ORIGINAL ARTICLE

Coronary Angiographic Findings in Survivors of Sudden Cardiac Arrest at Nicvd Karachi

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ABSTRACT

Background: The most recent guidelines advocate an immediate coronary angiography [1] for those who have survived a cardiac arrest and are still exhibiting electrocardiographic indications of ischemia. Recovered cardiac patients who don't show signs of ongoing ischemia may nonetheless need an emergency angiography, according to the same recommendations. Conventional ECG is ineffective in diagnosing if coronary culprit lesions are present during an angiography, according to earlier study [2]. As a result, some believe that all patients who are resuscitated after a cardiac arrest should undergo an urgent cardiac catheterization. [3].

Objective: To determine the frequency of coronary angiographic findings in survivors of sudden cardiac arrest.

Materials and methods: We included all patients who satisfied the study's criteria and visited the NICVD in Karachi for treatment. After a thorough explanation of the study's procedures, risks, and benefits, participants agreed to participate. The results of coronary angiography were recorded for each patient. The form at the end contained all of the information that had been acquired and was used electronically for research purposes.

Results: Mean ± SD of age was 51.4±10.6 years. In distribution of gender, 142 (67.6%) were male while 68 (32.4%) were female. left anterior descending (LAD) as noted in 104 (49.5%) patients, left circumflex artery (LCX) in 31 (14.8%), 52 (24.8%) had right coronary artery (RCA) while left main artery (LMA) was found in 23 (10.9%) patients.

Conclusion: It is to be concluded that left anterior descending noted as most common coronary angiographic finding followed by right coronary artery and left circumflex artery. Epidemiological and research data should be expanded by further studies to validate the current findings.

Keywords: Acute Coronary Syndrome, Angiographic Findings, CABG, Cardiac, Arrest, Survivors, Percutaneous Coronary Intervention

INTRODUCTION

Out-of-hospital cardiac arrest (OHCA) is a condition that has a high death rate despite advances in resuscitation and post-cardiac arrest care. There is a 50% chance of death even if the patient has a return of spontaneous circulation (ROSC) and is taken to critical care. The majority of out-of-hospital cardiac arrests are caused by ST-segment elevation on the ECG (ECG) following ROSC, and coronary angiography should be performed as soon as possible. It is widely accepted now that patients who have this ECG abnormality following ROSC should have this treatment performed. There is a high prevalence of acute coronary occlusions and considerable stenosis among the individuals included in these retrospective studies [3-5]. When it comes to detecting acute coronary lesions, the presence of ST-elevations on an ECG (electrocardiogram) is regarded to be an accurate strategy. As a result, an immediate coronary angiography may be advantageous to these patients [6]. But it appears that a post-ROSC ECG is less likely to forecast anything unpleasant in the wrong way. Acute coronary occlusion occurs in around 30 percent of patients, and severe coronary artery stenosis occurs in a high percentage of patients who do not have ST-elevation. As a result, the ECG cannot be used as a reliable tool for detecting coronary artery occlusion [7]. No one knows yet if persons who have cardiac arrest but do not have an elevated ST segment benefit from rapid coronary angiography and maybe percutaneous cardiac intervention in the event that these procedures are carried out on them. out (PCI). Until recently, the only studies that were given were those that went back into the past and provided a variety of outcomes. After being brought back from cardiac arrest without the presence of ST-segment elevation, patients were offered the option of receiving either immediate or delayed coronary angiography, which was found to have no effect on survival or cognitive function. Among those who got urgent coronary angiography in this trial, 33% went on to get PCI. Compared to the results of several retrospective investigations comparing early coronary angiography versus late coronary angiography, this is a much lower rate. Patients with a high risk of heart disease should have a coronary angiography, but there is little data to support this suggestion. This test is recommended for patients with a high risk of cardiovascular disease. [7-8] Some 55.7 percent of the survivors had abrupt cardiac arrests caused by the right coronary artery (RCA), left main artery (LMA), and left anterior descending artery (LAD), according to the findings of one study [9.]. Therefore, those who survive cardiac arrest outside of a hospital are a very heterogeneous group, and their clinical profiles as well as the demographic characteristics that contribute to their survival are distinct from those of people who are at risk for ischemic heart disease [10, 11].

