Pak Heart J

GENDER EFFECT ON ELECTIVE PERCUTANEOUS CORONARY INTERVENTION (PCI) OUTCOME IN ACUTE CORONARY SYNDROME

Muhammad Nawaz Lashari[1], Muhammad Tanvir Alam[2], Muhammad Mujtaba Sheikh[3]

[1-3]Department of Cardiology, Dow University of Health Sciences, Karachi-Pakistan

Address for Correspondence:

Dr. Muhammad Nawaz Lashari,

Assistant Professor,

1-C 7th East Street, DHA-1, Karachi-Pakistan

Email: nawazlashari@gmail.com

Date Received: August 05,2013
Date Revised: October 10,2013
Date Accepted: October 20,2013

Contribution
All the authors contributed significantly to the research that resulted in the submitted manuscript.

All authors declare no conflict of interest.

ABSTRACT

Objective: This study examined the effect of female gender on Procedural success, in-hospital and six month adverse cardiac event rates following elective percutaneous coronary intervention in acute coronary syndrome.

Methodology: This prospective, multi-center and descriptive study conducted at Karachi Pakistan from July 2010 to March 2012. A total 312 acute coronary syndrome (ACS) patients who underwent elective coronary angioplasty with stent were included in study. Patients underwent primary PCI were excluded. Procedure success defined as when there was less than 10% post-dilated stent stenosis without complication. In-hospital and six month follow up adverse event rates was the combined rate of death, myocardial infarction, stroke, heart failure, CABG or repeat PCI.

Results: Compared with men with ACS (n=190,60.9%), women (n=122,39.1%) were older and more often had hypertension, diabetes mellitus, dyslipidemia, and unstable angina ($p<0.001$ for all), whereas multi-vessel disease was less frequent ($p<0.01$). Procedure success in male and female was 97.6% and 96.7% respectively. In-hospital mortality rates for elective PCI were low and comparable. In hospital and six months after the procedure there were no gender differences for cardiac death, myocardial infarction, or percutaneous revascularization for men and women, respectively.

Conclusion: Women undergoing elective coronary angioplasty with stent for acute coronary syndrome have a higher baseline risk characteristics , whereas procedural success, in hospital and six month adverse event rates were similar.

Key Words: Gender, Effect, Elective Coronary Angioplasty with Stent, Outcome, ACS

INTRODUCTION

Many studies have been published on gender-related mortality and outcomes in acute coronary syndrome.[1-3] Most of these studies have shown a higher unadjusted mortality rate in women. For instance, Vaccarino, in one of his longest studies on this topic, stated that unadjusted prognosis was worse in women.[4] However, differences in mortality decrease after adjustment for age, co-morbidity, treatments and procedures.

Several factors have been considered as possibly related to a high mortality rate for women, namely, the onset of acute coronary syndrome at a later age; an association with a higher number of cardiovascular risk factors and higher co-morbidity, longer delay prior to receiving healthcare and lesser efforts both in terms of diagnosis and therapy received by women.[5-13]

However, the effect of gender on mortality has not yet been well defined and there are few data on how important gender is as an independent determinant of disease course in acute coronary syndrome patients. Also, little is known on whether the gender link to mortality depends on having undergone interventional procedures or not. It has, however, been proven that women do not undergo these procedures so frequently as their male counterparts, although it is also difficult to discern to what extent this difference is accounted for by clinical and prognostic issues.[14-15] Moreover, women have a smaller vessel diameter, more coronary tortuosity and different plaque composition compared to men that can lead to a higher dissection rate and a greater number of procedural complications.[14]

Although early data on PTCA suggested worse immediate results in women than in men, more recent data suggest that this difference is less marked. The introduction of stents with a low profile and a higher tractability and pushability has allowed the extensive application of these devices even in small and tortuous vessels improving the outcome of PTCA. This improvement has been higher in women than in men leading to the equalization of the immediate outcome in the two sexes, even if the baseline characteristics remain worse in women.[12] However, there is still a significant amount of controversy on strategies of treatment on the basis of gender. This study evaluated the gender effect on elective percutaneous coronary intervention (PCI) outcomes in patients with acute coronary syndrome.

