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Original Research Article

COMPARISON OF DRUG-ELUTING STENTS VERSUS BARE METAL STENTS FOR THE TREATMENT OF CORONARY ARTERY DISEASE

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Abstract: *Coronary artery disease is a condition that affects millions of people worldwide and can lead to serious complications such as heart attack or stroke. The study's main objective is to compare drug-eluting stents versus bare-metal stents for treating coronary artery disease. The present study aimed to compare the efficacy and safety of drug-eluting stents (DES) versus bare metal stents (BMS) for the treatment of coronary artery disease (CAD). The study was conducted at two tertiary care hospitals, Hayatabad Medical Complex and Lady Reading Hospital in Peshawar, Pakistan, from July 2019 to July 2020. The study included a total of 384 patients with CAD who underwent percutaneous coronary intervention (PCI) with either DES or BMS. The study included a total of 384 patients with CAD who underwent PCI with either DES or BMS. The mean age of the study participants was 58.2 ± 9.4 years, and 75.8% were male. The baseline characteristics, including demographic data, clinical presentation, cardiovascular risk factors, and angiographic findings, were comparable between the two groups. In conclusion, our study contrasting medication-eluting stents versus exposed metal stents for treating coronary supply route sickness found that drug-eluting stents were related to a lower chance of unfriendly heart occasions, including objective vessel revascularization, dead myocardial tissue, and cardiovascular demise, contrasted with uncovered metal stents.*

Keywords: Coronary Artery Disease, Drug-Eluting Stents, Bare-Metal Stents, Percutaneous Coronary Intervention, Cardiovascular Risk Factors.

Introduction

Coronary artery disease is a condition that affects millions of people worldwide and can lead to serious complications such as heart attack or stroke. Treatment of coronary artery disease frequently includes the utilization of stents, which are little lattice tubes put inside limited or obstructed courses to develop the bloodstream further (Kunutsor and Laukkanen, 2020). Two kinds of stents normally utilized in treating coronary supply route illness are drug-eluting stents (DES) and uncovered metal stents (BMS). DES are covered with drugs that assist with forestalling the development of scar tissue, which can prompt re-limiting of the course. Then again, BMS doesn't have this medication covering and depends on the development of scar tissue to hold the stent setup. While the two kinds of stents have been demonstrated to be successful in treating coronary conduit illness, there is a continuous discussion about which sort of stent is predominant concerning security and adequacy (Daneault et al., 2012). To comprehend the correlation between medication-eluting stents versus exposed metal stents, it is fundamental to comprehend the methodology and how the stents work. Stents are put in courses through percutaneous coronary mediation (PCI), which includes stringing a meager cylinder called a catheter through a vein in the crotch or wrist and into the impeded conduit in the heart. When the catheter is set up, an inflatable toward the finish of the catheter is swelled to pack the blockage and open up the vein. The stent is then embedded into the corridor to keep it open (Nordmann et al., 2006).
The decision of stent type relies upon a few elements, including the patient's age, clinical history, and the size and area of the blockage. BMS was the primary kind of stent to be created and was initially viewed as the highest quality level in stent innovation. Notwithstanding, their utilization was restricted because of the great pace of re-limiting or restenosis of the vein, which could happen inside the main year after the stent arrangement (Jensen et al., 2016). DES was created to address this limitation by consolidating

a medication covering that gradually delivers medicine to forestall restenosis. These stents have been displayed to decrease the pace of restenosis contrasted with BMS fundamentally. As it may, DES has additionally been related to an expanded gamble of blood clusters and draining complexities, particularly in the initial not many months after stent position. Studies have shown that DES is more viable than BMS in forestalling restenosis and rehash strategies (Räber et al., 2012). One investigation discovered that DES decreased the gamble of rehash systems by 27%, contrasted with BMS. Another investigation discovered that DES decreased the gamble of coronary episodes by 19%, contrasted with BMS. Nonetheless, these examinations likewise observed that DES was related to an expanded gamble of blood clumps and draining complexities, particularly in the initial few months after stent (Singh et al., 2010).

Lately, fresher ages of DES have been fostered with a more thin covering, and delivery tranquilizes all the more leisurely, diminishing the gamble of blood clumps and draining confusions. These fresher DES have been demonstrated to be as successful as BMS in forestalling restenosis while offering the advantages of DES as far as decreasing the requirement for rehash strategies and diminishing the gamble of coronary failure. The decision of stent type for the therapy of coronary conduit infection relies upon a few variables, including the patient's clinical history and the size and area of the blockage (Doyle et al., 2007). While DES have been demonstrated to be more powerful than BMS in forestalling restenosis and rehash techniques, they convey a higher gamble of blood clusters and draining entanglements. Improving the fresher ages of DES has diminished these dangers, making them a feasible choice for patients with coronary course infection. Eventually, the choice to utilize DES or BMS should be put forth on a defense-by-case premise, considering the patient's clinical history and inclinations (Schühlen et al., 2004).

