



# A STUDY OF ELECTROCARDIOGRAPHIC T WAVE INVERSION IN PATIENTS WITH TIGHT MID LEFT ANTERIOR DESCENDING ARTERY STENOSIS

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## ABSTRACT

**OBJECTIVE:** To determine the frequency of Electrocardiographic T wave inversion in patients with Tight mid Left Anterior Descending Artery stenosis.

**MATERIAL AND METHODS:** This study was conducted from 1st of July 2015 to 31st of December 2015 at department of cardiology, Punjab Institute of Cardiology Lahore. All the patients in study population had acute coronary syndrome (ACS). A total of 500 patients of all ages and both genders who had undergone angiography and had a tight mid left anterior descending artery (LAD) stenosis were studied. All the patients with secondary T wave inversion were excluded from the study. Evaluation of Electrocardiograms in the cases under study and coronary angiograms were done by consultant cardiologists.

**RESULTS:** T wave inversion in aVL was found in 420 (84%) ECGs in patients with tight mid LAD lesions while T wave inversion in leads V5, V6, I and V4 was found in 40(08%), 15(03%), 15(03%), and 10(02%) patients respectively.

**CONCLUSION:** Hence we conclude here that T wave inversion in lead aVL is quite commonly seen in patients with tight mid LAD stenosis.

**KEY WORDS:** Acute Coronary Syndrome, Mid LAD, T wave inversion.

## INTRODUCTION

The twelve-lead electrocardiogram (ECG) is a simple non invasive readily available diagnostic tool in the diagnosis and evaluation of acute coronary syndrome (ACS). Diagnosis and prediction of ischemic lesions by using ECG can provide early therapeutic intervention for the patients with ACS<sup>1</sup>. For example, T wave inversion in anterior or inferior location and or ST-segment depression in inferior leads has been associated with high incidence of LAD lesion.<sup>2,3</sup> However, little is known about the prognostic significance of the lead aVL as a predictor for CAD in patients with ACS.

Several recent, small studies have suggested that T wave inversion in lead aVL is associated with mid-segment left anterior descending (MLAD) lesions.<sup>4</sup> For example, a prospective observational study reported that the T wave inversion in lead aVL was significantly associated with a MLAD lesion of >50% in patients with chronic stable angina.<sup>5</sup> Another retrospective study from the USA, using data from 431 patients who underwent percutane-

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ous coronary intervention (PCI), reported that the sensitivity of isolated T wave inversion in lead aVL for predicting a MLAD lesion of >50% was 76.7%, and the specificity was 71.4%.<sup>6</sup>

However these studies were conducted in limited population samples (eg, single-centre studies), thereby limiting the generalisability of their inferences for patients with suspected ACS. Therefore we aimed to investigate the diagnostic value of T wave inversion in lead aVL for MLAD lesions among patients who underwent coronary angiogram for ACS.

## MATERIAL AND METHODS:

500 patients of all ages and both genders who had undergone coronary angiography and had a tight mid LAD (Left Anterior Descending Artery) stenosis were included in the study. All the patients in study population had acute coronary syndrome (ACS). All the patients with secondary T wave inversion were excluded from the study. Patients with ST elevation MI were also not included in the study. Evaluation of Electrocardiograms in the cases under study and coronary angiograms was done by consultant cardiologists.

Data was analyzed using SPSS (Statistical Package for Social Sciences) Version 20.0 for Window. Mean  $\pm$  S.D was given for quantitative variables. Frequencies, percentages were given for qualitative variables. This was a descriptive data so no test of

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significance was applied.

**RESULTS:**

Out of 500 patients 359(71.8%) were male while 141 (28.2%) were female. the mean age of the patient was 48.97 years with standard deviation 20.62. The minimum age was 16 years and maximum age was 99 years. (Table-1)

84%(420) patients had T wave inversion in aVL followed by chest lead V5 in which T wave inversion was found in 8%. While the ECG changes in other leads like lead I, V4 and V6 were seen in very few patients (2-3%). (Table-2, Fig-1)

Amongst the chest leads, higher number of patients were seen with T wave inversion in V5 i.e. 40(8%) patients as compared to leads V4 and V6 i.e. 10(2%) patients and 15(3%) patients

respectively. (Table-2)

