RESEARCH PAPER

Diagnostic Accuracy of Admission Electrocardiography for Localization of the Culprit Coronary Artery in Patients with Unstable Angina and Non-ST Elevation Myocardial Infarction: A Prospective Observational Study

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Abstract: Acute coronary syndrome (ACS), and most pronounced unstable angina (UA) and non-ST elevation myocardial infarction (NSTEMI) need to be established as early and accurately as possible so that a timely treatment can be offered and patients results can be enhanced. Electrocardiography (ECG) is a flexible, fast and easily obtainable diagnostic test, which can help in determining where the culprit vessel is located before subjecting the patient to invasive examination. The objective of this prospective observational study was to measure the diagnostic accuracy of admission ECG to localize the culprit coronary artery in UA and NSTEMI patients, based on the cohort, and where the gold standard data is provided by the coronary angiography. Introductory 140 patients with UA or like NSTEMI were recruited. ECG finding results of admission were compared and contrasted with the results of coronary angiography. Left anterior descending artery (LAD) was found to be the most frequent culprit artery followed by right coronary artery (RCA), left circumflex artery (LCX) and left main coronary artery (LMCA). The most common ECG abnormality was that of ST-segment depression. Admission ECG showed that the overall diagnostic accuracy was 75.7 and sensitivity and specificity of 78.4 and 82.1, respectively. LMCA and LAD lesions were found to have the best localization accuracy. The conclusion is that the ECG within admission has a good diagnostic value to predict the presence of culprit coronary artery involvement in patients with UA and NSTEMI. Despite its status as the ultimate diagnostic modality, ECG can be an effective first-line test to detect a case of risk early and to triage the patient clinically.

Keywords: Unstable Angina; NSTEMI; Electrocardiography; Coronary Angiography; Culprit Coronary Artery

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I. INTRODUCTION

Acute coronary syndrome (ACS) is invariably one of the major causes of morbidity and mortality throughout the world, and it constitutes a significant burden to health care systems. Unstable angina (UA) and non-ST elevation myocardial infarction (NSTEMI) forms a significant percentage of ACS presentation and are linked with high recurrence risks, heart failure, and even death in case of untimely diagnosis and intervention [1]. The timely detection of the affected coronary artery that causes myocardial ischemia will play a vital role in making efficient therapeutic choices, risk assessment, and developing optimal revascularization strategies. The main diagnostic tool that is highly recommended in the initial examination of patients with suspected ACS is electrocardiography (ECG) obtained due to its rapidity, non-invasiveness, relative cost-free nature, and universal availability. ST-segment depression, T-wave inversion, and transient ST-segment elevation

are typical ECG abnormalities in patients with UA and NSTEMI, and are likely to indicate the site and magnitude of myocardial ischemia [2]. These electrical alterations can help present significant information about the affected coronary artery, hence helping clinicians determine the culprit lesion prior to conducting invasive tests.

Coronary angiography is referred to as the gold standard of the culprit coronary artery and measuring the degree of coronary artery disease. Nevertheless, angiography might not be readily accessible within all healthcare institutions, especially the ones with resource limitations. Consequently, identification of the diagnostic accuracy of culprit vessel localization uses of admission ECG is of great clinical importance [3]. Accurate localization using ECG methods may help in decision-making early, better patient assessment, and using the most effective treatment measures during the delay period before the definitive angiographic evaluation. Although there are new developments in cardiac imaging and interventional cardiology, predictive value of admission ECG in the localization of the culprit artery in UA and NSTEMI is under investigation. Thus, the proposed observational study will be conducted to analyze the diagnostic quality of admissionary electrocardiography to locate the culprit coronary artery in unstable angina and NSTEMI patients based on the results of the ECG and coronary angiography.