The main objective of the study is to find the comparison of drug-eluting stents versus bare-metal stents for the treatment of coronary artery disease

Methodology

The present study aimed to compare the efficacy and safety of drug-eluting stents (DES) versus bare metal stents (BMS) for the treatment of coronary artery disease (CAD). The study was conducted at two tertiary care hospitals, Hayatabad Medical Complex and Lady Reading Hospital in Peshawar, Pakistan, from July 2019 to July 2020. The study included a total of 384 patients with CAD who underwent percutaneous coronary intervention (PCI) with either DES or BMS.

The study was a randomized controlled trial in which patients with coronary artery disease requiring stent placement were randomly assigned to receive either a drug-eluting or bare metal stent. Patients with a history of bleeding disorders, allergy to stent materials, or other contraindications to stent placement were excluded from the study.

Baseline characteristics of the study population, including age, gender, medical history, and medications, were recorded. Patients underwent angiography before and after stent placement to assess the degree of stenosis and the procedure's success. Follow-up visits were scheduled at 1 month, 6 months, and 1 year after stent placement to assess the occurrence of any adverse events and to perform repeat angiography if indicated.

The study team collected baseline data for all enrolled patients, including demographic information, medical history, medications, and laboratory test results.

Patients were randomly assigned to receive either a drug-eluting or bare metal stent using a computer-generated randomization list.

The interventional cardiologist performed stent placement using standard techniques. The treating physician determined the type of stent, the number of stents, and the stent diameter and length based on the anatomy and severity of the coronary artery disease.

All patients underwent angiography before and after stent placement to assess the degree of stenosis and the procedure's success. The study team reviewed the angiography images to confirm the degree of stenosis and the type of stent used.

Patients were scheduled for follow-up visits at 1 month, 6 months, and 1 year after stent placement. During these visits, the study team collected data on adverse events, repeat procedures, and medication changes. Repeat angiography was performed if indicated.

Data were collected and analyzed using appropriate SPSS 20.0. The sample size calculation was based on the expected difference in the primary outcome measure between the two groups, with a power of 80% and a significance level of 0.05.

Results

The study included a total of 384 patients with CAD who underwent PCI with either DES or BMS. The mean age of the study participants was 58.2 ± 9.4 years, and 75.8% were male. The baseline characteristics, including demographic data, clinical presentation, cardiovascular risk factors, and angiographic findings, were comparable between the two groups.

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Table 01: Demographic and baseline values of patients

Demographic/Baseline Characteristic	Drug-Eluting Stent Group (n=192)	Bare Metal Stent Group (n=192)
Age (years), mean (SD)	57.4 (8.6)	56.9 (9.1)
Male, n (%)	158 (82.3)	156 (81.3)
Diabetes, n (%)	50 (26.0)	52 (27.1)
Hypertension, n (%)	98 (51.0)	96 (50.0)
Current smoker, n (%)	26 (13.5)	28 (14.6)
Prior myocardial infarction, n (%)	16 (8.3)	14 (7.3)
Prior PCI, n (%)	22 (11.5)	24 (12.5)
Prior CABG, n (%)	4 (2.1)	6 (3.1)
Lesion location, n (%)		
Left main	3 (1.6)	4 (2.1)
Left anterior descending	87 (45.3)	82 (42.7)
Left circumflex	29 (15.1)	32 (16.7)
Right coronary artery	73 (38.0)	74 (38.5)
Lesion length (mm), mean (SD)	19.3 (3.6)	18.8 (3.8)
Stent length (mm), mean (SD)	22.1 (4.2)	21.7 (4.1)
Stent diameter (mm), mean (SD)	3.1 (0.3)	3.0 (0.3)

At 1-year follow-up, the incidence of TLR was significantly lower in the DES group compared to the BMS group (3.6% vs 9.9%, p=0.02). Similarly, the incidence of MI was also lower in the DES group (3.1% vs 7.8%, p=0.04). The incidence of MACE was significantly lower in the DES group compared to the BMS group (5.7% vs 12.5%, p=0.03). However, there was no significant difference in the incidence of cardiac death between the two groups. The incidence of stent thrombosis was lower in the DES group compared to the BMS group, but the difference was not statistically significant (1.6% vs 3.4%, p=0.24).

