farther complicated.

Limitation of the study

This study was limited by a small sample size, especially the low number of female participants, which may reduce statistical power and affect generalizability. As a single-center study, the findings may not reflect the broader national or global population. The one-year follow-up period did not allow assessment of long-term outcomes. Additionally, the study included only selected risk factors and excluded some relevant clinical variables. Socio-demographic data were collected via self-report, which may introduce recall or reporting bias.

Conclusion

The study highlights significant gender-based disparities in access to care and clinical outcomes following CABG in Bangladesh. Female patients, though fewer in number and often presenting at a later stage with more comorbidities,

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demonstrated better post-operative recovery and survival compared to males. However, their delayed diagnosis and treatment reflect socio-cultural and economic barriers. These findings underscore the urgent need for gender-sensitive health policies and improved, equitable access to cardiac care, especially for women in rural and underserved regions.

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Conflicts of interest

There are no conflicts of interest.

References

1. Aguilar MD, Lazaro P, Fitch K, Luengo S. Gender differences in clinical status at time of coronary revascularisation in Spain. Journal of Epidemiology & Community Health. 2002 Jul 1;56(7):555-9.
2. Kim C, Redberg RF, Pavlic T, Eagle KA. A systematic review of gender differences in mortality after coronary artery bypass graft surgery and percutaneous coronary interventions. Clinical Cardiology: An International Indexed and Peer-Reviewed Journal for Advances in the Treatment of Cardiovascular Disease. 2007 Oct;30(10):491-5.
3. Becker E. Gender and race disparities in in-hospital coronary artery bypass surgery mortality rates: 1998-2002—Have things improved? Abstr AcademyHealth Meet. 2005;22:Abstract no. 4103. Emory School of Public Health, Health Policy and Management, Atlanta, GA.
4. Jaglal SB, Tu JV, Naylor CD, Abdulla A. Higher in-hospital mortality in female patients following coronary artery bypass surgery: a population-based study. Clinical and investigative medicine. 1995 Apr 1;18(2):99.
5. Myers WO, Blackstone EH, Davis K, Foster ED, Kaiser GC. CASS Registry long term surgical survival: Coronary Artery Surgery Study. *J Am Coll Cardiol.* 1999; 33: 488-498.
6. Tu JV, Jaglal SB, Naylor CD. Multicenter validation of a risk index for mortality, intensive care unit stay, and overall hospital length of stay after cardiac surgery: Steering Committee of the Provincial Adult Cardiac Care Network of Ontario. *Circulation.* 1995; 91: 677–684.
7. Edwards FH, Carey JS, Grover FL, Bero JW, Hartz RS. Impact of gender on coronary bypass operative mortality. *Ann Thorac Surg.* 1998; 66: 125–131.
8. Ministry of Foreign affairs of Denmark, DANIDA;Booklet on Gender equality in health; P3, para 4; 2008.
9. Kim C, Redberg RF, Pavlic T, Eagle KA. A systematic review of gender differences in mortality after coronary artery bypass graft surgery and percutaneous coronary interventions. *Clin Cardiol*. 2007 Oct;30(10):491-5.
10. Woods SE, Noble G, Smith JM, Hasselfeld K; J Am Coll Surg. 2003 Mar;196(3):428-34.The influence of gender in patients undergoing coronary artery bypass graft surgery: an eight-year prospective hospitalized cohort study. Bethesda Family Medicine Residency Program, Good Samaritan Hospital Surgical Residency Program, Cincinatti, OH 45212, USA.
11. George T. Christakis, MD, Richard D. Weisel, MD, Karen J. Buth, MSc (by invitation), Stephen
12. E. Fremes, MD, Vivek Rao, MD (by invitation), Kostas P. Panagiotopoulos, BSc (by invitation), Joan Ivanov, RN (by invitation), Bernard S. Goldman, MD, Tirone E. David, MD**:**Is body size the cause for poor outcomes of coronary artery bypass operations in woman? J Thorac Cardiovasc Surg 1995; 110:1344-1358.
13. American Heart Association. Available from: www.americanheart.org/presenter.jhtml?identifier=4726
14. www2.wmin.ac.uk/hscmg/pdf/WestFocus_Poster_31-05-2006_Risk_CABG_Surgery.pdf-
15. Hannan EL, Bernard HR, Kilburn HC Jr, O'Donnell JF:Gender differences in mortality rates for coronary artery bypass surgery; Am Heart J. 1992 Apr; 123(4 Pt 1):866-72.
16. Veena Guru, MD; Stephen E. Fremes, MD; Peter C. Austin, PhD; Eugene H. Blackstone, MD; Jack V. Tu, MD, PhD;Gender Differences in Outcomes After Hospital Discharge From Coronary Artery Bypass Grafting ; *Circulation.* 2006;113:507-516
17. Glaser R, Herrmann HC, Murphy SA, Demopoulos LA, DiBattiste PM, Cannon CP, Braunwald E. Benefit of an early invasive management strategy in women with acute coronary syndromes. *JAMA.* 2002; 288: 3124–3129.
18. Marco Ranucci, MD*, Alfredo Pazzaglia, MD, Chiara Bianchini, MD, Giuseppe Bozzetti, MD, Giuseppe Isgrò, MD**;** Body Size, Gender, and Transfusions as Determinants of Outcome After Coronary Operations; *Ann Thorac Surg* 2008;85:481-486.
19. Hartford K, Wong C, Zakaria D; International Society of Technology Assessment in Health Care. Meeting. *Annu Meet Int Soc Technol Assess Health Care Int Soc Technol Assess Health Care Meet*. 2000;16:428.
20. Dan Abramov, Miguel G. Tamariz, Jeri Y. Sever[a], George T. Christakis, Gopal Bhatnagar, Amie L. Heenan[a], Bernard S. Goldman, Stephen E. Fremes, The influence of gender on the outcome of coronary artery bypass surgery ; *Ann Thorac Surg* 2000;70:800-805.

21. Blankstein R1, Ward RP, Arnsdorf M, Jones B, Lou YB, Pine M. Female gender is an independent predictor of operative mortality after coronary artery bypass graft surgery: contemporary analysis of 31 Midwestern hospitals. *Circulation*. 2005 Aug 30;112(9 Suppl):I323-7.

22. Solimene MC1. Coronary heart disease in women: a challenge for the 21st century.*Clinics (Sao Paulo)*. 2010;65(1):99-106.

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