II. RELATED WORKS

The diagnosis and management of unstable angina (UA) and non-ST elevation myocardial infarction (NSTEMI) continue to be major areas of research in cardiovascular medicine. Proper identification of the culprit coronary artery is required to timely act and ensure risk stratification and better patient outcomes. A number of recent studies have examined how electrocardiography (ECG), coronary angiography, advanced imaging modalities, and artificial intelligence can be used to evaluate the patient with non-ST elevation acute coronary syndromes (NSTE-ACS). Han et al. [15] explored the effect of the time of angiography on clinical outcomes in patients with NSTEMI using a big Chinese registry. Their results confirmed the hypothesis that expeditious invasive assessment was connected with a better patient outcome, and the timely diagnosis of myocardial lesions and prompt revascularisation is crucial. On the same note, Ji-Xiang and colleagues [17] compared the intervention timing and the prognosis in patients with NSTEMI upon the use of the GRACE risk scores. The researchers based their conclusions on the fact that early intervention turned out to be especially helpful in patients at a high risk, and immediate diagnostic evaluation is necessary. Angiographies and their importance in the planning of treatment are a widely studied topic. A study by Jobs et al. [18] on the revascularization approaches in patients with multivessel disease who have suffered myocardial infarction exhibited that full revascularization of the patient could be used to enhance the clinical outcome in the long run. Corroborating these results, a systematic review and network meta-analysis of Jonik et al. [19] showed the effectiveness and safety of revascularization in NSTEMI patients with multivessel disease through the approaches. Similarly, Muste et al. [24] also reported that a complete revascularization in an NSTE-ACS patient was linked to positive prognostic results and less cardiovascular activities.

A number of studies have tried to explore alternative diagnostic modalities in the assessment of coronary artery disease. Lu et al. [20] showed the applicability of the coronary computed tomography angiography (CCTA) and a pericoronary adipose tissue radiomics to distinguish NSTEMI and unstable angina. Matsuda et al. [23] also found that coronary CT angiographic findings were likely to predict undiagnosed myocardial infarction in non-culprit regions further showing the rising role of complex imaging in the evaluation of coronary arteries. In ECG interpretation, artificial intelligence has also gained recent research into the field of technology. The study by Luo et al. [21] has created an ECG prediction model based on artificial intelligence predictors of ECG in case of emergency patients with chest pain and provided promising results of this type of diagnostic in raising the issue of acute coronary syndrome. Their results indicate AI-based methods of analyzing ECGs can lead to better diagnostic quality of standard electrocardiographic assessment and clinical decision-making. In acute cardiac care, although the imaging and computational methods have advanced, the most common and available way to be used in diagnosing is the standard ECG. Malik et al. [22] researched the trends of coronary artery disease in NSTE-ACS patients with a normal ECG and discovered that the pattern of left circumflex artery was very high. Their analysis indicated the weaknesses of ECG in identifying some of the coronary lesions, especially LCX disease which may manifest itself with little or no abnormal electrocardiographic pattern.

There have also been other studies that were done on prognostic factors as well as clinical outcomes of acute coronary syndrome. The study by Janusz et al. [16] revealed predictors of contrast induced nephropathy after the invasive treatment of ACS and indicated its relationship to poor short and long-term outcomes. A five years follow-up study by Nguyen et al. [26] showed that ACS patients experienced high mortality rates with the need to detect these infections and treat them adequately. Also, Nedim and colleagues [25]

studied nutrition related inflammatory indices and established how much these indices can be a prognosis of angiographic severity and survival of ACS patients. Altogether, existing literature proves the significance of coronary angiography, high-quality imaging, and developing technologies of artificial intelligence in UA and NSTEMI management. Nevertheless, since ECG is the initial diagnostic tool that is provided in most health facilities, more studies should be conducted on the potential of the method to localize the offending coronary artery. Thus, the current research will determine the diagnostic value of admission ECG in locating the culprit vessel through comparison of ECG with the coronary angiographic findings in patients presenting with the unstable angina and NSTEMI.

III. METHODS AND MATERIALS

Study Design and Setting

This future observational trial was carried out to estimate the diagnosis accuracy of admission ECG in localizing the culprit coronary artery in patients presenting with unstable angina (UA), and non-ST elevation myocardial infarction (NSTEMI). The research was conducted in the Department of Cardiology, of a tertiary care teaching hospital, over twelve months. Patients were enrolled consecutively with the Friday of informed consent after admission into a given setting and testing eligible with diagnosis of either UA or NSTEMI. The research was conducted in accordance with the ethics of the Declaration of Helsinki and the permission of the Institutional Ethics Committee was given before adopting it [4].

Study Population

The patient population was composed of adult patients who declined to the emergency department or any of the coronary care units presenting with symptoms suggestive of acute coronary syndrome, and were later diagnosed with UA or NSTEMI. Diagnosis was made on the basis of clinical manifestation, electrocardiographic, cardiac biomarker determination as per the modern cardiology principles.