METHODOLOGY

It is prospective, descriptive, multi-center (Ziaudin Hospital, National Medical Center & Civil Hospital, Karachi) study, conducted at Pakistan from July 2010 to March 2012. A total 312 acute coronary syndrome (STEMI, NSTEMI, USA) patients who underwent elective coronary angioplasty with stent after routine consent were included in study. Patients having STEMI underwent primary PCI were excluded while received thromobolytic were included. The prospective information on variables including age, gender, history of diabetes (defined as fasting glucose > 126 mg/dl or on treatment), hypertension (systolic blood pressure > 140/90 mmHg or on treatment), hyperlipidaemia (fasting cholesterol > 190 mg/dl or on treatment), smoking, prior PCI or coronary artery bypass grafting (CABG), angiographic and procedural details (severity of stenosis, number of diseased vessels, use of stents, GP IIb- IIIa inhibitors, complications) and Electrocardiogram (ECG) findings were recorded. Elective PCI of the significant coronary arteries were performed in standard fashion using a variety of guiding catheters, coronary wires, balloons and stents. The majority of interventions were performed via the femoral route. All patients received 5000-10,000 units of intravenous unfractionated heparin, Aspirin 300 mg, clopidogrel 300 mg (loading dose). Platelet glycoprotein IIb IIIa inhibitor, nitroglycerin and adenosine use were at the discretion of operators. All patients were prescribed Aspirin 300 mg, Clopidogrel 75 mg and anti-lipids 20-40 mg daily at the time of discharge from the hospital. Patients were followed during routine follow up to six months. Procedure success defined as when there was less than 10% post-dilated stent stenosis without complication. In-hospital and six month follow up adverse events rates were the combined rate of death, myocardial infarction, stroke, heart failure, CABG or repeat PCI.

Statistical Package for Social Sciences (SPSS) version 14.0

Table 1: Baseline Characteristics of Patients Undergoing Elective PCI

Baseline Characteristics	Men	Women	P-value
Age(years)	48±10.8	56±9.7	
Gender	60.9%	39.1%	
Hypertension	40%	51%	<0.001
Diabetes Mellitus	25%	42%	<0.001
Dyslipidemia	22%	39%	<0.001
Current smoker	48%	17.6%	<0.001
Family history of CAD	11.1%	7.3%	<0.001
NSTEMI	20%	19%	0.1
USA	23%	40%	<0.001
STEMI	57%	41%	<0.001

NSTEMI= Non-ST-Elevation Myocardial Infarction, USA= Unstable Angina, STEMI= ST-Elevation Myocardial Infarction, CAD = Coronary Artery Disease

Table 2: Showed Angiographic Characteristics

Features	Men	Women	P-value
OVD	4.3%	8.7%	<0.001
SVD	51.2%	61.3%	<0.001
2VD	28.3%	17.6%	<0.01
3VD	16.2%	12.4%	<0.01
LAD	59.5%	60.0%	0.15
RCA	26.3%	25.7%	0.15
LCX	14.2%	14.3%	0.1
BMS	96.2%	94.6%	0.15
DES	03.8%	05.4%	0.15
Glycoprotein IIb/IIIa Inhibitor	09.5%	16.7%	<0.01

0VD=Non-significant Vessel Disease, SVD= Single Vessel Disease,
2VD= Two Vessel Disease, 3VD=Three Vessel Disease,
LAD= Left Anterior Descending, RCA= Right Coronary Artery,
LCX= Left Circumflex Artery. BMS= Bare Metal Stent, DES= Drug Eluting Stent.

was used for data entry and analysis. Mean and standard deviation (SD) were calculated for quantitative variable and proportions for categorical variables. Chi-square test used for P-value detection. P-value < 0.05 was considered as statistically significant.

RESULTS

Compared with men with ACS (n = 190,60.9%), women (n = 122,39.1%) were older and more often had hypertension, diabetes mellitus, dyslipidemia, and unstable angina (p <0.001 for all) as in Table 1, whereas multi-vessel disease was less frequent (p <0.01) (Table 2). Procedure success in male and female was 97.6% and 96.7% respectively and in hospital (Table 3) and six months (Table 4) after the procedure there were no gender differences for cardiac death, myocardial infarction, stroke, heart failure or percutaneous revascularization, for men and women, respectively.

DISCUSSION

Studies of outcomes after coronary stenting in new device trials or registries suggest improved outcomes in both men and women when compared with past studies.[15,16]

With respect to sex-related differences in the early and late outcome after elective PCI, the main problem is the small, limited amount of data internationally while local data was not found.

In this study total number of male patients were more as compared to female. Females were more older than male which explains that female patients are less prone to have cardiovascular disease before menopause. Our study also showed that diabetes mellitus, hypertension and dyslipedemia were more common in females (p=0.001). Berger et al, in their study reported that out of 4284 patients, 1331 (31 %) were women.[17] Women were significantly older than men (p<0.001). Hypertension and diabetes were more prevalent in women (p<0.001). Presentation with unstable angina was more frequent in female (p=0.034) which is similar to our study.