Only one vessel was implicated (28.9 percent) in 13 of 45 cases, while two vessels were engaged in 17 of the cases (37.8 percent). Three vessels were involved in 12 cases (10.1 percent). [12]. Acute myocardial infarction (AMI) is more common in South Asians than in Western cultures, and they are more likely to have it earlier in life. On the other hand, the number of young people who have suffered an acute myocardial infarction has increased in recent years [13]. Sudden cardiac arrest can be caused by a number of different things. A serious but curable form of heart disease is coronary artery disease. A shift in its occurrence has been found recently, which may be due to differences in risk factors in different regions of the world. This study is taking place in Pakistan because there hasn't been a lot of published research in this field up to this point. In this study, all of the participants have survived a sudden cardiac arrest. Angiography will be made necessary as a means of investigation into these situations, in accordance with local recommendations and strategies that will be developed based on the facts and statistics that are now available. In addition, there is always room for improved results and a more compelling conclusion, particularly in light of the recent breakthroughs that have been made in the field of medical science. More research needs to be done in order to achieve this goal, which will result in an improvement in the present standard of care.

MATERIALS AND METHODS

At the National Institute of Cardiovascular Diseases (NICVD) in Karachi, a descriptive cross-sectional study was conducted. As of this writing, it's situated in Pakistan. The summary was approved by the College of Physicians and Surgeons of Pakistan's Research Department and then used to begin the study's data collection phase. Those who agreed to participate in this study did so after getting all the necessary information. Recording sociodemographic data, such as the age, gender and BMI of the patient as well as other information such a diabetes, high blood pressure and smoking a family history of coronary heart disease (CAD), was done using a predesigned proforma. Each patient voluntarily provided this data (attached). Finally, in each of these cases, a coronary angiography was conducted. By recording and verifying the angiography data, two cardiologists who had more than five years of experience after completing their fellowships confirmed the findings of the researcher. It was necessary to apply both inclusion and exclusion criteria, together with stratification, to control variables that could cause confusion. Only those with a legitimate need to know were given access to the patients' personal information, which was kept safe and secure.

The major tool for analyzing the data was SPSS version 23.0. Mean and standard deviation were computed for each variable ranging from a person's age to their BMI to the length of their cardiac arrest. Coronary artery disease (CAD) runs in the family, so it was taken into account, as well as the pattern of coronary angiographic findings (left anterior-descending (LAD), left circumflex-artery (LCX), right coronary artery (RCA), and left main arterial vein). Each of these parameters was analyzed in terms of frequency and percentages (LMA). stratification was used so that we could account for possible effect modifiers such as a patient's age and gender as well as BMI, hypertension, diabetes, smoking, a family history of heart disease (CAD), and the period of cardiac arrest. After dividing the subjects into groups, the appropriate Chi-square or Fisher's Exact test was used.. The two-sided p-value must be less than 0.05 to be declared significant.

RESULTS

In this study 210 patients were included to assess the coronary angiographic findings in survivors of sudden cardiac arrest and the results were analyzed as: Mean ± SD of age was 51.4±10.6 with C.I (49.95 and 52.84) years. Mean ± SD of body mass index was 26.8±5.6 with C.I (26.03 and 27.56) kg/m^2.Mean ± SD of duration of cardiac arrest was 14.6±2.3 with C.I (14.28 and 14.91) hours. In distribution of gender, 142 (67.6%) were male while 68 (32.4%) were female. Diabetes mellitus was documented in 64 (30.5%) patients.

Table 1: Stratification For Age Group With Patterns of Angiographic Findings n=210

Age group [in years]	Patterns of angiographic findings				P-value
	Lad	Lcx	Rca	Lma	
30 – 50	65 (31.0%)	20 (9.5%)	12 (5.7%)	7 (3.3%)	0.0001
>50	39 (18.6%)	11 (5.2%)	40 (19.0%)	16 (7.6%)	

Applied Chi-Square test

Table 2: Stratification For Gender With Patterns Of Angiographic Findings n=210

Gender	Patterns of angiographic findings				P-value
	Lad	Lcx	Rca	Lma	
Male	66 (31.4%)	23 (11.0%)	35 (16.7%)	18 (8.6%)	0.453
Female	38 (18.1%)	8 (3.8%)	17 (8.1%)	5 (2.4%)	