Inclusion Criteria

The patients, who addressed the following criteria, were considered to be included in the study:

- Age 18 years or over.
- Unstable angina or NSTEMI.
- Access to a conventional 12-lead ECG that was taken during admission prior to coronary intervention.
- Having coronary angiography as an inpatient.
- Written informed consent.

Exclusion Criteria

The patients were not eligible when they had:

- ST-elevated myocardial infarction (STEMI).
- Past coronary artery bypass graft surgery.
- Permanent pacemaker rhythm.
- Left bundle branch block or other significant conduction abnormalities that affect the interpretation of the ECG of the patient.
- Considerable heart valve disease.
- Congenital heart disease.
- Missing clinical, ECG or angiographic data.

Sample Size

The sample size was obtained by utilizing a formula to entail diagnostic accuracy studies that included anticipated sensitivity of admission ECG to localize culprit vessels, level of 95 as well as acceptable margin of error. The sample size used was a mean of 120-150 patients based on previous literature and the fact that significant statistical analysis would be achieved [5].

Data Collection Procedure

Clinical assessment of all the eligible patients was done at the time of admission. A structured case record form was used to capture demographic data and cardiovascular risk factors, the presenting symptoms, medical history, laboratory, and treatment.

A routine 12-lead ECG was taken at any point before reperfusion therapy or invasive intervention was administered on admission. Two experienced cardiologists who received no information about the results of coronary angiography independently interpreted the ECGs. A consensus review was used in settling any disagreement [6].

Afterwards, coronary angiography was done on all the patients as a routine clinical management procedure. Interventional cardiologists analyzed their angiography with the addition of blindness in relation to the localization outcomes. The angiographed culprit coronary artery was taken as a reference standard to compare.

Electrocardiographic Assessment

Admission ECG assessment was assessed of ischemic abnormalities such as:

- ST-segment depression.
- T-wave inversion.
- Transient ST-segment elevation.
- ST-segment changes of lead groups.
- Change to dynamic ischemia in case of availability.

A known ECG criteria was used to localize the suspected culprit artery. The changes in anterior leads were deemed as suggestive of left anterior descending artery (LAD) while changes in the inferior or lateral leads were assessed as right coronary artery (RCA) or left circumflex artery (LCX) disease [7]. AVR involvement-diffuse ischemia was thought to be indicative of left main coronary artery (LMCA) or multivessel disease.

Table 1. ECG Findings Used for Prediction of Culprit Coronary Artery

ECG Pattern	Suspected Culprit Artery
ST depression or T-wave inversion in V1–V4	Left Anterior Descending (LAD)
ST depression in inferior leads (II, III, aVF)	Right Coronary Artery (RCA)
ST depression/T-wave inversion in I, aVL, V5–V6	Left Circumflex (LCX)
Diffuse ST depression with ST elevation in aVR	Left Main Coronary Artery (LMCA) or multivessel disease
Extensive anterior and lateral ischemic changes	Proximal LAD lesion

Coronary Angiography

In standard techniques of accessing the femoral artery or radial access, coronary angiography was done. Multiple projections of images were used to have a sufficient view of the coronary circulation. Significant coronary artery disease was considered to be luminal stenosis of 70 per cent or above in major epicardial coronary arteries or 50 per cent or above stenosis in left main coronary artery [8].

The identified coronary artery culprit was due to angiographic features such as:

- Presence of significant stenosis.
- Thrombus formation.
- Plaque rupture.
- Reduced distal blood flow.
- Correlation with clinical and laboratory findings.

The culprit vessels were classified as:

- Left Anterior Descending artery (LAD).
- Left Circumflex artery (LCX).
- Right Coronary Artery (RCA).
- Left Main Coronary Artery (LMCA).

Outcome Measures

The quality of diagnostic accuracy of admission ECG to localize culprit coronary artery (versus coronary angiography) was the primary outcome measure.

Secondary outcome measures were:

- Sensitivity of ECG localization.
- Specificity of ECG localization.
- Positive predictive value (PPV).
- Negative predictive value (NPV).
- Agreement between ECG and angiographic findings.
- Association between specific ECG abnormalities and culprit vessel involvement.