**DISCUSSION:**

The ECG has been established in medical literature as an applicable and reproducible non-invasive diagnostic tool for assessing myocardial ischemia<sup>7</sup> In the setting of acute coronary syndrome, several ECG findings help to localize the occlusion site of the LAD coronary artery with respect to its major branches for example ST segment elevation in lead aVL was found to be a very useful in identifying LAD occlusion proximal to first septal perforator .<sup>3</sup>

T wave inversion in ECG is vital to the early diagnosis and detection of ischemic lesions in patients with suspected ACS. Reciprocal changes in ECG are recognized earlier than the ST elevation as the reflection of the ischemic lesion in ACS.<sup>8,9</sup>

Several studies have focused on the diagnostic values of T wave inversion for predicting Mid LAD lesions.<sup>4,5,10</sup> Among patients with chronic stable angina,the odd ratio of T wave inversion in lead aVL for predicting Mid LAD lesions was 2.93<sup>5</sup>. In another study, T wave inversion in leads aVL and I had a sensitivity of 86.5% and specificity of 55.6% for predicting Mid LAD lesions<sup>4</sup>. This is in agreement with our study, where T wave inversion in lead aVL regardless of other T wave changes was found in 84% of the patients having mid LAD lesions. However in a study conducted by Nakanishi et al.<sup>11</sup> T wave inversion in lead aVL regardless of other T wave changes had a low sensitivity of 32.9% and a specificity of 48.2% for predicting mid LAD lesions. The disparities in the diagnostic values may be attributable to the differences in study population, settings, or any combination of these factors. Mean age of 48.97±2.06 years in our study represents younger population of patients as compared to previous studies<sup>4,11</sup>. In evaluating the prognostic value of lead aVL T wave inversion in patients with ACS ; after excluding secondary etiologies that may alter the T wave polarity such bundle branch block, left ventricular out flow tract obstruction, hypertension with strain pattern and paced ventricular rhythms, the results from this study showed that T wave inversion in lead aVL significantly predicts LAD lesion typically mid segment

Since treatment strategy and complications depend on the infarction site,<sup>12</sup> isolated T wave inversion in lead aVL might help to predict the site of the ischaemic lesion, resulting in improved patient outcome. Moreover, previous studies reported that approximately 75% of physicians missed an isolated T wave inversion in lead aVL and that

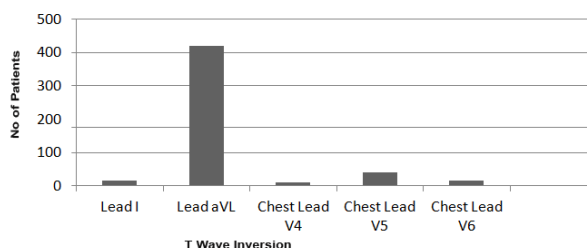
**Table-1: Demographic Profile of cases under study**

Variables		Frequency (%) n=500
Gender	Male	359(71.8%)
	Female	141(28.2%)
Age		48.97±20.62 (16-99)

**Table- 2: ECG Changes (T Wave Inversion)**

ECG Leads T Wave Inversion	
Lead I	15(3.0%)
Lead aVL	420(84%)
Chest Lead V4	10(2%)
Chest Lead V5	40(8%)
Chest Lead V6	15(3%)

**Fig-1: ECG changes (T wave inversion)**





the best single lead for the emergency detection of ACS was lead aVL.<sup>10,13</sup> In agreement with this literature, our findings underscore the importance of cautious interpretation of T wave inversion in lead aVL as a clue to predict ischaemic lesions in acute coronary syndrome.

Our study has several potential limitations. First, because this study is a single-centre study, the generalisation of our inferences is limited. Second, the disease in other coronary arteries was not studied. Third, as with any other cross sectional observational studies focused on patients with ACS, we could not differentiate whether the mid LAD lesion had or had not newly occurred. However, our inferences were not changed materially among patients

with ACS caused by the mid LAD lesions.

## CONCLUSION:

Hence we conclude here that T wave inversion in lead aVL is quite commonly seen with coronary artery disease in typically mid left anterior descending artery in patients with ACS in absence of secondary ST-T changes. Such findings add important information to the medical field especially to general practitioners during routine check up or cardiac risk assessment. More research is needed in this context for exploration of other avenues in evaluating the electrocardiographic relationship with angiographic findings in patients with acute coronary syndrome.

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