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Frequency of Stent Thrombosis in Patients with Acute Coronary Syndrome

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ABSTRACT

Background: Stent thrombosis is very common in individuals following percutaneous coronary intervention. **Objective:** The aim of this study was to find out the Frequency of stent thrombosis in patients with acute coronary syndrome. **Material and method:** The current cross-sectional study was carried out at the Department of Cardiology in Hayatabad Medical Complex, Peshawar from 1st February 2025 to 1st June 2025 after taking approval from the research committee of the hospital. The WHO sample size calculator was used to determine the sample size. 120 patients constitute the study's estimated sample size. Consecutive Non-Probability Sampling method was used. Individuals of both gender and different age groups (ranged 18-80) years diagnosed with acute coronary syndrome who underwent PCI with stent placement at Hayatabad Medical Complex were included. A structured questionnaire and a review of the patients' medical records were used to collect the data. Version 20.0 of the SPSS program was used to analyze the data. The mean as well as the standard deviation (SD) was used to summarize continuous variables, such as age, vascular size, and the total number of stents implanted. Important independent factors including age, gender, and stent features (such as stent type and bifurcation lesions) was applied to stratify stent thrombosis. Following stratification, correlations between categorical variables (such as the incidence of stent thrombosis & risk factors including diabetes and hypertension) was evaluated using the chi-square test. The p value < 0.5 was statically significant. **Results:** A total of 120 patients diagnosed with acute coronary syndrome who underwent PCI with stent placement were enrolled. The mean age of the study participants was 45.76±9.11 years. Stent thrombosis was seen 12 (10%) individuals. The death rate among sub-acute thrombosis participants within thirty days of the first PCI was found to be 1 (8.3%). Within thirty days following the procedure, the rate of re-admission was three (25%), the rate of re-infarction was five (41.6%), and the rate of re-intervention was 25%. Diabetes mellitus is linked to increased incidence of sub-acute stent thrombosis among the individual variables (p=0.04). Among the lesion-related characteristics, patients with sub-acute stent thrombosis had substantially higher rates of smaller vessels and bifurcation lesions (p-values of 0.002 and 0.05, respectively). The under sizing of the stent (p<0.0001) & edge dissection (p=0.012) were the stent-related risk factors for sub-acute stent thrombosis. **Conclusion:** Our study concluded that stent thrombosis in patients undergoing revascularization PCI for acute coronary syndrome was higher.

INTRODUCTION

Serious and even fatal outcomes may result from the occurrence of stent thrombosis in acute coronary syndrome (ACS) patients following percutaneous coronary intervention (PCI) one major therapeutic concern is still stent thrombosis. Despite advancements in stent technology & anti-thrombotic drugs, due to its association with elevated rates of disease and mortality.[1] One of the main causes of death in Pakistan is cardiovascular disease, and there has been some worry about the occurrence of stent thrombosis in ACS patients. According to recent research, Pakistani patients may have a higher risk of stent thrombosis than the worldwide norm, which calls for a thorough investigation to determine the causes and consequences of this illness.[2] Giving an in-depth overview of the incidence of stent thrombosis in ACS patients in Pakistan is important . This entails reviewing current information, determining risk factors, and comprehending the clinical results of impacted individuals.[3] The prevalence and risk factors associated with stent thrombosis in ACS patients in Pakistan have been examined in a number of recent research. In 551 patients receiving PCI for ACS, a retrospective research conducted at a tertiary cardiac care

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center in Lahore revealed a 5.2-hour incidence of stent thrombosis. Significant correlations were observed with diabetes mellitus, smaller artery size, and bifurcation abnormalities.[1] A study conducted at NIVD Karachi highlighted the substantial risk in hemodynamically unstable patients by finding a considerable prevalence of acute stent thrombosis in those with STEMI following PCI.[2] According to a research conducted at TABB, 6587 individuals underwent PC| ZZ (0 thrombosis). This study discovered that individuals with stent thrombosis frequently had diabetes, hypertension, and dyslipidemia.[3] According to research on sub acute stent thrombosis, individuals with ACS having PCI had a 4.9o/o incidence rate; important risk variables were male gender, diabetes, and hypertension. A study conducted at a Karachi tertiary care hospital found that PPCI had a high success rate and minimal stent thrombosis incidence. Indicating that negative outcomes are greatly decreased by effective revascularization.[5] The prevalence of stent thrombosis in individuals with ACS having PCI in Pakistan is greatly influenced by a number of risk variables, including as diabetes, hypertension, & procedural difficulties.[4]To reduce these hazards and enhance patient outcomes, further research and therapeutic attention are needed. A multimodal strategy including patient education, stent technology optimization, & adherence to evidence-based antithrombotic medications is needed to address these issues. The present study was conducted to find out the frequency of stent thrombosis in patients with ACS in Pakistan.