Applied Chi-Square test

Out of 210 patients, 90 (42.9%) were smoker while 120 (57.1%) were non-smoker. Hypertension was found to be in 118 (56.2%) patients. Positive family history of CAD was found to be in 34 (16.2%) while negative history of CAD was documented in 176 (83.8%). In distribution of patterns of angiographic findings LAD was noted in 104 (49.5%) patients, LCX in 31 (14.8%), 52 (24.8%) had RCA while LMA was found to be in 23 (10.9%) patients. Stratification of age group, gender, body mass index, diabetic mellitus, smoking status, family history, hypertension, and duration of cardiac arrest was done with respect to patterns of angiographic findings in order to assess significant difference.

Table 3: Stratification For Body Mass Index With Patterns Of Angiographic Findings n=210

Bmi [in kg/m^2]	Patterns of angiographic findings				P-value
	Lad	Lcx	Rca	Lma	
16 – 24	29 (13.8%)	7 (3.3%)	36 (17.1%)	4 (1.9%)	0.0001
24	75 (35.7%)	24 (11.4%)	16 (7.6%)	19 (9.0%)	

Applied Chi-Square test

Table 4: Stratification For Diabetes Mellitus With Patterns Of Angiographic Findings n=210

Diabetes mellitus	Patterns of angiographic findings				P-value
	Lad	Lcx	Rca	Lma	
Diabetic	25 (11.9%)	6 (2.9%)	20 (9.5%)	13 (6.2%)	0.005
Non-diabetic	79 (37.6%)	25 (11.9%)	32 (15.2%)	10 (4.8%)	

Applied Chi-Square test

Table 5: Stratification For Smoking Status With Patterns Of Angiographic Findings n=210

Smoking status	Patterns of angiographic findings				P-value
	Lad	Lcx	Rca	Lma	
Smoker	51 (24.3%)	12 (5.7%)	13 (6.2%)	14 (6.7%)	0.009
Non-smoker	53 (25.2%)	19 (9.0%)	39 (18.6%)	9 (4.3%)	

Applied Chi-Square test

Table 6: Stratification For Family History Of Cad With Patterns Of Angiographic Findings n=210

Family history	Patterns of angiographic findings				P-value
	Lad	Lcx	Rca	Lma	
Positive	11 (5.2%)	3 (1.4%)	14 (6.7%)	6 (2.9%)	0.024
Negative	93 (44.3%)	28 (13.3%)	38 (18.1%)	17 (8.1%)	

Applied Chi-Square test

Table 7: Stratification For Hypertension With Patterns Of Angiographic Findings n=210

Hypertension	Patterns of angiographic findings				P-value
	Lad	Lcx	Rca	Lma	
Hypertensive	45 (21.4%)	22 (10.5%)	30 (14.3%)	21 (10.0%)	0.0001
Non-hypertensive	59 (28.1%)	9 (4.3%)	22 (10.5%)	2 (1.0%)	

Applied Chi-Square test

Table 8: Stratification For Duration Of Cardiac Arrest With Patterns Of Angiographic Findings n=210

Duration [in hours]	Patterns of angiographic findings				P-value
	Lad	Lcx	Rca	Lma	
1 – 12	41 (19.5%)	17 (8.1%)	34 (16.2%)	6 (2.9%)	0.003
>12	63 (30.0%)	14 (6.7%)	18 (8.6%)	17 (8.1%)	

Applied Chi-Square test

DISCUSSION

This primary cause of death, acute coronary syndrome (ACS), continues to be a major problem in today's society. In order to keep the heart beating and prevent it from stopping again, post-resuscitation care is critical, including coronary angiography and

percutaneous coronary intervention (PCI). Outside of a hospital, the failure of several organs accounts for 68% of deaths following a cardiac arrest. There is a noticeable pause in the flow of blood for three days [14].

