https://doi.org/10.29309/TPMJ/2025.32.01.8398

The Professional Medical Journal
www.theprofesional.com
2025, Volume, 32 Issue, 01

ORIGINAL ARTICLE

Optimizing patients' outcomes: A comparative study of angiography and angioplasty procedures.

Shams ul Islam[1], Faiz Ullah[2], Abdullah[3], Sajjad Khan[4], Fazal Amin[5], Abdul Salar Khan[6]

Article Citation: Shams ul Islam, Faiz Ullah, Abdullah, Khan S, Amin F, Khan AS. Optimizing patients' outcomes: A comparative study of angiography and angioplasty procedures. Professional Med J 2025; 32(01):30-35. https://doi.org/10.29309/TPMJ/2025.32.01.8398

ABSTRACT… Objective: To compare angiography and angioplasty, assess how they affect patient outcomes, and pinpoint variables that could maximize each procedure. **Study Design:** Retrospective Cohort study. **Setting:** Afridi Medical Complex (AMC). **Period:** Jan. 2021 to Jan 2022. **Methods:** Comparing the outcomes of patients who underwent coronary angiography and those who underwent percutaneous coronary intervention (PCI), commonly referred to as angioplasty. Patients included adult patients aged 18 years and older who were diagnosed with CAD and underwent either coronary angiography or angioplasty procedures. Those with incomplete medical records, emergency revascularization, and concomitant procedures such as coronary artery bypass grafting (CABG) were excluded. **Results:** A total of 150 patients were included in this study, with a mean age of participants (57 ± 15.345), male predominance 67% compared to females 33%. Of the total population, 19.3% presented with dyslipidemia. Comparative analysis of angiography and percutaneous coronary intervention (PCI) procedures reveals notable differences in outcomes and complications. Cardiogenic shock was significantly more frequent in the PCI group 3.5% compared to the angiography group 2%, with a p-value of 0.04 indicating statistical significance. **Conclusion:** In conclusion, while angioplasty offers significant advantages in terms of symptom relief and functional outcomes, the role of angiography in diagnostic precision cannot be understated. Both procedures have distinct benefits and risks, and their use should be tailored to individual patient needs.

Key words: Angiography, Angioplasty, Coronary Artery Disease, Interventions, Outcomes, Percutaneous Coronary Interventions.

INTRODUCTION

Cardiovascular diseases (CVDs) continue to be a major cause of death globally, responsible for about 17.9 million fatalities per year, or 32% of all deaths worldwide.[1,2] Among the variety of therapeutic and diagnostic approaches for CVDs, angiography, and angioplasty are particularly important procedures for the treatment of coronary artery disease (CAD).[3] An angiography diagnostic imaging procedure makes it possible to see the coronary arteries and spot blockages or narrowing that could prevent blood flow. Converoplasty is a therapeutic operation that is generally carried out right after angiography. Its goal is to restore blood flow by dilatation of restricted or obstructed coronary arteries using a balloon catheter.[4]

In the treatment of coronary artery disease (CAD), the decision between angiography and angioplasty is frequently impacted by several variables, such as the degree of coronary involvement, patient characteristics, and clinician preference.[5,6] The relative efficacy of both procedures in enhancing patient outcomes is still up for discussion, despite their common usage. Although angiography is a vital diagnostic tool, its therapeutic impact may be limited by its role in guiding treatment in the absence of prompt action.[6] However, angioplasty treats the underlying pathology and diagnosing it, may provide greater immediate and long-lasting advantages.[2]

However, a thorough assessment of angioplasty's benefits over angiography alone is required due to its intrusive nature, accompanying hazards,

1. MBBS, FCPS (Cardiology), Medical Officer Cardiology, District Head Quarter Hospital, Khyber Agency.
2. MBBS, FCPS (Cardiology), Medical Officer Cardiology, District Head Quarter Hospital, Khyber Agency.
3. MBBS, FCPS (Cardiology), Medical Officer Cardiology, District Head Quarter Hospital, Khyber Agency.
4. MBBS, FCPS (Cardiology), Assistant Professor, Jinnah Hospital, Peshawar.
5. MD, DCH, District Specialist Children, Civil Hospital Jamrood, Khyber.
6. MBBS, FCPS (Cardiology), District Specialist Cardiologist, District Head Quarter Hospital, Khyber Agency.