Procedural success for elective PCI in this study was not significantly different. Hospital mortality and adverse events were also similar in men and women. Comparable rates have been quoted by Berger et al,(97 % in both).[17] Bounhoure et al, in their study showed similar procedure

Table 3: Showed Hospital Outcome After Elective PCI

Outcome	Men	Women	P-value
Procedure success	97.6%	96.7%	0.1
Coronary perforation	0.1%	0.5%	0.15
Coronary dissection	0.5%	0.6%	0.15
Incomplete stent opening	0.3%	0.2%	0.15
Urgent PCI	0.7%	0.9%	0.15
Urgent CABG	0.29%	0.29%	0.1
Myocardial infarction	0.5%	0.8%	0.15
Death	0.01%	0.01%	0.1

Table 4: Outcome of Elective PCI in ACS Patients at Six Months

Major Adverse Cardiac Events	Men	Women	P-value
Myocardial re-infarction (STEMI, NSTEMI)	2.1%	3.1%	0.15
Unstable Angina (USA)	1.8%	2.3%	0.1
Stroke	0.2%	0.4%	0.1
Heart Failure	3.0%	2.8%	0.1
Coronary Artery Bypass Grafting	0.3%	0.6%	0.1
Repeat PCI	2.6%	3.8%	0.15
Death	2.3%	2.7%	0.1

ACS: Acute Coronary Syndrome (Include STEMI, NSTEMI, USA)

success rate, with similar incidence of in-hospital MACE.[18] After mean follow-up 564 days ,two groups had a similar rates of mortality, myocardial infarction, and repeat revascularization. In our study, after mean follow-up six months, two groups had shown comparable rates of MACE. This improvement in procedure success and adverse events in our study might be due to increased utilization of intracoronary stents (100 %, BMS=94.6%, DES=5.6%), GPI(16.7% vs. 9.6%, female to male), LMWH and dual antiplatelet in all patients, findings which were confirmed with multivariate analysis.[19-22] Almed et al, study ,in which he noted significant improvement in in-hospital MACE (9.1 % vs. 2.8%; $p<0.001$).[23] Tilmanns et al, also showed similar success rate (women 95%, men 94%), hospital and 04 years hospital outcome for primary PCI in acute STEMI patients.[24]

With respect to sex-related differences in the early and late outcome after elective PCI, the main problem is the small, limited amount of data due to the lack of randomized clinical studies including a larger number of women.

Study limitation: It is small study, need further studies to fill a gap in our understanding of behaviour in men and women during elective PCI in acute coronary syndrome patients.

CONCLUSION

Women undergoing elective coronary angioplasty with stent for acute coronary syndrome have a higher baseline risk characteristics, whereas procedural success, in hospital and six month adverse event rates were compare-able.

REFERENCES

1. Sonke G, Beaglehole R, Stewart A, Jackson R, Stewart F. Sex differences in case fatality before and after admission to hospital after acute cardiac events: analysis of community based coronary heart disease register. BMJ 1996;313:853-55.
2. Hochman JS, McCabe CH, Stone PH, Becker RC, Cannon CP, DeFeo-Fraulini T, et al. Outcome and profile of women and men presenting with acute coronary syndromes: a report from TIMI IIIB. J Am Coll Cardiol 1997;30:141-8.
3. Fox KAA, Poole-Wilson P, Clayton TC, Henderson RA, Shaw TRD, Wheatley DJ, et al. 5-year outcome of an interventional strategy in non-ST-elevation acute syndrome: the British Heart Foundation RITA 3 randomised trial. Lancet 2005;366:914-20.
4. Vaccarino V, Rathore SS, Wenger NK, Frederick PD, Abramson JL, Barron HV, et.al. Sex and racial differences in the management of acute myocardial infarction, 1994 through 2002. N Engl J Med 2005;353:671-82.
5. Marrugat J, Sala J, Masia R, Pavesi M, Sanz G, Valle V, et al. Mortality differences between men and women following first myocardial infarction. RESCATE Investigators. (Spanish acronym for Resources Used in Acute Coronary syndrome and Waiting Time). JAMA 1998;280:1405-9.
6. Berger JS, Brown DL. Impact of gender on mortality following primary angioplasty for acute myocardial infarction. Prog Cardiovasc Dis 2004;46:297-304.
7. Vaccarino V, Abramson JL, Veledar E, Weintraub WS. Sex differences in hospital mortality after coronary artery bypass surgery: evidence for a higher mortality in younger women. Circulation 2002;105:1176-81.
8. Wiviott S, Cannon CP, Morrow DA, Murphy SA, Gibson CM, McCabe CH, et al. Differential expression of cardiac biomarkers by gender in patients with unstable angina/non -ST- elevation myocardial infarction: a TACTICS-TIMI 18 (Treat Angina with Aggrastat and determine Cost of Therapy with an Invasive or Conservative Strategy-Trombolysis in Myocardial Infarction 18) Substudy. Circulation 2004;109:580-6.
9. O'Donnell S, Condell S, Begley C, Fitzgerald T. In-hospital care pathway delays: gender and myocardial infarction. J Adv Nurs 2005;52:14-21.
10. Janzon M, Levin LA, Shawhn E. Invasive treatment in unstable coronary artery disease promotes health-related quality of life: results from the FRISC II TRIAL. Am Heart J 2004;148:114-20.

