Original Article

Effectiveness of Balloon Angioplasty Compared with Coronary Stenting in Narrow Coronary Arteries

Tariq Nawaz, Muhammad Amin, Suliman Khan and Syed Muhammad Nayab Ali

ABSTRACT

Objective: The study aimed to assess the effectiveness of balloon angioplasty compared with coronary stenting in narrow coronary arteries.

Study Design: A comparative study

Place and Duration of Study: This study was conducted at the department of cardiology, Lady Reading Hospital Peshawar. The study duration was one year from June 2022 to June 2023.

Methods: This comparative study was carried out at the department of cardiology, Lady Reading Hospital Peshawar. The study duration was one year from June 2022 to June 2023. A total of 100 patients with lesions in narrow coronary arteries were enrolled. Participants were randomly allocated to get stent placement or traditional balloon angioplasty. Each participant signed a written statement of informed permission. During a year, the rates of clinical events were assessed. SPSS version 25 was used for descriptive statistics.

Results: Total 100 patients were enrolled in this study. Male patients were 59(59%) and female patients were 41 (41%). Each group consists of 50 patients with comparable baseline demographics and angiography findings. Major adverse cardiac events and the rate of success of angiography were equivalent, according to treatment analysis: 5.4% and 95.6% in the case of coronary stenting and 5.6% and 93.5% in the case of balloon angioplasty. 3.8% of patients had significant closure changes throughout the course of 30 days. At six months, stenting substantially increased the lumen by1.52 mm and balloon angioplasty by 1.32 mm. (p=0.002) and the post-procedural lumen diameter was increased 2.31mm by stent and 1.82 mm by balloon angioplasty (p=0.002). The restenosis incidence after coronary stenting and balloon angioplasty was found to be 35% and 55%, respectively. The survival rates (event-free) after coronary stenting and angioplasty were respectively 75% and 65% (p=0.034).

Conclusion: Our study concludes that lesions in narrow coronary arteries may respond well to optimum balloon angioplasty with subsequent stenting. The restenosis rates were reported to be 35% and 55% in coronary stenting and balloon angioplasty respectively.

Key Words: Coronary Stenting, Balloon Angioplasty, Narrow Coronary Arteries, Restenosis

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INTRODUCTION

With improvements in clinical controlled trials and management, stent insertion has become a routine treatment in interventional cardiology. However, the increased risk of restenosis and conventional balloon angioplasty in narrow coronary arteries remains a significant problem[1,2]. Several studies examining elective stent placement's efficiency for small coronary artery lesions produced different results [3, 4].

Department of Cardiology Lady Reading Hospital, Peshawar.

Correspondence: Suliman Khan, Postgraduate Resident Cardiology, Lady Reading Hospital, Peshawar.
Contact No: 03439195480
Email: sulimanmohmand6@gmail.com

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There continues to be debate on the appropriateness of implanting stents as a primary treatment for small coronary disease or just in cases when results are deemed inadequate. Coronary stents allow for a more aggressive balloon dilation method, which has significantly improved balloon angioplasty procedural results in the stent era. Today, a promising approach to enhance the primary angioplasty long-term result has been proposed: balloon angioplasty best results in stent implantation [5].

According to the results of two significant randomized studies balloon angioplasty for large coronary arteries new pathological alterations are best treated with elective stent implantation (.3 mm) [6, 7]. In modern practice, a third of lesions are found in coronary arteries just 3mm in diameter, a disease with a dismal prediction after balloon angioplasty [8, 9]. Many investigations suggested that in narrow arteries coronary stenting compared to balloon angioplasty,

provide higher clinical outcomes and lower rates of restenosis [10.11]. There needs to be evidence comparing the effectiveness of coronary stenting and balloon angioplasty as therapy for narrow artery disease. This side-by-side investigation was done to determine the effectiveness of balloon angioplasty and coronary stenting in treating narrow coronary arteries.