For survivors of SCA, echocardiograms and coronary angiographies are performed on a regular basis. A patient's cause of cardiac arrest may remain unknown after a physical exam, EKG, echocardiogram, and coronary angiography in up to 50% of instances. Arrhythmias like as VF and VT are found in the majority of individuals (5–7). Myocardial scarring is required in cases of malignant ventricular arrhythmias. In the United States, cardiac arrest is the most common health problem. Between 5 and 7 percent of the population has survived for decades, yet improvement has been made. Take Heart America campaign and cardiopulmonary resuscitation have been demonstrated to improve the survival chances of patients [15].

OHCA is a common medical condition, yet it has a high risk of death. Injured people rarely make it to the hospital, and those who do live are extremely rare. If a patient survives to the hospital, their total survival percentage for OHCA ranges from 24% to 33%. It doesn't matter if emergency services are well-organized or the public is well-informed. A lack of consensus among medical professionals continues to exist about the diagnosis and treatment of OHCA patients who survive the initial round of CPR (CPR). All of these causes have the ability to stop the heart's beating. There was a substantial difference between the health and age of those who survived ischemic heart disease and those who survived cardiac arrest outside of a hospital.

Because patients are usually unconscious, interpreting clinical and electrocardiographic data can be difficult (CPR).Transient repolarization anomalies caused by electrolyte abnormalities8 or other causes might cause ST-segment deviation. Angioplasties for recent coronary blockages have been found to be safe therapy, with 6-month survival rates exceeding 50% compared to historical controls. Our findings jibe with prior research. Age 51.410.16 in our study. Wester et al. found 65.911.4. Another search found 5612. KB 61.311.8 was discovered by Kern et al A BMI of 26.85.6 kg/m2 was recently discovered. Nielsen et al found 29.7 kg/m2 BMI. The study involved 142 men and 68 women (32.4 percent). Males made up 78.3%, say Wester et al. Neilan TG et al reported 90 guys (66%) Kern KB et al [17] studied 150 guys (78.1 percent).

Diabetes was identified in 64 (30.5%) of the people. 216 persons had diabetes, according to Wester et al (15.3 percent). Neilan et al discovered diabetes in 28 (20%) people. 118 (56.2%) of the people had hypertension. They found 582 hypertensives (41.2 percent). Neilan TG et al reported 31 (23%) cases of hypertension. Our study found 34 (16.2%) with CAD family history and 176 without (83.8 percent). 223 instances (15.8%) had ancestry [9]. TG Neilan et (20 percent). 104 (49.5%) patients had LAD, 31 (14.8%) had LCX, 52 (24.8%) had RCA, and 23 (10.9%) had LMA. The Wester A, et al study identified LAD in 719 (50.9%), LCX 328 (23.2%), RCA 458 (32.4%) and LM 57 (4 percent). Angiographic results showed LAD 80 (52%) LCX 20 (13%), RCA 50 (32.5%) and LM 04 (4%). (4 percent). (2.6%) SCA is deadly, accounting for nearly half of all coronary heart disease deaths. Initiation rhythm, underlying cause, patient characteristics, and time to CPR/defibrillation [18].

The time to ROSC is essential. International norms and algorithms ensure rapid ROSC. Recent studies have addressed and focused on post-resuscitation care. Prompt coronary angiography followed by PCI has been shown to improve prognosis in some individuals. A significant relationship was found between age (P=0.0001), BMI (P=0.0001), diabetes (P=0.005), smoking status (P=0.009), family history of CAD (P=0.024), hypertension (P=0.0001), and cardiac arrest duration (P=0.003). [19]

Sequential sampling was a good fit for our study design and sample selection criteria. Using objective predictor and outcome variable definitions reduces study bias. Our study used a weak cross-sectional design that does not require prior sample size computation. Our study's limited outcomes reduce its value. Our study may have contained predictor and outcome variables that were connected. However, we had a small sample size and a short follow up period. Due to the hospital setting, the figures do not reflect true disease prevalence or severity. Applicability was also constrained by the study's single hospital unit.

CONCLUSION
It is to be concluded that left anterior descending noted as most common coronary angiographic finding followed by right coronary artery and left circumflex artery. Epidemiological and research data should be expanded by further studies to validate the current findings.

