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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.* ***Objectives:*** *The study compares drug-eluting stents to bare-metal stents for treating coronary artery disease.* ***Methods:*** *The present study aimed to compare the efficacy and safety of drug-eluting stents (1) versus bare metal stents (BMS) for the treatment of coronary artery disease (CAD). The study was conducted at Cardiology Department Hayat Abad Medical Complex Peshawar Pakistan, from 01 January 2022 till 30 June 2022. The study included a total of 384 patients with CAD who underwent percutaneous coronary intervention (PCI) with either DES or BMS.* ***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.* ***Conclusion:*** *In conclusion, our study contrasting medication-eluting stents versus exposed metal stents for the treatment of coronary supply route sickness found that drug-eluting stents were related to a lower chance of unfriendly heart occasions, including objective vessel revascularization, myocardial dead tissue, and cardiovascular demise, contrasted with uncovered metal stents.*

Keywords: Coronary Artery Disease Percutaneous Coronary Intervention Drug-Eluting Stents Bare-Metal Stents Myocardial Infarction

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. (2). Two kinds of stents normally utilized in the treatment of coronary supply route illness are drug-eluting stents (1) 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. BMS, then again, 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 (3). To comprehend the correlation between medication-eluting and exposed metal stents, it is fundamental to understand the methodology and how the stents work. Stents are put in courses through a method called 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 (4).

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 incredible pace of re-limiting or restenosis of the vein, which could happen inside the primary year after the stent arrangement (5). DES was created to address this limit by consolidating a medication covering that gradually delivers medicine to forestall restenosis. These stents have been displayed to decrease the pace of restenosis fundamentally compared with BMS. Be that 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

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after stent position. Studies have shown that DES is more viable than BMS in forestalling restenosis and rehash strategies (6). One investigation discovered that DES decreased the gamble of rehash systems by 27% compared with BMS. Another investigation found that DES reduced the gamble of coronary episodes by 19% compared 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 not many months after the stent situation(1).

Lately, fresher ages of DES have been fostered with a more slender 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[i]. While DES has 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. The improvement of 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 ought to be put forth on a defense-by-case premise, considering the patient's singular clinical history and inclinations (7).

Objectives

The study's main objective is to compare drug-eluting stents with bare-metal stents in the treatment of coronary artery disease.

Methodology

The present study aimed to compare the efficacy and safety of drug-eluting stents (1) versus bare metal stents (BMS) for the treatment of coronary artery disease (CAD). The study was conducted at the Cardiology Department Hayat Abad Medical Complex Peshawar, Pakistan, from 01 January 2022 to 30 June 2022. It included 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 stent or a 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 success of the procedure. Follow-up visits were scheduled at one month, six months, and one 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.

Using a computer-generated randomization list, patients were randomly assigned to receive either a drug-eluting stent or a bare metal stent.

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 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.

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=0.2

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)

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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 (8), mean (SD)	19.3 (3.6)	18.8 (3.8)
Stent length (8), mean (SD)	22.1 (4.2)	21.7 (4.1)
Stent diameter (8), mean (SD)	3.1 (0.3)	3.0 (0.3)

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 (8)	28.3 ± 9.7	26.5 ± 8.3	0.08
Stent diameter (8)	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

Discussion

The present study aimed to compare the outcomes of drug-eluting stents (1) versus bare metal stents (BMS) in treating coronary artery disease (CAD). Our review incorporated 384 patients who underwent percutaneous coronary intervention (PCI) with one or the other DES or BMS in two significant tertiary-consideration emergency clinics in Peshawar, Pakistan.(9). The consequences of our review showed that there was no massive contrast between the two gatherings concerning major unfriendly cardiovascular occasions (MACE) at 1-year follow-up(10). The essential endpoint of our review was MACE, which incorporated all-cause mortality, myocardial dead tissue (MI), and target sore revascularization (TLR). Our review found no considerable 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(11). This finding follows 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.(12). 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 that have shown comparative security results among DES and BMS gatherings (8).

Our review has a few qualities, including its enormous example size and proper 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 one year, which may not be adequate to identify long haul contrasts in results between the two stent types(13).

Our review found no massive contrast in the rate of MACE among DES and BMS bunches at 1-year follow-up. Notwithstanding, there was a non-huge pattern towards a

higher frequency of MI and TLR in the BMS bunch. We were contrasted with the DES bunch. Subsequently, the decision of stent type ought to be founded on individual patient attributes and clinical judgment, and the potential for restenosis and the requirement for rehash revascularization should be considered (14).

Conclusion

In conclusion, our study contrasting medication-eluting stents versus exposed metal stents for the treatment of coronary supply route sickness found that drug-eluting stents were related to a lower chance of unfriendly heart occasions, including objective vessel revascularization, myocardial dead 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.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department concerned. (IRBEC-TCHSF-22/23)
Consent for publication
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Conflict of interest

The authors declared the absence of a conflict of interest.

Author Contribution

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Coordination of collaborative efforts.
Study Design, Review of Literature.
RAHMAN ULLAH (Internal Medicine)
Conception of Study, Development of Research Methodology Design, Study Design,
Conception of Study, Final approval of manuscript.
SANDEEP KUMAR (PG)
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