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Original Article

Short-Term Clinical Outcomes of Drug Eluting Stents in Diabetic versus Non-Diabetic Patients Having Stable Coronary Artery Disease

Yasir Adnan*, Lubna Noor, Muhammad Habeel Dar**,Haris Adnan*** and Muhammad Hafizullah****

*Department of cardiology, Police and Services Hospital, Peshawar, **Department of Cardiology, Lady Reading Hospital, Peshawar and *** Category C Hospital, Nahaqi Peshawar

Abstract:

Background: Diabetes mellitus (DM) increases the risk of adverse outcomes after coronary artery revascularization. Diabetic patients have a worse prognosis than non-diabetic patients, with generally greater rates of death, myocardial infarction and need for target lesion and vessel revascularization.

Objectives: The aim of this study was to assess the Short-Term clinical outcomes in diabetic versus non-diabetic patients who underwent successful percutaneous revascularization with drug-eluting stents.

Material and Methods: Between April 2011 and July 2012, 144 diabetic and 232 non-diabetic patients with stable coronary disease undergoing DES implantation at Cardiology Unit Lady Reading Hospital, were enrolled prospectively. Clinical outcomes (Myocardial infarction [MI], unstable angina [UA], and positive ETT) at three months were measured in Diabetic and non-Diabetic patients who received DES for coronary artery lesions. All patients were followed and reassessed after 3 months from the index procedure. Exercise Tolerance Test (ETT) was performed on every patient and recorded on Proforma. Data analysis was done using SPSS version 16.

Results: We evaluated 376 patients with stable coronary artery disease treated with DES of the 376 patients, 144 (38.3%) were Diabetics. The mean age was57±9.313 years. Male patients were 271(72.1%). At 3-Months follow-up, diabetic patients treated with DES had significantly higher rates for myocardial infarction (5.6 vs. 1.3%; p = 0.025), unstable angina (12.5 vs. 3.4%; p = 0.001) and positive ETT (16.7 vs. 5.6%; p = 0.001).

Conclusion: Our study revealed that despite the use of DES the risk of myocardial infarction, unstable angina, and positive ETT at three months remains higher in diabetic patients.

Key Words: Coronary Artery Disease, Drug Eluting stent, Exercise tolerance test.

Introduction

Newer generation drug eluting stents have revolutionized interventional cardiology. Drug-eluting stents (DES) have the ability to reduce neointimal hyperplasia, decreasing the coronary restenosis and the need for subsequent revascularizations.[1]Due to such benefits; these new devices have expanded the indications for percutaneous treatment of complex lesions and in more complicated patients.[2]

In the last several decades, the global prevalence of diabetes mellitus (DM) has continuously increased.[3,4]

AUTHOR'S CORRESPONDENCE:
Dr. Yasir Adnan, FCPS Cardiology
Cardiologist, Police and Services Hospital, Peshawar
Email: doctoryasiradnan@gmail.com
Cell: 03219077089

Coronary artery disease (CAD) is a major cause of morbidity and mortality in diabetic patients, and more than 80% of DM deaths occur in low- and middle-income countries. Patients with DM have a higher rate of angiographic restenosis and major adverse cardiovascular events (MACE) than non-diabetic patients.[5] Compared to non-diabetic patients, patients with DM have a greater extent of coronary atherosclerosis, higher plaque burden, and are more prone to develop multi vessel CAD.[6-8]

Drug-eluting stents (DES) have been shown to dramatically improve the outcome of patients with coronary artery disease, especially in more complex scenarios such as DM or chronic total occlusion(CTO),[9-13]although both DM and CTO are still independently associated with higher event rates.[5, 9-10]Although CABG remains superior to PCI among patients with DM and MVD, particularly for patients with higher angiographic disease complexity,

the gap between CABG and PCI has narrowed over time.[14]Without sufficiently powered data from diabetic subgroup analyses and in the absence of randomized controlled trials in diabetic patients with primary clinical outcomes controversy is ongoing over safety and efficacy of drug-eluting stents (DES) in diabetic patients. This study was carried out to compare the safety and efficacy of the Drug-eluting stent (DES) in diabetic and non-diabetic patients.

Material & Methods

From April 2011 to July 2012, 376 patients with stable coronary artery disease treated with PCI and successful implantation of at least one Drug Eluting Stent DES, were prospectively included in a single center observational study. This prospective study was carried out in the Department of Cardiology, Lady Reading Hospital Peshawar. The total study duration was 15 months. Patients with previous history of revascularization whether percutaneous coronary intervention or Coronary artery bypass graft and primary percutaneous coronary intervention were excluded from the study. Of the 376 patients, 144 (38.3%) were Diabetics. Clinical outcomes (Myocardial infarction [MI], unstable angina [UA], and positive ETT) at three months were measured in Diabetic and non-Diabetic patients who received DES for coronary artery lesions. Use of Drug Eluting Stents via radial or femoral routes in all patients from both genders of any age, stent size, stent diameter and stented coronary vessels, were documented on a specified Proforma. All patients who underwent PCI (DES stent) for stable angina pectoris were recalled and reassessed after three months from the index procedure. History was taken regarding unstable angina, myocardial infarction and hospitalization for any of these events over the last three months. ETT was performed on every patient on Bruce protocol and was recorded on Proforma. Study exclusion criteria were followed to control confounders and bias in the study results. Data analysis was done using SPSS version 16. Mean + standard deviation was calculated for continuous variables like age, stent length and stent diameter. Frequency and Percentages was calculated for categorical variables like gender, vessels stented, unstable angina, positive ETT and myocardial infarction. P value <.05 was defined as the threshold of statistical significance. Continuous variables were compared with the Student's t test, and categorical variables with the chi-square test.

