Chest Pain, Dynamic ECG Changes and Coronary Artery Disease

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Abstract

Background: Chest pain is a common emergency. Some patients have dynamic ECG changes with chest pain. Purpose of study was to find out the incidence of coronary artery disease (CAD) in patients presenting with chest pain and dynamic ECG changes.

Material and Results: Seventy two patients presenting with chest pain and dynamic ECG changes were subjected to coronary angiography. Thirty nine patients had typical angina/unstable angina (USA). Twenty seven were males and 12 were females. Mean age was 57.28 ± 8.91 years. 36 (92.3%) of these were found to have CAD. Only three patients of these had normal coronaries. Thirty three patients had atypical chest pain. Twenty two were females and 11 were males. Mean age was 45.15 ± 10.18 years. Only two (6%) of these patients had CAD. Thirty one (94%) patients had normal coronaries.

Conclusion: History of typical angina with dynamic ECG changes is highly suggestive of CAD as a cause of chest pain. Patients with atypical chest pain with dynamic ECG changes have low likelihood of CAD. Young patients and females may have dynamic ECG changes without CAD.

INTRODUCTION

Patients with new or severe chest pain are at increased risk of cardiac death and nonfatal ischaemic events. An estimation of risk is useful in selection of site of care (coronary care unit, monitored step-down unit or outpatient setting) and selection of therapy. Therefore, an assessment of likelihood of coronary artery disease (CAD) is starting point of determination of prognosis of patients presenting with chest pain. Five most important factors that relate to experiencing an episode of ischaemia due to CAD are (a) nature of symptoms (b) prior history of CAD (c) age (d) sex and (e) number of traditional risk factors present for CAD.¹ Patients who present with dynamic ECG changes are thought to have high likelihood of CAD.² However, some of these patients do not have chest pain suggestive of angina and still may have dynamic ECG changes. Whether these patients also need same care and treatment as those with typical angina with dynamic ECG changes is difficult to answer. So we studied the patients with chest pain and dynamic ECG changes.

MATERIAL AND METHODS

Patients presenting with chest pain to our hospital were subjected to 12 lead ECG. Those patients who had ST shift of more than 0.05 mv or T inversion of > 0.3 mv during chest pain and normalization of these changes during rest (dynamic ECG changes) were included in the study. Detailed history was taken about the nature of chest pain, duration, relation to exertion, radiation, reliving and aggravating factors. These patients were divided into group 1 with typical angina/unstable angina (USA) and group 11 with atypical chest pain. Exclusion criteria

1. Patients of old myocardial infarction (MI)
2. Patients of proved CAD
3. Patients with fixed ECG changes

All patients were subjected to coronary angiography (CAG). Patients having a diameter stenosis of ≥ 50% of at least one of the coronary arteries were labeled to have CAD.

RESULTS

Seventy two patients with chest pain and dynamic ECG changes were subjected to CAG. Thirty nine patients had history suggestive of typical angina/USA. Thirty six of these had CAD (92.3%). Twenty seven (75%) of these had disease in two or more vessels. Thirty three patients presented with features of atypical chest pain. Only two (6%) of these had CAD and both had single vessel disease. Table 1 shows characteristics and angiographic findings in both
Fig. 1: ECG of a female patient presenting with atypical chest pain, showing significant ST changes at presentation.

Fig. 2: ECG of same patient showing normalization of ST changes.
Fig. 1 shows ST changes in a patient with chest pain and Fig. 2 shows normalization of these changes. Figs. 3 and 4 show normal left and right coronaries respectively in this patient.

**DISCUSSION**

Cardiovascular diseases have been the leading cause of death in United States since 1919 and claim as many lives annually as the next seven leading causes combined. Chest pain, the main symptom of CAD, accounts for nearly eight million annual emergency department (ED) visits and represents the second most common ED complaint. However, while nearly half of these patients are admitted to patient units for further evaluation and treatment, only 1/3 of these are ultimately found to have the diagnosis of acute coronary syndrome (ACS). Even with these conservative admission statistics, up to 3% of patients with acute coronary ischemia are mistakenly discharged home and are at increased risk of having adverse cardiac events. Reduction of adverse cardiac events and reduction of unnecessary inpatient admissions, particularly in undifferentiated chest pain patients who present to ED are important areas of study. Improved risk stratification (RS) methods for undifferentiated chest pain patients would assist in reaching these goals.

RS of ED chest pain patients is important but problematic. The importance of proper history taking cannot be overemphasized. ECG is the first diagnostic tool. Brush et al showed that life-threatening complications are 23 times more likely in those with a positive ECG, which includes evidence of infarction, ischemia, strain and left ventricular hypertrophy (LVH), left bundle branch block (LBBB) or a paced rhythm. A component of well-known TIMI risk score includes ST segment deviation on initial ECG among seven predictor variables.

RS has also been largely aided by the advent of cardiac troponins (Tn). These markers have shown to be extremely valuable in risk determination and guiding initial treatment. Sayre et al demonstrated that patients presenting to ED with Tn value $\geq 0.2$ µg/L were 3.5 times more likely to have adverse cardiac events within 60 days. Further studies have shown that Tn positive patients benefit from therapy as low molecular weight heparin and glycoprotein IIb/IIIa inhibitors. However Tn may be negative during initial few hours and may not help in decision about admission.

Though ST segment deviation on initial ECG indicates high risk, we found that dynamic ECG changes in patients with atypical chest pain carries a very low risk of CAD as a cause of chest pain. In contrast, patients with typical angina/USA and dynamic ECG changes have high risk of having CAD. Female patients and young patients may have ST deviation without CAD.

Roe et al found that strongest independent predictor of insignificant CAD in patients presenting with USA included younger age, female sex and absence of enrollment MI, prior angina, diabetes or ST depression.

| Table 1: Shows characteristics and coronary angiographic findings of patients |
|---------------------------------|-----------------|-----------------|
| Typical angina/Unstable angina | Atypical chest pain |
| Total patients                  | 39              | 33              |
| Mean age (years)                | 57.28 ± 8.91    | 45.15 ± 10.18   |
| Males                           | 27              | 11              |
| Females                         | 12              | 22              |
| Hypertensives                   | 16              | 08              |
| Diabetics                       | 05              | 02              |
| CAD (patients)                  | 36              | 02              |
| Left main disease               | 03              | 00              |
| Single vessel disease           | 12              | 02              |
| Two vessel disease              | 09              | 00              |
| Three vessel disease            | 15              | 00              |
| Normal coronaries               | 03              | 31              |

Fig. 3: Normal left coronary of same patient.

Fig. 4: Normal and non dominant right coronary of same patient.

**Table 1**: Shows characteristics and coronary angiographic findings of patients.
**CONCLUSION**

Good history taking is a time-tested method of diagnosis. Typical history of angina with dynamic ECG changes predicts a high likelihood of CAD as a cause of chest pain and majority of these patients have ≥2 vessel disease. Patients with atypical chest pain and dynamic ECG changes have a very low likelihood of having CAD. Young females may have dynamic ECG changes without having CAD.

**REFERENCES**