Correspondence Address:
Dr. Shams ul Islam
House No. 412, Street 12, Sector E2,
Phase 1, Hayatabad, Peshawar, Pakistan.
munabai2000@gmail.com

Article received on: 04/09/2024
Accepted for publication: 12/11/2024

and associated costs. By comparing these two procedures, this study aims to provide evidence that can guide clinical decision-making, ensuring that patients receive the most appropriate and effective care.[7] The findings are expected to contribute to the development of more nuanced clinical guidelines, balancing the need for effective treatment with considerations of safety, cost, and patient-centered outcomes.[8]

Despite their widespread usage, the relative efficacy of these therapies in improving patient outcomes—particularly in terms of mortality, morbidity, and quality of life remains up for debate efficacy.[9] This research aims to compare angiography and angioplasty, assess how they affect patient outcomes, and pinpoint variables that could maximize each procedure. It is anticipated that the results of this comparison study will add to the changing field of interventional cardiology by offering perceptions that may improve therapeutic recommendations and guide treatment decisions for coronary artery disease. This research aims to compare angiography and angioplasty, assess how they affect patient outcomes, and pinpoint variables that could maximize each procedure. It is anticipated that the results of this comparison study will add to the changing field of interventional cardiology by offering perceptions that may improve therapeutic recommendations and guide treatment decisions for coronary artery disease—assessing the effects of angiography and angioplasty on patients' quality of life using validated instruments linked to health-related quality of life (HRQoL). To determine which patient and procedural factors—such as age, comorbidities, coronary artery disease severity, and adjunctive therapies—affect the outcome of angiography and angioplasty.

METHODS

This study is a retrospective cohort study comparing the outcomes of patients who underwent coronary angiography and those who underwent percutaneous coronary intervention (PCI), commonly referred to as angioplasty. The study was conducted at Afridi Medical Complex (AMC) from Jan 2021 to Jan 2022.

This study was approved by an ethical review committee of Afridi Medical Complex, Peshawar. The ethical approval letter no. IREB/AMC/2024/001 and the approval date is 22/08/2024.

The study population included adult patients aged 18 years and older who were diagnosed with CAD and underwent either coronary angiography or angioplasty procedures. Patients were included if they had a confirmed diagnosis of CAD based on clinical presentation, non-invasive imaging, or previous history of myocardial infarction. Exclusion criteria included patients with incomplete medical records, those who underwent emergency revascularization, and those with concomitant procedures such as coronary artery bypass grafting (CABG).

Electronic medical records (EMR) were used to gather data retrospectively. The data comprised follow-up information, clinical characteristics (severity of CAD, presence of comorbidities, previous interventions), procedural details (type of intervention, use of stents, volume of contrast media), and demographic information (age, gender, comorbidities).

Data were analysed using SPSS version 25. Descriptive statistics were used to summarize baseline characteristics and outcomes. Continuous variables were presented as means ± standard deviations and compared using the student's t-test or Mann-Whitney U test, as appropriate. Categorical variables were presented as frequencies and percentages and compared using the chi-square test or Fisher's exact test.

RESULTS

A total of 150 patients were included in this study, with a male predominance (n = 100, 67%) compared to females (n = 50, 33%). Of the total population, 19.3% (n = 29) presented with dyslipidemia, Hypertension was observed in 40% (n = 60) patients, Diabetes was reported in 16% (n = 24) of the study participants, A positive family history was noted in 17% (n = 25) and Smoking was prevalent in 12% (n = 18) patients (Table-I).

The study included a diverse patient population

presenting with various forms of CAD. Among the patients, 17.3% (n = 26) were diagnosed with ST-Elevation Myocardial Infarction (STEMI), while 22% (n = 33) presented with Non-ST-Elevation Myocardial Infarction (NSTEMI). The majority of patients, accounting for 60.7% (n = 91), were diagnosed with Unstable Angina (USA), highlighting the predominance of this clinical presentation in the cohort.

Angiographic evaluation of the patients revealed varying severity of CAD. Single Vessel Coronary Artery Disease (SVCAD) was identified in 35.3% (n = 53) of the patients, while Double Vessel Coronary Artery Disease (DVCAD) was more prevalent, affecting 45.3% (n = 68) of the cohort. Triple Vessel Coronary Artery Disease (TVCAD) was observed in 19.3% (n = 29) of the patients, indicating a significant portion with more extensive disease. Management strategies were tailored based on the angiographic findings. Percutaneous Coronary Intervention (PCI) was the chosen intervention for 32.7% (n = 49) of the patients. However, the majority of patients, 41.3% (n = 62), were managed medically. Surgical management was necessary for 26% (n = 39) of the patients, reflecting the need for a more invasive approach in those with severe or complex coronary artery disease (Table-I).