Table 2. Diagnostic Accuracy Parameters Evaluated

Parameter	Formula
Sensitivity	True Positive / (True Positive + False Negative) × 100
Specificity	True Negative / (True Negative + False Positive) × 100
Positive Predictive Value (PPV)	True Positive / (True Positive + False Positive) × 100
Negative Predictive Value (NPV)	True Negative / (True Negative + False Negative) × 100
Diagnostic Accuracy	(True Positive + True Negative) / Total Cases × 100
Cohen's Kappa Coefficient	Measure of agreement between ECG and angiographic localization

Data Management

Data that was collected were put in a secure database and checked to ensure they were complete and accurate before analysis. Cleaning of data procedures were carried out to detect any missing data and inconsistencies and outliers. The confidentiality of the patients was assured by issuing each patient with a unique identification code and limiting the study records [9].

Statistical Analysis

Statistical package for Social Sciences (SPSS) version 26.0 or other statistical software was used to perform statistical analysis. Continuous variables were reported as mean SD (standard deviation) or median with interquartile range with the data distribution. Percentages and the frequencies of categorical variables were reported.

Chi-square test or Fisher exact test was used respectively to determine the relationship between ECG results and angiographic localization of culprit vessels. Sensitivity, specificity, PPV, NPV and the

overall diagnostic accuracy were computed and expressed with 95 percent interval [10]. The use of Cohen kappa coefficient was used to determine whether the ECG-based localization was in agreement with the angiographic results.

The p-value of less than 0.05 was regarded to be statistically significant. The end product was the concept of tabulating, graphing and summary statistics in order to be ready to interpret and compare with the past research.

Ethical Considerations

The study was started after receiving ethical approval of the Institutional Ethics Committee. The informed consent was written by all the participants following information detail on the study objectives, procedures, expected risks and benefits. Engagement was completed between their consent for this as participation was fully agreeable and patients had autonomy to cancel this study at any point without influencing their medical services. The process of research guaranteed a high level of confidentiality and anonymity of the information about patients.

IV. RESULTS AND ANALYSIS

This prospective observational study enlisted 140 patients who were diagnosed with unstable angina (UA) or non-ST elevation myocardial infarction (NSTEMI). Admission electrocardiography (ECG) was done to all the participants and coronary angiography was done immediately after. A reference standard used to determine the culprit coronary artery was the angiographic results [11]. The following results will be used to describe the demographic features, history of culprit vessels, ECG outcomes, diagnostic ECG performance of admission ECG and a correlation between ECG localization and angiographic diagnosis.

4.1 Demographic and Clinical Characteristics

The population sampled was mainly middle aged and the elderly. The mean age of the respondents was 58.6 years old in standard deviation of 10.8 where most patients were aged between 51 and 70 years. The proportion of male to female in the sample was higher than that of females. Among cardiovascular risk factors prevalent among the participants included hypertension, diabetes mellitus, smoking and dyslipidemia [12].

Table 1. Demographic and Clinical Characteristics of the Study Population (n = 140)

Variable	Frequency (n)	Percentage (%)
Age Group (Years)		
<40	12	8.6
41–50	28	20.0
51–60	46	32.9
61–70	38	27.1
>70	16	11.4
Gender		
Male	96	68.6
Female	44	31.4
Diagnosis		
Unstable Angina	54	38.6
NSTEMI	86	61.4
Risk Factors		
Hypertension	88	62.9
Diabetes Mellitus	64	45.7
Smoking	58	41.4
Dyslipidemia	72	51.4

The results show ACS without ST-segment elevation was more prevalent in the elderly and men. The standard prevalence of traditional cardiovascular risk factors justifies their determined part in the

pathophysiology of a coronary artery disease and acute ischemic events.