11. Jenkins JS, Flaker GC, Nolte B, Price LA, Morris D, Kurz J, et al. Causes of higher in-hospital mortality in women than in men after acute myocardial infarction. Am J Cardiol 1994;73:319-22.

12. Aguado MJ, Márquez S. Differences between women's and men's access to interventional cardiovascular procedures at public hospitals in Andalusia (Spain). Rev Esp Cardiol 2006;59:785-93.

13. Antoniucce D, Valenti R, Moschi G, Migliorini A, Trapani M, Santoro GM, et al. Sex-based differences in clinical and angiographic outcomes after primary angioplasty or stenting for acute myocardial infarction. Am J Cardiol 2001;87:289-93.

14. Ayanian JZ, Epstein AM. Differences in the use of procedures between women and men hospitalized for coronary heart disease. N Engl J Med 1991;325:221-5.

15. Lansky AJ, Hochman JS, Ward PA, Mintz GS, Fabunmi R, Berger PB, et al. Percutaneous coronary intervention and adjunctive pharmaco-therapy in women: a statement for healthcare professionals from the American Heart Association. Circulation 2005;111:940-53.

16. Vogt A, Engel H, Glunz H, Sattelberger U, Reil GH, Sechtem U, et al. Early results of coronary angioplasty despite more complex interventions (Registry of the German Community Hospitals 1993-2000). Am J Cardiol 2002;90:1005-9.

17. Berger JS, Sanborn TA, Sherman W, Brown DL. Influence of sex on in-hospital outcomes and long-term survival after contemporary percutaneous coronary intervention. Am Heart J 2006;151:1026-31.

18. Bounhoure JP, Farah B, Fajadet J, Marco J. Prognosis after acute coronary syndrome. Lack of difference according to sex. Bull Acad Natl Med 2004;188:383-97.

19. Jacobs AK, Johnston JM, Haviland A, Brooks MM, Kelsey SF, Holmes DR J, et al. Improved outcomes for women undergoing contemporary percutaneous coronary intervention: a report from the National Heart, Lung, and Blood Institute Dynamic registry. J Am Coll Cardiol 2002;39:1608-14.

20. Robertson T, Kennard ED, Mehta S, Popma JJ, Carrozza JP, King SB, et al. Influence of gender on in-hospital clinical and angiographic outcomes and on one-year follow-up in the New Approaches to Coronary Intervention (NACI) registry. Am J Cadiol 1997;80:26-39.

21. Lansky AJ, Pietras C, Costa RA, Tsuchiya Y, Brodie BR, Cox DA. Gender differences in outcomes after primary angioplasty versus primary stenting with and without abciximab for acute myocardial infarction: results of the Controlled Abciximab and Device Investigation to Lower Late Angioplasty Complications (CADILLAC) trial. Circulation 2005;111:1611-8.

22. Peterson ED, Lansky AJ, Kramer J, Anstrom K, Lanzilotta MJ. Effect of gender on the outcomes of contemporary percutaneous coronary intervention. Am J Cardiol 2001;88:359-64.

23. Almed FQ, Hendel RC, Nathan S, Meyer PM, Calvin JE, Klein LW. Improved in-hospital outcomes in acute coronary syndrome (unstable angina / non-ST segment elevation myocardial infarction) despite similar TIMI risk score. J Invasive Cardiol 2003;15:502-6.

24. Tillmanns H, Waas W, Voss R, Grempels E, Hölschermann H, Haberbosch W, et al. Gender differences in the outcome of cardiac interventions. Am J Cardiol 2005;30:375-89.