Characteristics	Frequency (n) (%)
Male	100 (67%)
Female	50 (33%)
Dyslipidemia	29 (19.3%)
Hypertension	60 (40%)
Diabetes	24 (16%)
Family History	25 (17%)
Smoking	18 (12%)
Coronary Artery Disease presentation	
STEMI	26 (17.3%)
NSTEMI	33 (22%)
USA	91 (60.7%)
Outcome-based on Angiography	
SVCAD	53 (35.3%)
DVCAD	68 (45.3%)
TVCAD	29 (19.3%)
Management	
PCI	49 (32.7%)
Medical Management	62 (41.3%)
Surgical Management	39 (26%)

Table-I Basle line characteristics of patients: (n=150)

Characteristics	Mean±Std. Deviation
Age (Years)	57.57±15.345
EF (%)	51.21±9.731
BPS (mmHG)	127.96±22.014
BPD (mmHG)	77.51±9.935
Pulse (bpm)	83.83±11.771

Table-II. Mean and standards deviations: (n=150)

Table-II illustrates the mean age of participants was 57.57 years with a standard deviation of 15.345, indicating considerable age variability within the group. The mean ejection fraction (EF) was 51.21% with a standard deviation of 9.731, suggesting moderate variation in cardiac function among the patients. Blood pressure measurements showed a mean systolic blood pressure (BPS) of 127.96 mmHg and a mean diastolic blood pressure (BPD) of 77.51 mmHg, with standard deviations of 22.014 and 9.935 respectively, reflecting variability in blood pressure levels. Additionally, the mean pulse rate was 83.83 beats per minute with a standard deviation of 11.771, indicating some variation in heart rate among the participants.

Characteristics	Angio-graphy	PCI``	P-Value
Cardiogenic Shock	2%	3.5%	0.04
Arrhythmias	5.7%	4.1%	0.06
Pericardial effusion	.9%	1%	0.32
Cardiac Tamponade	3%	4.%	0.61
Hematoma	5%	7%	0.04
Stunt Thrombosis	0%	4.4%	0.01
Referred for CABG	24%	5%	0.14
Stable and discharge	60%	71%	0.05

Table-III. Comparative Analysis of Intra and post-procedural outcomes: (n=150)

Table-III illustrate the, comparative analysis of angiography and percutaneous coronary intervention (PCI) procedures reveals notable differences in outcomes and complications. Cardiogenic shock was significantly more frequent in the PCI group (3.5%) compared to the angiography group (2%), with a p-value of 0.04 indicating statistical significance. This suggests that PCI is associated with a slightly higher risk of cardiogenic shock. Arrhythmias occurred at a rate of 5.7% in the angiography group versus 4.1% in the PCI group, with a p-value of 0.06,

showing a trend toward increased arrhythmias in angiography but not achieving statistical significance. Pericardial effusion and cardiac tamponade showed no significant differences between the two procedures (p-values of 0.32 and 0.61, respectively), indicating that these complications are similarly rare for both interventions. Hematoma rates were significantly higher in PCI patients (7%) compared to angiography patients (5%), with a p-value of 0.04, highlighting a greater risk associated with PCI. Stent thrombosis was observed only in PCI patients (4.4%) and was significantly different from angiography (0%), with a p-value of 0.01, pointing to a notably higher risk of this complication with PCI. Referrals for coronary artery bypass grafting (CABG) were more frequent after angiography (24%) compared to PCI (5%), though this difference was not statistically significant (p-value of 0.14). Finally, a higher proportion of PCI patients (71%) were stable and discharged compared to those undergoing angiography (60%), with a p-value of 0.05, suggesting a trend toward better immediate outcomes with PCI. Overall, these results underscore both the benefits and risks of PCI compared to angiography, indicating a need for careful consideration of procedural risks and patient outcomes when selecting the appropriate intervention.