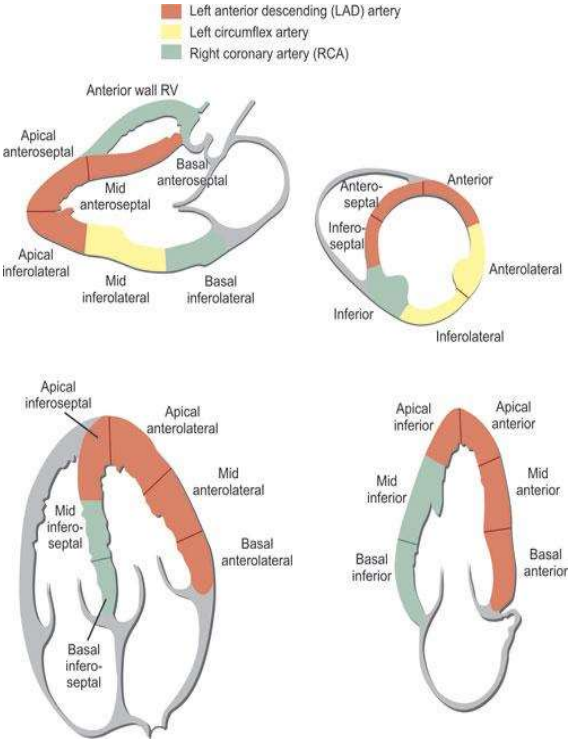

Figure 1: "Anatomical Distribution of Major Coronary Arteries and Their Myocardial Territories"

4.2 Distribution of Culprit Coronary Arteries

All enrolled patients who had their culprit vessel with the help of coronary angiography. The left anterior descending artery (LAD) and the right coronary artery (RCA) were the most commonly involved arteries with the left circumflex artery (LCX) and the left main coronary artery (LMCA) [13].

Table 2. Distribution of Culprit Coronary Arteries on Coronary Angiography

Culprit Coronary Artery	Number of Patients (n)	Percentage (%)
Left Anterior Descending (LAD)	58	41.4
Right Coronary Artery (RCA)	40	28.6
Left Circumflex (LCX)	30	21.4
Left Main Coronary Artery (LMCA)	12	8.6
Total	**140**	**100.0**

The fact that the LAD involvement is the most predominant is in line with other studies conducted in the past that indicate that the anterior myocardial territory that is served by the LAD is quite vulnerable to the ischemic damage. RCA and LCX lesions were also prevalent and LMCA disease was the smallest, but most clinically important subgroup because it is associated with the extensive myocardial jeopardy.

4.3 Admission ECG Findings

Different ECG abnormalities that are ischemic were observed on the study participants. The most frequent results were ST-segment depression and inverted T-wave, which are typical signs of subendocardial ischemia and are typically attributed to UA and NSTEMI.

Table 3. Admission Electrocardiographic Findings

ECG Finding	Number of Patients (n)	Percentage (%)
ST-Segment Depression	62	44.3
T-Wave Inversion	40	28.6
Combined ST Depression and T-Wave Inversion	24	17.1
Transient ST Elevation	8	5.7
Diffuse ST Depression with aVR Elevation	6	4.3
Total	**140**	**100.0**

The most common was the ST-segment depression followed by almost half of the patients. The second most frequent but finding was T-wave inversion. In patients with diffuse ST depression, which has ST elevation in the lead aVR, there was a tendency towards LMCA or severe multivessel coronary artery disease. The implications of these observations are that ECG as a primary diagnostic instrument can be useful in the diagnosis of ischemic patterns in relation to individual coronary territories [14].

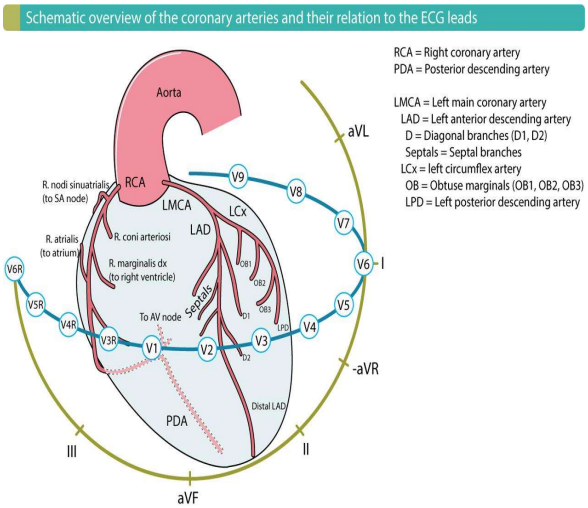

Figure 2: "Electrocardiographic Patterns Suggestive of Culprit Coronary Artery Involvement"

4.4 Correlation Between ECG Localization and Angiographic Findings

Localization of the culprit vessel via ECG was compared to the results of the coronary angiography. A large percentage of the ECG interpretations accurately forecasted the coronary artery involved.