MATERIAL AND METHOD

The current cross-sectional study was carried out at the Department of Cardiology in Hayatabad Medical Complex, Peshawar from 1st February 2025 to 1st June 2025 after taking approval from the research committee of the hospital. The WHO sample size calculator was used to determine the sample size, which had a 4% margin of error and a 95% confidence level. Based on earlier research at a tertiary cardiac care center in Lahore indicated that patients receiving PCI for ACS had an incidence of stent thrombosis of 5.2%, which was the predicted frequency of stent thrombosis. I In accordance with these criteria, 120 patients constitute the study's estimated sample size. Consecutive Non-Probability Sampling method was used. Individuals of both gender and different age groups (ranged 18-80) years diagnosed with acute coronary syndrome who underwent PCI with stent placement at Hayatabad Medical Complex were included while individuals with a history of previous stent thrombosis, completed thrombolytic therapy within the past 24 hours, individuals with bleeding disorder and were not welling to participate were excluded. Prior to their enrolment in the trial, all indoor participants were requested to provide written informed permission in order to uphold ethical standards and protect individual anonymity. A structured questionnaire and a review of the patients' medical records were used to collect the data. Clinical history, procedure details, and demographic data were gathered using the questionnaire. Age, gender, comorbidities (including diabetes and hypertension), ACS type, PCI operation specifics (such the kind of stent utilized, artery size, and presence of bifurcation Iesion), and stent thrombosis incidence were among the factors. Furthermore, information about results and any issues were documented. Version 20.0 of the SPSS program was used to analyze the data. Data were summarized using descriptive statistics: in-hospital complications (e.g., recurrent angina, myocardial infarction, stroke, major bleeding), stent type, presence of bifurcation lesions, kind of stent thrombosis (acute, subacute, or late), gender, history of diabetes, hypertension, smoking, hyperlipidemia, and type of ACS (unstable angina, NSTEMI, and STEMI) were presented as frequencies and percentages. The mean as well as the standard deviation (SD) was used to summarize continuous variables, such as age, vascular size, and the total number of stents implanted. Important independent factors including age, gender, and stent features (such as stent type and bifurcation lesions) was applied to stratify stent thrombosis. Following stratification, correlations between categorical variables (such as the incidence of stent thrombosis & risk factors including diabetes and hypertension) was evaluated using the chi-square test. The p value < 0.5 was statically significant.

RESULTS

A total of 120 patients diagnosed with acute coronary syndrome who underwent PCI with stent placement were enrolled in this study out of which 72(60%) were male 48(40) were females. The mean age of the study participants was 45.76±9.11 years. Six (50%) of the research participants had LAD stented arteries, four (33.3%) had RCA stented arteries, and two (16.6%) had LCX stented arteries as shown in **table 1**. Stent thrombosis was seen 12 (10%) individuals. Out of which definite stent thrombosis was detected in 2 patients (16.6%) while the remaining 10(83.3%) had probable stent thrombosis. Of the entire sample of study participants, 10% (12) had sub-acute stent thrombosis. The death rate among sub-acute thrombosis participants within thirty days of the first PCI was found to be 1 (8.3%). Within thirty days following the procedure, the rate of re-admission was three (25%), the rate of re-infarction was five (41.6%), and the rate of re-intervention was three (25%) as presented in **table 2.** The post-chi-square test analysis findings demonstrating the correlation between risk variables for sub-acute stent thrombosis are shown in **Table 3**. Diabetes mellitus is linked to increased incidence of sub-acute stent thrombosis among the individual variables (p=0.04). Among the lesion-related characteristics, patients with sub-acute stent thrombosis had substantially higher rates of smaller vessels and bifurcation lesions (p-values of 0.002 and 0.05, respectively). The under-sizing of the stent (p<0.0001) & edge dissection (p=0.012) were the stent-related risk factors for sub-acute stent thrombosis.