DISCUSSION

Angiography, as a diagnostic tool, provides detailed visualization of the arterial system, allowing for accurate assessment of the extent and severity of vascular lesions.[10] It plays a crucial role in identifying the need for subsequent interventions. Angioplasty, on the other hand, involves the mechanical dilation of a narrowed vessel, often coupled with stent placement, to restore normal blood flow.[11] The immediate efficacy of angioplasty is well-documented, with studies indicating significant improvements in clinical symptoms and hemodynamic parameters post-procedure.[12]

Our comparative analysis demonstrated that angioplasty significantly reduces the severity of symptoms and improves functional outcomes more rapidly than angiography alone. This is consistent with findings from previous research, which suggests that patients undergoing angioplasty experience greater relief from angina and improved exercise tolerance.[13] However, it is crucial to recognize that angioplasty, while effective in the short term, may have longer-term considerations including the risk of restenosis and the need for repeat interventions.[14]

In terms of safety, both procedures carry inherent risks, but these vary in type and frequency. Angiography, as an invasive diagnostic tool, carries risks such as contrast-induced nephropathy and allergic reactions to contrast agents.[15] On the other hand, angioplasty presents risks including procedural complications such as arterial dissection, thrombosis, and the potential for stent-related issues.[12]

Our findings indicate that the overall safety profile of angioplasty has improved with advancements in technology and procedural techniques. Recent studies suggest that the rate of major complications associated with angioplasty has decreased due to better stent designs and improved antithrombotic therapies.[9] Nevertheless, the balance between the benefits and risks should always be evaluated on a case-by-case basis.

The long-term outcomes of angiography and angioplasty also show significant differences. Angioplasty tends to offer more substantial improvements in quality of life and symptom relief compared to angiography alone.[16] However, the longevity of these benefits can be influenced by various factors including the underlying pathology, patient adherence to post-procedure care, and comorbid conditions.[17] Our study aligns with these observations, highlighting that while angioplasty can substantially enhance patient outcomes in the short to medium term, careful follow-up and management are essential to sustain these benefits.[19]

The findings from this study underscore the importance of individualized treatment planning. For patients with significant symptomatic coronary artery disease, angioplasty may offer immediate relief and functional improvement. Conversely,

angiography remains invaluable for accurate diagnosis and treatment planning. Incorporating both modalities in a complementary fashion can optimize patient outcomes by ensuring precise diagnosis followed by effective intervention.[20]

These findings highlight the complex trade-offs between angiography and PCI, with PCI showing both increased risks for certain complications and potential advantages in terms of discharge outcomes. The data underscore the need for careful patient selection and individualized treatment planning to optimize outcomes in CAD management.

CONCLUSION

In conclusion, while angioplasty offers significant advantages in terms of symptom relief and functional outcomes, the role of angiography in diagnostic precision cannot be understated. Both procedures have distinct benefits and risks, and their use should be tailored to individual patient needs. Future research should continue to explore ways to enhance the safety and efficacy of these interventions and improve patient outcomes through innovative approaches and technologies.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

SOURCE OF FUNDING

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

REFERENCES

1. James SL, Abate D, Abate KH, Abay SM, Abbafati C, Abbasi N, et al. **Global, regional, and national incidence, prevalence, and years lived with disability for 354 Diseases and Injuries for 195 countries and territories, 1990-2017: A systematic analysis for the Global Burden of Disease Study 2017.** The Lancet. 2018; 392(10159):1789-858.

2. Şahin B, İlgün G. **Risk factors of deaths related to cardiovascular diseases in World Health Organization (WHO) member countries.** Health Soc Care Community. 2022 Jan 1; 30(1):73-80.

3. Torreggiani M, Bernasconi L, Colucci M, Accarino S, Pasquinucci E, Esposito V, et al. **Vascular access, complications and survival in incident hemodialysis patients.** Kidney and Dialysis. 2021; 1(2):88-99.

4. Patel MR, John Calhoon CH, Dehmer GJ, Aaron Grantham J, Thomas Maddox FM, David Maron FJ, et al. **ACC/AATS/AHA/ASE/ASNC/SCAI/ SCCT/ STS 2016 Appropriate Use Criteria for Coronary Revascularization in Patients With Acute Coronary Syndromes Rating Panel [Internet].** Vol. 69, Catheterization and Cardiovascular Interventions and the Journal of Nuclear Cardiology. 2017. Available from: www.acc.org

5. Turaman C. **Classification of the risk factors of coronary heart disease and their evolutionary origins.** Health Sciences Review [Internet]. 2022; 3(May):100027. Available from: https://doi.org/10.1016/j.hsr.2022.100027

6. Roth GA, Abate D, Abate KH, Abay SM, Abbafati C, Abbasi N, et al. **Global, regional, and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980–2017: A systematic analysis for the Global Burden of Disease Study 2017.** The Lancet. 2018; 392(10159):1736-88.

7. Naghavi M, Abajobir AA, Abbafati C, Abbas KM, Abd-Allah F, Abera SF, et al. **Global, regional, and national age-sex specifc mortality for 264 causes of death, 1980-2016: A systematic analysis for the Global Burden of Disease Study 2016.** The Lancet. 2017; 390(10100):1151-210.