Table 4. Comparison of ECG Localization with Coronary Angiography

Culprit Artery	Correctly Predicted by ECG (n)	Incorrectly Predicted (n)	Accuracy (%)
LAD	46	12	79.3
RCA	30	10	75.0
LCX	20	10	66.7
LMCA	10	2	83.3
Overall	**106**	**34**	**75.7**

The lesions of LMCA, LAD were the most localized with an accuracy of 83.3 and 79.3 respectively. The relative lack of accuracy of ECG in LCX lesions was expected based on the established limitations of conventional 12-lead ECG to identify ischemia of the posterior and lateral wall [27]. Its total accuracy of 75.7% implies that admission ECG can be useful in the provision of information about culprit vessel localization before angiography can verify the information.

It is possible that the high predictive value of LAD lesions is due to the typical ECG variants due to anterior wall ischemia that tend to be more easily recognizable as compared to ECG variants linked with LCX disease. Likewise, there are many cases of diffuse ischemic that are undergone with aVR elevation as signs that the LMCA has been involved and this is the reason that the diagnostic performance is found to be high in this subgroup.

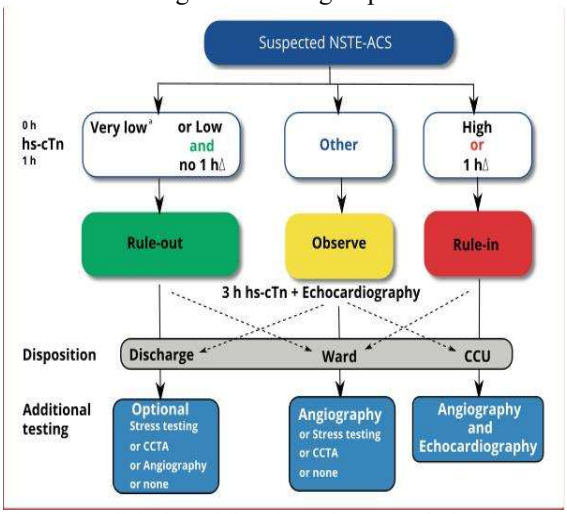

Figure 3: "Clinical Workflow for Culprit Vessel Identification in NSTEMI and Unstable Angina"

4.5 Diagnostic Performance of Admission ECG

Coronary angiography was used as the gold standard to compute the diagnostic indices of admission ECG. These parameters give a verdict on the capability of ECG to possibly identify culprit coronary arteries in patients with UA and NSTEMI.

Table 5. Diagnostic Performance of Admission ECG for Culprit Vessel Localization

Diagnostic Parameter	Value (%)
Sensitivity	78.4
Specificity	82.1
Positive Predictive Value (PPV)	79.7
Negative Predictive Value (NPV)	80.9
Overall Diagnostic Accuracy	75.7

Cohen's Kappa Coefficient	0.69
p-value	<0.001

The sensitivity of 78.4% indicates that the method of admission ECG was recognizing about four out of ten culprit vessels. The specificity of 82.1% indicates that it will be able to rule out false localization of the vessel. Both positive and negative predictive values were also high implying good diagnostic performance in various clinical settings [28].

The Cohen's kappa coefficients of 0.69 imply a significant consistency in the localization of the findings between ECG and the findings of coronary angiography. Also, statistically significant p-value (<0.001) allows concluding that the statistically reliable association between ECG interpretation and angiographic diagnosis was unlikely to have arisen due to random chance occurrences.

4.6 Analysis of ECG Performance Across Different Coronary Arteries

The diagnostic value of admission ECG had different values across coronary arteries. The variability of anterior lead changes caused by ischemia in the given vascular territory allowed LAD lesions to have a great level of concordance between the findings of ECG and the angiographic diagnosis. RCA lesions were also detected with reasonable accuracy especially in case of ischemic changes of inferior leads.

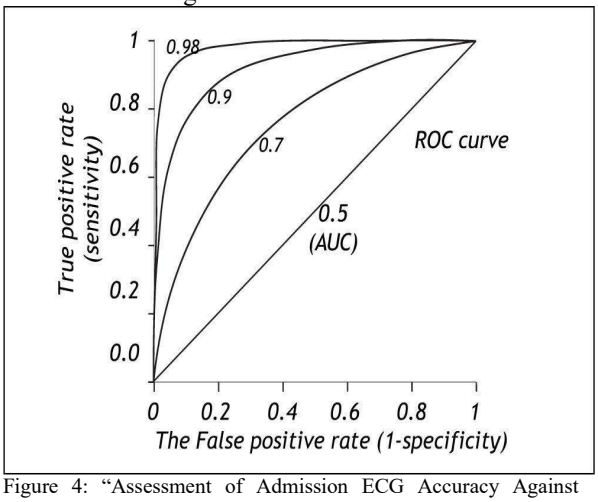

Figure 4: "Assessment of Admission ECG Accuracy Against Coronary Angiography Findings"