METHODS

This comparative study was carried out at the department of cardiology, Lady Reading Hospital Peshawar. The study duration was one year from June 2022 to June 2023. Participants were randomly allocated to get stent placement or traditional balloon angioplasty. Participants were randomly assigned to get stent placement or standard balloon angioplasty. The ethics and research committee accepted the study protocol. An informed consent was taken in written from all the individuals. During a year, the rates of clinical findings were analyzed. Patients with de novo small coronary arteries lesions who had ischemic heart symptoms (myocardial ischemia, angina pectoris, or both) were included. The treatment was carried out using a femoral approach and an artery with a 6F to 8F size introduction. Before the treatment, Each patient got an 80 U/kg heparin bolus, which was increased per usual practice. The bulk of the patients received aspirin 160mg to 325 mg on daily basis. In some circumstances, 500 mg of aspirin was treated with intravenous before to the treatment. Those assigned to have stents implanted received daily aspirin 100 mg dosages. The small, designed for vessels with a 2.5 to 3.0 mm diameter, was employed. Utilizing a noncompliant 2.75 mm balloon measuring 20 mm in length, each lesion was evaluated prior to stenting. The selection of the balloon size was made with the objective of attaining a balloon-to-artery ratio that closely approximates unity. PTCA procedures included the use of analogous balloons. The optimal angiographic outcome, as per visual criteria, was seen as a remaining stenosis measuring 30% of the luminal diameter.

The data analysis was carried out by using SPSS version 25. Continuous data were described using the mean value and SD, and two-tailed t-tests were employed to examine group differences. Chi-square test was used t compare categorical data. One-year clinical event rates were calculated using Kaplan-Meier curves. A p-value of <0.05 was observed as significant.

RESULTS

Total 100 patients focused in this study. male patients were 59(59%) and female patients were 41 (41%) out of total patients. Each group got 50 patients with comparable baseline demographics and angiography findings. Major adverse cardiac events and the success rate of angiography were similar, according to treatment analysis: 5.4% and 95.6% in the case of coronary stenting and 5.6% and 93.5% in the case of balloon angioplasty.

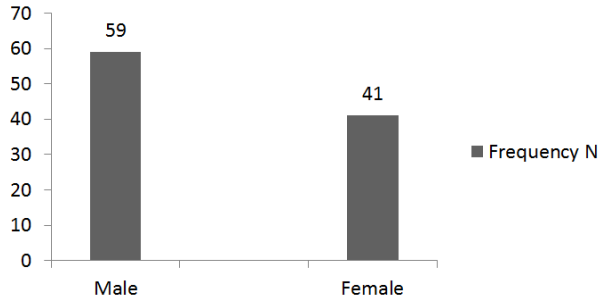

Figure No. 1: The Distribution of male and female

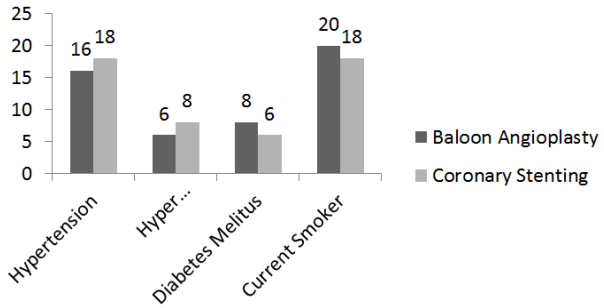

Figure No. 2: Comparing risk variables between two groups

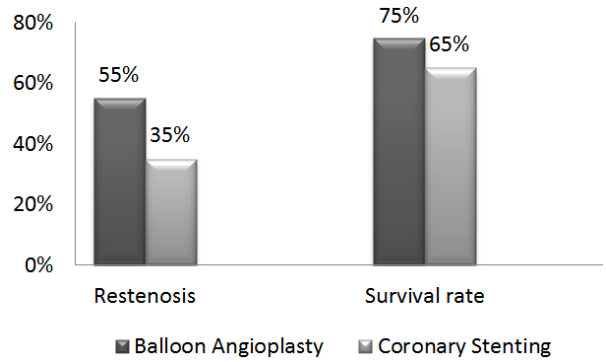

Figure No.3: Incidence of restenosis in both groups

Table No. 1: Characteristics & Demographic Details

Parameters	Balloon angioplasty (n=50)	Coronary stenting (n=50)
Age, years	56.38±6.8	55.43±5.7
Gender Male Female	 32 18	 27 23
Unstable angina	11 (22%)	10 (20%)
Previous myocardial infarction	7 (14%)	9 (18%)
Disease vessel 1 2 3	 27 (54%) 14 (28%) 9 (18%)	 26 (53%) 13 (26%) 11 (22%)

Table No. 2: Patient Angiographic Characteristics

Parameters	Balloon Angioplasty (n=50)	Coronary Stenting (n=50)
Artery Dilated		
LAD	28(56%)	22 (44%)
RCA	15 (30%)	15 (30%)
LCX	7 (14%)	13 (26%)
Types of lesions		
A	20 (40%)	17 (34%)
B	30 (60%)	33 (66%)
Minimum diameter (mm)	2·53±0·16	2·49±0·31
The balloon-to-artery ratio	1·16±0·09	1·26±0·32
Maximum airflow for a balloon in an atm	11·6±1.9 (11–15)	12·4±3·3 (11–15)
Rapid gain (mm)	1·53±0·39	1·94±0·31
Restenosis on Angiograms	15/50 (30%)	18/50 (36%)