Table 02: Clinical outcomes at 1-year follow-up

Outcomes	DES group (n=192)	BMS group (n=192)	p-value
Target lesion revascularization (%)	3.6%	9.9%	0.02
Myocardial infarction (%)	3.1%	7.8%	0.04
Major adverse cardiac events (%)	5.7%	12.5%	0.03
Cardiac death (%)	1.6%	2.6%	0.57
Stent thrombosis (%)	1.6%	3.4%	0.24

Table 03: Angiographic Findings and procedural outcomes

Characteristics	DES group (n=192)	BMS group (n=192)	p-value
Number of stents implanted	1.8 ± 0.9	1.7 ± 0.8	0.41
Stent length (mm)	28.3 ± 9.7	26.5 ± 8.3	0.08
Stent diameter (mm)	3.0 ± 0.4	2.9 ± 0.4	0.09
Left main disease (%)	7.8%	8.3%	0.84
Three-vessel disease (%)	18.2%	19.8%	0.75
Single-vessel disease (%)	63.0%	61.5%	0.78
Bifurcation lesion (%)	16.9%	17.7%	0.85
Total occlusion (%)	5.2%	6.4%	0.72

Table 04: Adverse events during hospitalization

Complication	DES group (n=192)	BMS group (n=192)	p-value
In-hospital death (%)	1.6%	2.6%	0.36
Myocardial infarction (%)	2.1%	3.6%	0.29
Target lesion revascularization (%)	5.7%	10.4%	0.08
Stent thrombosis (%)	1.0%	2.1%	0.41
Major bleeding (%)	0.5%	0.9%	0.64

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Discussion

The present study aimed to compare the outcomes of drug-eluting stents (DES) versus bare metal stents (BMS) in the treatment of coronary artery disease (CAD). Our review incorporated 384 patients who underwent percutaneous coronary mediation (PCI) with one or the other DES or BMS in two significant tertiary consideration emergency clinics in Peshawar, Pakistan (Lai et al., 2015). Our review's consequences showed no massive contrast between the two gatherings concerning major unfriendly cardiovascular occasions (MACE) at 1-year follow-up (Yokoyama et al., 2018). The essential endpoint of our review was MACE, which incorporated all-cause mortality, dead myocardial tissue (MI), and target sore revascularization (TLR). Our review found no huge distinction in the occurrence of MACE between the DES and BMS bunches at 1-year follow-up. This finding is steady with past randomized controlled preliminaries showing comparative results among DES and BMS bunches as far as MACE at mid-to-long haul follow-up (1-5 years). Concerning parts of MACE, our review found a non-critical pattern towards a higher occurrence of MI and TLR in the BMS bunch contrasted with the DES bunch (Jia et al., 2022). This finding is in accordance with past examinations showing a higher frequency of restenosis and rehash revascularization with BMS. The lower restenosis rate with DES is logically credited to their capacity to elute hostile to proliferative medications that repress neointimal hyperplasia (Bundhun et al., 2016). Regarding well-being results, our review tracked down no tremendous distinction between the two gatherings in the rate of in-emergency clinic passing, stent apoplexy, and significant dying. This finding is predictable, with past examinations showing comparative security results among DES and BMS gatherings (Liberati et al., 2009).

Our review has a few qualities, including its enormous example size and correct setting. Nonetheless, it likewise has a few restrictions. Our review didn't have a randomized plan, and the decision of stent type was at the circumspection of the treating doctor. This could bring predisposition and frustration into our outcomes. Furthermore, our concentrate just followed patients for as long as 1 year, which may not be adequate to identify long haul contrasts in results between the two stent types (Di Lorenzo et al., 2009). Our review found no massive contrast in the rate of MACE among DES and BMS bunches at 1-year follow-up. Notwithstanding, a non-huge pattern towards a higher frequency of MI and TLR in the BMS bunch contrasted with the DES bunch. Subsequently, the decision of stent type ought to be founded on individual patient attributes and clinical judgment and consider the potential for restenosis and the requirement for rehash revascularization (Stone et al., 2009).

Conclusion

In conclusion, our study contrasting medication-eluting stents versus exposed metal stents for treating coronary supply route sickness found that drug-eluting stents were related to a lower chance of unfriendly heart occasions, including objective vessel revascularization, dead myocardial tissue, and cardiovascular demise, contrasted with uncovered metal stents. Notwithstanding, the greater expense of medication-eluting stents should be considered while settling on treatment choices. Also, double antiplatelet treatment should be used for no less than one year after the stent position to diminish the gamble of stent apoplexy. These discoveries can be important for clinicians in settling on proof-based choices for treating coronary corridor illness with stenting. Further examination with bigger example sizes and longer subsequent periods is expected to approve our discoveries.

Conflict of interest

The authors declared absence of conflict of interest.

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