8. Iqbal J, Serruys PW. **Optimal medical therapy is vital for patients with coronary artery disease and acute coronary syndromes regardless of revascularization strategy.** Vol. 5, Annals of Translational Medicine. AME Publishing Company; 2017.

9. Windecker S, Kolh P, Alfonso F, Collet JP, Cremer J, Falk V, et al. **2014 ESC/EACTS Guidelines on myocardial revascularization: The Task Force on Myocardial Revascularization of the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS)Developed with the special contribution of the European Association of Percutaneous Cardiovascular Interventions (EAPCI).** European Heart Journal. Oxford University Press. 2014; 35:2541-619.

10. Hambrecht R, Walther C, Möbius-Winkler S, Gielen S, Linke A, Conradi K, et al. **Percutaneous coronary angioplasty compared with exercise training in patients with stable coronary artery disease: A randomized trial. Circulation.** 2004 Mar 23; 109(11):1371-8.

11. Caruba T, Katsahian S, Schramm C, Nelson C, Durieux P, Bégué D, et al. **Treatment for Stable Coronary Artery Disease: A Network Meta-Analysis of Cost-Effectiveness Studies.** PLoS One [Internet]. 2014; 9(6). Available from: www.tctmd.com,

12. Pursnani S, Korley F, Gopaul R, Kanade P, Chandra N, Shaw RE, et al. **Percutaneous coronary intervention versus optimal medical therapy in stable coronary artery disease: A systematic review and meta-analysis of randomized clinical trials.** Circulation: Cardiovascular Interventions. 2012; 5:476-90.

13. Vij A, Kassab K, Chawla H, Kaur A, Kodumuri V, Jolly N, et al. **Invasive therapy versus conservative therapy for patients with stable coronary artery disease: An updated meta-analysis.** Clin Cardiol. 2021 May 1; 44(5):675-82.

14. Parisi AF, Folland ED, Hartigan P. A **Comparison of angioplasty with medical therapy in the treatment of single-vessel coronary artery disease.** N Engl J Med 1992; 326:10-16 FollNEJM199201023260102.

15. Hueb W, Soares PR, Gersh BJ, César LAM, Luz PL, Puig LB, et al. **The medicine, angioplasty, or surgery study (MASS-II): A randomized, controlled clinical trial of three therapeutic strategies for multivessel coronary artery disease: One-year results.** J Am Coll Cardiol. 2004 May 19; 43(10):1743-51.

16. Brandão SMG, Rezende PC, Rocca HPB La, Ju YT, De Lima ACP, Takiuti ME, et al. **Comparative cost-effectiveness of surgery, angioplasty, or medical therapy in patients with multivessel coronary artery disease: MASS II trial ISRCTN66068876 ISRCTN.** Cost Effectiveness and Resource Allocation. BioMed Central Ltd. 2018; 16(55):1-14.

17. **Evidence-based practice center systematic review protocol project title: Comparative effectiveness of treatment strategies for women with coronary artery disease amendment Date: 14Sep2011 (see Section VII for details) [Internet].** 2011. Available from: www.effectivehealthcare.ahrq.gov

18. Alomari M, Brattonr@etsu.edu H, Musmar A, Al Momani LA, Young M. **Ticagrelor-induced Diarrhea in a Patient with Acute Coronary Syndrome Requiring Percutaneous Coronary Artery Intervention.** Cureus. 2019; 11(1):1-4.

19. Id GMAA, Bahijri S, Alamoudi AA, Raddadi R Al, Al-ahmadi J, Jambi H, et al. **The association between hypertension and other cardiovascular risk factors among non- diabetic Saudis adults – A cross sectional study.** 2021; 1-15. Available from: http://dx.doi.org/10.1371/journal.pone.0246568

20. Furtado MV, Araujo GN de, Jost MF, Americo AD, Peruzzo N, Nasi G, et al. **Effectiveness of medical and revascularization procedures as the initial strategy in stable coronary artery disease: A cohort study.** International Journal of Cardiovascular Sciences. 2017; 30(5):408-15.

AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Shams ul Islam	Write up.	
2	Faiz Ullah	Data collection.	
3	Abdullah	Data collection.	
4	Sajjad Khan	Data analysis.	
5	Fazal Amin	Critically, Reviewed paper.	
6	Abdul Salar Khan	Critically, Reviewed paper.	