Results

We evaluated 376 patients with stable coronary artery disease treated with DES. Of the 376 patients, 144 (38.3%) were Diabetics. The mean age was 57±9.313 years. Males were 271(72.1%). Mean length of drug eluting stent was 27.313±7.235 while mean diameter of stent was 2.90±0.2483. Hypertensive patients and smokers were more in the diabetic group as compared to non-diabetic group. Most of the patients in either group got stented to LAD and CX arteries. Baseline clinical and angiographic characteristics of the study groups (Diabetic vs non-Diabetic) are shown in Table-1.

Table-1: Baseline clinical and angiographic characteristics of the study groups

	Diabetic Patients N =144	Non-Diabetic Patients N =232
Age	**58±7.321**	**56±9.142**
Male	**66% (95)**	**75.9%(176)**
Target Vessel:		
LAD	**36.8%(53)**	**53%(123)**
LCX	**22.9%(33)**	**31%(72)**
RCA	**3.5%% (05)**	**8.2%(19)**
LAD and LCX	**21.5% (31)**	**2.6%(06)**
LCX and RCA	**9.7% (14)**	**2.9%(09)**
LAD and RCA	**5.6% (08)**	**1.3%(03)**
Hyperlipidemic Patients	**59%(85)**	**34.5%(80)**
Hypertensive Patients	**70.8%(102)**	**68.1%(158)**
Smoking History	**31.2%(45)**	**10.8%(25)**

Our report describes 3-months data of clinical outcomes of the Drug Eluting Stents in Diabetic and non-diabetic patients. The three months clinical outcomes included MI, U.A and positive ETT. At 3-Months follow-up, diabetic patients treated with DES had significantly higher rates for clinical outcomes. In our study rate of MI (myocardial infarction) was 5.6% (n=8) in diabetic group as compared to 1.3% (n=3) in non-diabetic group with a p=0.025 which was statistically significant. The rate of unstable angina was 12.5% (n=18) in diabetic group vs 3.4% (n=8) in non-diabetic group with a p=0.001 which was also statistically significant. At 3-months follow up we did ETT on every patient. ETT was reported to be positive in 16.7% (n=24) patients in diabetic group as compared to 5.6% (n=13) in non-diabetic group with a p=0.001. All the results have been shown in Table 2.

Table-2: Comparison of clinical outcomes in study groups *Overall (n=376)*

	Diabetic Patients (n=144)	Non-Diabetic Patients (n=232)	p-value
MI	5.6% (8)	1.3% (3)	0.025
U.A	12.5% (18)	3.4% (8)	0.001
Positive ETT	16.7% (24)	5.6% (13)	0.001

Discussion

Diabetic patients with coronary artery disease represent a challenging subset of patients as evidence by their higher rates of adverse cardiac events regardless of the treatment strategy utilized. Drug-eluting stents differ in design, polymer and drug, resulting in the potential for different outcomes. Randomized trials and registries with both first- and second-generation platforms have yielded conflicting results as to best options with regard to stent choice in the diabetic population.

Our report compares 3-months data of clinical outcomes of the Drug Eluting Stents in diabetic patients with that of non-diabetic patients. The three months clinical outcomes included MI, U.A and positive ETT. At 3-Months follow-up, diabetic patients treated with DES had significantly higher rates of myocardial infarction (5.6 vs. 1.3%; p = 0.025), unstable angina (12.5 vs. 3.4%; p = 0.001) and positive ETT (16.7 vs. 5.6%; p = 0.001). These worse results in diabetic patients are due to the facts that they have a higher severity and extension of the coronary atherosclerotic disease with a consequent unfavorable clinical evolution in the short-term and long-term. Diabetic patients have increased oxidative stress and inflammation, besides protein glycation; as a consequence, they develop more extensive atherosclerosis, coagulation disorders, and a greater number of vulnerable atherosclerotic plaques. Furthermore, in our study there were more hypertensive patients and smokers in diabetic group which also might have affected the results negatively.

Although the goals of DES are to lower restenosis at the stented site, the therapy is local and obviously will do nothing to prevent progression of coronary disease at other sites. In addition to restenosis, non-culprit lesion progression is another important factor underlying adverse outcomes seen in diabetic patients after percutaneous coronary intervention (PCI).[16].A recent large meta-analysis of 10 randomized trials[17] showed that, despite substantial reductions in restenosis when DES were used, both in diabetic and non-diabetic patients, the presence of diabetes was associated with an increased risk of unfavorable clinical outcomes.[17-19] Therefore, diabetic status has been regarded as both a major risk factor for adverse outcomes and an important clinical indicator in the choice of revascularization methods.

Conclusion

Our study revealed that despite the use of DES the risk of myocardial infarction, unstable angina, and positive ETT at three months remains higher in diabetic patients. These findings indicate that diabetes per se, is a driver of inferior efficacy and adverse PCI outcomes in the era of DES. Finally, revascularization in diabetic patients utilizing coronary stent implantation will also require systemic therapy to address alterations in underlying pathobiology responsible for both atherosclerosis progression and aggressive neointimal formation.

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CONTRIBUTION OF AUTHORS	
Author	**CONTRIBUTION**
Yasir Adnan	
Lubna Noor	
Muhammad Habeel Dar	
Haris Adnan	
Muhammad Hafizullah	

KEY FOR CONTRIBUTION OF AUTHORS:

A. Conception/Study Designing/Planning
B. Experimentation/Study Conduction
C. Analysis/Interpretation/Discussion
D. Manuscript Writing
E. Critical Review
F. Facilitated for Reagents/Material/Analysis