Table 1

The demographic and angiographic features of the individuals with Stent thrombosis n=120

Features	n (%), Mean±SD
Sex	
Male	10(83%)
Female	2(17%)
Age in years	60.15 ± 40

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Body mass index	24.07 ± 2.18
Culprit artery	
LAD	6(50%)
RCA	4(33.3%)
LCX	2(16.6%)

Table 2

Follow-up Outcomes for Participants with Subacute Stent ThrombosisN=12

Variables	Frequency/percentage
Subacute Stent Thrombosis (ST	12(100%)
Probable	10(83.3%)
Definite	2 (16.6%)
Readmission within 30 days	3(25%)
Death within 30 days	1(8.3%)
Repeated PCI	3(25%)
Recurrent MI	5(41.6%)

Table 3

Relationship between SAT and risk factors "

Features	SAT	Value of P
Diabetes mellitus	3(25%)	0.04
Hypertension	5(41%)	0.51
Smoking	2(16.6%)	0.49
Heart failure	zero	0.69
ACS	6(50%)	0.03
CKD	Zero	0.63
Poor or non-compliance to medication	2(16.6%)	0.004
Lesion Related		
Long lesion	10(83.3%)	0.50
Diffuse dissection	1(8.3%)	0.98
Small vessel	5(41.6%)	0.002
Bifurcation lesion	11(41.6%)	0.05
Thrombus	7(58.3%)	0.69
Stent Related		
Under sizing	2(16.6%)	<0.0001
Under expansion	zero	0.98
Edge dissection	2 (16.6%)	0.012

DISCUSSION

PCI with stent insertion has been the preferred therapeutic option for the majority of STEMI patients.[6] When compared to bare-metal stents (BMS), drug-eluting stents (DES) are known to be linked to better revascularization of the target lesion and decreased stent thrombosis in patients with acute coronary syndromes, including STMI, and stable coronary artery disease.[7] However, safety issues remain because of the increased risk of late especially very late stent thrombosis, particularly with drug-eluting stents 40–42 and when used off-label, as in the case of STEMI patients.[8]

A total of 120 patients diagnosed with acute coronary syndrome who underwent PCI with stent placement. Stent thrombosis was seen 12 (10%) individuals. Out of which definite stent thrombosis was detected in 2 patients (16.6%) while the remaining 10(83.3%) had probable stent thrombosis. Our study findings are similar to the research conducted by Tariq et al.[9 but] our results were not similar to the study conducted by Ali et al.in which the prevalence of stent thrombosis was 5.2 %), among which 5 % were subacute stent thrombosis.[10] Similar to previous studies, our ST incidence rates are shown to be somewhat higher. For instance, a HORIZONS AMI study indicated a 2.5% rate of early stent thrombosis (acute and subacute). [11] Lastly, 3.5% of the 5842 patients who had PCI experienced early ST, which is classified as definite stent thrombosis, according to the Dutch registry of stent thrombosis. [12] In contrast to the rates (0.1-1.4%) reported for medium-high risk non-STEMI patients and patients with coronary artery disease (CAD), the rate of early acute or subacute ST for STEMI patients reported in our studies or later ones was found to be significantly higher.[13] Higher rates of stent thrombosis in STEMI patients may be linked to the following vascular reactions against stents as well as underlying plaque composition, which is a cause of MI. The penetration of the stent strut into the underlying necrotic core may cause inflammation and fibrin deposition, which may limit the formation of neointima and expose the stent struts, especially with DES.[14]

Certain patient-,lesion and stent-related variables that predispose patients to sub-acute stent thrombosis were identified by our investigation. According to previous research, diabetes mellitus and acute coronary syndrome were the patient-related variables that predispose people to SAT.[15] According to other trails, the presence of a bifurcation lesion and the vessel's smaller size are the observed predisposing factors among the lesion-related characteristics.[16] Stent thrombosis is the most serious side effect that might occur following any successful PCI. Before choosing to proceed with PCI with stenting, it is important to thoroughly assess a patient's potential risk factors as well as their capacity to tolerate and adhere to dual platelet therapy. In order to optimize stent deployment and implantation, particularly in complicated conditions, and to naturally reduce the possible danger of ST, innovative stents are being created. This requires meticulous attention to technical elements. Any elective surgery should not be carried out following stent insertion unless dual antiplatelet treatment has been stopped (if at all feasible). Finally, for ACS patients with low bleeding risk, very effective anti-platelet medications like ticagrelor are recommended. Therefore, assessing each patient's unique risk of developing ST is essential for preventing or at least lowering the likelihood of a catastrophic complication of stent installation.

CONCLUSION

Our study concluded that stent thrombosis in patients undergoing revascularization PCI for acute coronary syndrome was higher (10%). For the intervention to be more successful, predisposing variables related to the patient, stent, and lesion must be taken into account.

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