During 30 days, 3.8% of patients suffered sudden closure changes. In comparison to balloon angioplasty, stenting produced a significantly bigger lumen 1.52mm vs. 1.32mm, p<0.002. after six months and a higher post-procedural lumen diameter 2.31mm vs. 1.82mm, p<0.002. With coronary stenting and balloon angioplasty, the incidence of restenosis was reported to be 35% and 55%, respectively. The survival rate (event-free) during coronary stenting and angioplasty was 75% and 65%, respectively p<0.034. Table-I displays clinical features and demographic information. The distribution of gender is seen in Figure 1. Figure 2 compares several risk variables for stenting small coronary arteries in both groups. Table II displays the patient's angiographic features. Figure 3 indicates the occurrence of restenosis in both groups.

DISCUSSION

The present study examined the effectiveness of coronary stenting in comparison with balloon angioplasty primarily in narrow coronary arteries and discovered that effective balloon angioplasty with primary stenting might provide a treatment alternative for lesions affecting narrow coronary arteries. Restenosis occurred in 35% and 55% of patients with coronary stenting and balloon angioplasty, respectively. Ideal balloon angioplasty was equivalent to primary stent implantation in treating minor coronary artery lesions. Our findings suggest that primary balloon angioplasty with partial stent placement is a more successful technique for treating minor artery disorders than primary stenting and that balloon angioplasty may be a viable immediate treatment for these lesions. To enhance clinical results, primary angioplasty techniques, including coronary stenting, are gaining popularity. Stents have contributed significantly to interventional cardiology, although several issues, such as high cost and in-stent restenosis, still limit their usage. Prior research has shown that coronary stent implantation is substantially less likely than balloon angioplasty to cause clinical and angiographic restenosis [12, 13].

The latest developments in balloon angioplasty have increased effectiveness by using aggressive balloon dilation strategies to acquire the most lumen. Clinical results and angiographic restenosis did not substantially vary between Optimal Coronary Balloon Angioplasty and Stent (OCBAS) [14]. As our observations are similar to those from the OCBAS study, the approach may also be used to treat lesions in smaller coronary arteries.

In the past, there have been contradicting accounts of this situation. According to ACCC, small artery stenting did not significantly improve long-term results in comparison to balloon angioplasty [15]. F. Levent et al. [16] investigated 2602 patients and found that capillary or coronary size was a minor independent predictor of restenosis.

Further studies have shown that stenting was ineffective in small arteries [17, 18]. Savage et al. found in another trial that restenosis rates after balloon angioplasty and stenting were 34% and 55%, respectively [19]. Another research revealed that inserting small vascular (3mm) stents during balloon angioplasty had a 30% restenosis rate [20].

Jeger et al. [21] with the NIR stent showed comparable results (35.7% against 30.9%). Different patient selection and procedural factors may contribute to different results. Earlier research found that the prevalence of complex lesions was 75%, complete occlusions were 7%, lengthier stents (20.8 (±10.9) mm were used, and there were many lesions (34.3%); both of these factors were linked to a poorer outcome after stenting [22, 23].

Our study showed that coronary stenting is a reliable and safe treatment, and these results were consistent with other studies, despite the lesion's acute or subacute thrombosis and greater risk [24]. The stent group had a much lower probability of experiencing serious adverse cardiac events throughout the course of the six-month follow-up period (13.6% vs. 27.1%), this compares well to all previously non-randomized or randomized data [25]. The balloon angioplasty adverse event rate is comparable with other studies conducted in a similar setting [26].

CONCLUSION

Our study concludes that optimal balloon angioplasty with preemptive stenting may be a suitable treatment for lesions in narrow coronary arteries. In coronary stenting and balloon angioplasty, the restenosis rates were reported to be 35% and 55%, respectively. It is possible and safe to implant stents in narrow coronary

arteries, and they are exceptionally effective in reducing the requirement for further revascularization of the target lesion as well as restenosis.

Author's Contribution:

Concept & Design of Study:	Tariq Nawaz
Drafting:	Muhammad Amin, Suliman Khan
Data Analysis:	Syed Muhammad Nayab Ali
Revisiting Critically:	Tariq Nawaz, Muhammad Amin
Final Approval of version:	Tariq Nawaz

Conflict of Interest: The study has no conflict of interest to declare by any author.

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