Conversely, LCX lesions were found to have relatively low localization accuracy. This observation can be attributed to the anatomical location of these lateral and posterior myocardial walls that are not well covered by the conventional 12 lead ECG. Accordingly, ischemic alterations in the case of LCX disease can be subtle or not but this decreases the sensitivity of ECG in identifying these lesions. LMCA lesions were most accurate to diagnose [29]. LMCA patients also often exhibited non-localized ST-segment depression with lead aVR ST elevation pattern, which is known to be an indicator of large scale myocardial ischemia and serious coronary artery disease. The presentation of this ECG was probably due to the nature of the presentation itself, which might have led to the high predictive value.

4.7 Clinical Implications of the Findings

The findings of the current research support the idea that the admission ECG continues to be of clinical significance to the process of patient assessment in cases of UA and NSTEMI. Though the currently definite way to determine the culprit coronary artery is through performing a coronary angiography, ECG offers quick and easily accessible information that can be utilized to complement the early risk stratification and treatment preparation.

Precise localization of the responsible vessel on ECG can guide clinicians to help with prioritizing patients to undergo urgent invasive assessment, especially in resource-limited practices with limited access to instant angiography. The early localization of LMCA or proximal LAD involvement is of particular importance since the lesions are related to larger ischemic areas and worse clinical outcomes [30]. The high concordance between the outcomes of ECG examinations and angiographic diagnosis, supports the effectiveness of ECG in use as a diagnostic adjunct. Although it cannot substitute the coronary angiography, ECG can be an efficient initial test to assess the probable perpetrator vessel and direct initial management actions.

4.8 Summary of Findings

In the study, admission ECG was found to have moderate to high diagnostic performance in the localisation of culprit coronary arteries in patients who presented with unstable angina and NSTEMI. Angiography showed LAD to be the most frequent culprit vessel and then RCA, LCX, and LMCA. The most commonly noted abnormalities in the ECG seen during presentation were ST-segment depression. The total diagnostic accuracy was 75.7 per cent, with the values of sensitivity and specificity of over 78 and 82 per cent, respectively. LMCA and LAD lesions showed the best performance whereas the LCX lesions were the most difficult to detect accurately using only ECG. The wide correspondence of ECG and angiographic results implies that admission ECG is a clinically useful and economical tool to undertake early evaluation of patients with non-ST elevation acute coronary syndromes.

V. CONCLUSION

The aim of this prospective observational study was to assess the diagnostic accuracy of at presentation with

unstable angina (UA) and non-ST elevation myocardial infarction (NSTEMI), admission electrocardiography (ECG) as versus coronary angiography to localize the culprit coronary artery. The results indicated that admission ECG has a significant potential to determine the culprit vessel causing myocardial ischemia, and can offer valuable diagnostic data at the early stage of assessment of patients with non-ST elevation acute coronary syndromes. The left anterior descending artery (LAD) was found to be the most common culprit artery followed by right coronary artery (RCA), left circumflex artery (LCX), and the left main coronary artery (LMCA). The localization of LMCA and LAD lesions was most accurately detected by ECG localization and localization of LCX lesions were relatively less detected because the latter lesions are poorly represented in the standard 12-lead ECG. In general, admission ECG proved a good sensitivity, specificity, and a diagnostic accuracy, and the agreement between the ECG and angiographic results is statistically significant.

The paper emphasizes the clinical relevance of the ECG as a quick and noninvasive, cheap, and ubiquitous method of diagnosis. Even though the coronary angiography is the standard method of unambiguous criminalization of the affected artery of the coronary, admission ECG can assist clinicians in the primary risk stratification, prioritization of invasive management, and prioritization of treatment of the culprit coronary artery especially where urgent angiography is not accessible. To sum up, admission ECG continues to be a useful initial test to predict culprit coronary artery involvement in patients with UA and NSTEMI. Its combination with clinical assessment and angiographic evaluation will be able to engage more effective and prompt management of patients with acute coronary syndrome.

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