REFERENCES
1. Murray CJ, Lopez AD. Measuring the global burden of disease. N Engl J Med. 2013;369 (5):448-57.
2. Islam SM, PurnatTD, Phuong NT, Mwingira U, Schacht K, Fröschl G. Non-Communicable Diseases (NCDs) in developing countries. a symposium report. Global Health. 2014;10 (1):81.
3. Joshi P, Islam S, Pais P, Reddy S, Dorairaj P, Kazmi K, et al. Risk factors for early myocardial infarction in South Asians compared with individuals in other countries. J Am Med Assoc. 2007;297(3):286-94.
4. Akhtar B, Ali N, Kashif R. Pattern of angiographic findings in young patients presenting with acute ST segment elevation myocardial infarction. Pak Heart J. 2015;48(3):125-9.
5. Gupta R, Joshi P, Mohan V, Reddy KS, Yusuf S. Epidemiology and causation of coronary heart disease and stroke in India. Heart. 2008;94(1):16-26.
6. Benjamin EJ, Blaha MJ, Chiuve SE, Cushman M, Das SR, Deo R, et al. Heart disease and stroke statistics-2017 update: a report from the American Heart Association. Circulation. 2017;135(10):e146-603.
7. Ahmed E, El-Menyar A, Al Suwaidi J, AlBinali HA, Singh R, Gehani AA. Gender differences in the cardiovascular risk factors in first acute myocardial infarction in a Middle Eastern country over a 20-year period. Circulation. 2014;130(suppl 2):A17011.
8. Yusuf S, Hawken S, Ounpuu S, Dans T, Avezum A, Lanas F, et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study); case-control study. Lancet. 2004;364(9438):937-52.
9. Wester A, Mohammad MA, Andell P, Rylance R, Dankiewicz J, Friberg H, et al. Coronary angiographic findings and outcomes in patients with sudden cardiac arrest without STelevation myocardial infarction: a SWEDEHEART study. Resuscitation. 2018;126:172-8.
10. Wijesekera VA, Mullany DV, Tjahjadi CA, Walters DL. Routine angiography in survivors of out of hospital cardiac arrest with return of spontaneous circulation: a single site registry. BMC Cardiovasc Disord.2014;14:30.
11. Camuglia AC, Randhawa VK, Lavi S, Walters DL. Cardiac catheterization is associated with superior outcomes for survivors of out of hospital cardiac arrest: review and metaanalysis. Resuscitation. 2014;85(11):1533-40.
12. Kitamura T, Iwami T, Kawamura T, Nitta M, Nagao K, Nonogi H, et al. Nationwide improvements in survival from out-of-hospital cardiac arrest in Japan. Circulation. 2012; 126(24):2834-43
13. Ahmed M, Rubaiyat KA, Saleh MA, Chowdhury AW, Khuda CK, Ferdous KA, et al. Clinical characteristics and angiographic profile of acute coronary syndrome patients in a tertiary hospital of Bangladesh. Bangladesh Heart J. 2018;33(1):10-5.
14. Sasson C, Rogers MAM, Dahl J, Kellerman AL. Predictors of survival from out-of-hospital cardiac arrest: a systemic review and meta-analysis. CircCardiovascQual Outcomes 2010;3:63–81.
15. Lick CJ, Aufderheide TP, Niskanen RA, Steinkamp JE, Davis SP, NygaardSD, et al. Take Heart America: a comprehensive, communitywide systems-based approach to the treatment of cardiac arrest. Crit Care Med 2011;39(1):26–33.
16. Wannamethee G, Shaper AG, Macfarlane PW, Walker M. Risk factors for sudden cardiac death in middle-aged British men. Circulation 1995;91(6):1749-56.
17. Cobb LA, Weaver WD, Fahrenbruch CE, Hallstrom AP, Copass MK. Community-based interventions for sudden cardiac death. Impact, limitations, and changes. Circulation 1992;85(1 Suppl):I98-102.
18. Survivors of out-of-hospital cardiac arrest with apparently normal heart. Need for definition and standardized clinical evaluation. Consensus Statement of the Joint Steering Committees of the Unexplained Cardiac Arrest Registry of Europe and of the Idiopathic Ventricular Fibrillation Registry of the United States. Circulation 1997;95:26572.
19. Chatterjee KA, Harris AL, Davies GE, Leatham AU. Electrocardiographic changes subsequent to artificial ventricular depolarization. Br Heart J. 1969;31(6):770.