Prognostic value of global extent of ST-segment depression in non ST-segment elevation acute coronary syndrome

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بسم الله الرحمن الرحيم

" نرفع درجات من نشاء وفوق كل ذى علم عليم "

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INTRODUCTION

The electrocardiogram (ECG) is a mainstay in the diagnosis of acute and chronic coronary syndromes. The findings depend upon several key factors including the duration (hyperacute/acute versus evolving/chronic), extent (Q wave versus non-Q wave), and localization (anterior versus inferior-posterior and the size of the ischemic or infarcted region) of ischemia or infarction, as well as the presence of other underlying abnormalities. The ECG also provides information on prognosis

Necrosis of sufficient myocardial tissue can lead to decreased R wave amplitude or frank Q waves due to loss of electromotive forces in the infarcted area. Thus, the reason why Q waves do or do not develop following coronary occlusion is related to the duration of occlusion, the area of myocardium at risk, and the extent to which myocardial viability is maintained during occlusion by remaining anterograde blood flow and the function of collaterals. The infarct-related artery is occluded in over 90 percent of cases. In contrast, coronary arteriography performed in the acute period of NSTEMI has shown that the infarct-related artery is not occluded in only 60 to 85 percent of patients **(Wong, GC, *et al*, 2002) (Kerensky, RA, *et al*, 2002)**.

Prognosis — Short-term and long-term outcomes are better in patients with unstable angina than in those with an MI. Among patients with an MI, NSTEMI is associated with a lower in-hospital mortality but a similar or worse long-term outcome than ST elevation infarcts. The worse short-term outcome with STEMI reflects a larger infarction that is presumably due to the much

higher rate of complete occlusion of the infarct-related artery with STEMI than with NSTEMI. The similar or worse late prognosis with NSTEMI is in part related to a more than 50 percent prevalence of multivessel disease in patients with an NSTEMI **(Liebson, PR, *et al*, 1997)**and a higher rate of recurrent ischemia and infarction than with STEMI **(Armstrong, PW, *et al*, 1998)**. Thus, a significant amount of myocardium remains at risk.

The goal is to study the pattern of coronary artery disease among ACS patients with respect to their medical history and data acquired on admission to find out whether or not initial ECG and a simple strip test would be a reliable diagnostic tool in patients with typical chest pain.

AIM OF THE WORK

The aim of this study is to assess the prognostic value of the global extent of ST-segment depression in non ST-elevation acute coronary syndrome.

Chapter 1

Acute Coronary Syndrome

1- Definitions

Among non-ST elevation acute coronary syndromes (ACS), unstable angina (UA) and non-ST elevation myocardial infarction (NSTEMI) differ primarily in whether the ischemia is severe enough to cause sufficient myocardial damage to release detectable quantities of a marker of myocardial injury.

Among patients with presumed unstable ischemic pain or ECG changes without ST elevation:

- NSTEMI is considered to be present if there is a typical rise and gradual fall (troponins) or more rapid rise and fall (CK-MB) of biochemical markers of myocardial necrosis **(Thygesen, K, *et al*,2007).**
- UA is considered to be present if there is no elevation in serum troponins or CK-MB, with or without electrocardiographic (ECG) changes indicative of ischemia (eg, ST segment depression or transient elevation or new T wave inversion).

Since an elevation in serum troponins and/or CK-MB may not be detectable for hours after presentation, UA and NSTEMI are frequently indistinguishable at initial evaluation and will therefore be considered together here.

Risk stratification of patients with an ACS begins upon presentation and is then a continuous process to predict those who are at high risk for further ischemic events or adverse outcomes. Among patients with UA/NSTEMI, risk

stratification begins with initial assessment to detect patients at immediate high risk. Subsequent evaluation is aimed at identifying patients who will benefit from an early invasive strategy at 4 to 48 hours and, finally, at predicting which patients are at increased risk after discharge **(Anderson, J, *et al*, 2007).**

2- Incidence of Acute Coronary Syndrome

Data from 44 years of follow-up in the original Framingham Study cohort and 20 years of surveillance of their offspring has allowed ascertainment of the incidence of initial coronary events including both recognized and clinically unrecognized MI, angina pectoris, unstable angina, and sudden and non-sudden coronary deaths **(Gordon T, *et al*, 1978)**. The following observations were noted:

- For persons aged 40 years, the lifetime risk of developing CHD is 49 percent in men and 32 percent in women. For those reaching age 70 years, the lifetime risk is 35 percent in men and 24 percent in women.
- For total coronary events, the incidence rises steeply with age, with women lagging behind men by 10 years. For the more serious manifestations of coronary disease, such as MI and sudden death, women lag behind men in incidence by 20 years, but the sex ratio for incidence narrows progressively with advancing age. The incidence at ages 65 to 94 compared to ages 35 to 64 more than doubles in men and triples in women.
- In premenopausal women, serious manifestations of coronary disease, such as MI and sudden death, are relatively rare. Beyond the menopause, the incidence and severity of coronary disease increases abruptly, with rates three times those of women the same age who remain premenopausal **(Gordon T, *et al*, 1978)**. Below age 65 years, the annual incidence of all coronary events in men (12 per 1000) more than equals the rate of all the other atherosclerotic cardiovascular events combined (7 per 1000); in women, it equals the rate of the other events

(5 per 1000). Beyond age 65 years, coronary disease still predominates .Coronary events comprise 33 to 65 percent of atherosclerotic cardiovascular events in men and 28 to 58 percent in women.

- The male predominance of CHD is least striking for angina pectoris. Under age 75, the initial presentation of coronary disease in women is more likely to be angina pectoris than MI **(Lerner DG, *et al*, 1986)**. Furthermore, angina in women is more likely to be uncomplicated (80 percent), while angina in men often occurs after a MI (66 percent). Infarction predominates at virtually all ages in men in whom only 20 percent of infarctions are preceded by long-standing angina; the percentage is even lower if the MI is silent or unrecognized **(Kannel WB, *et al*, 1987)** .

In addition to gender, other factors may influence whether the initial presentation of CHD is an acute MI, which is typically associated with plaque rupture, or with stable angina. A case control study of adults with a first clinical presentation of coronary disease as either acute MI (n = 916) or stable exertional angina (n = 468) suggested that recent prior therapy with statins and beta blockers affects the clinical presentation **(Go, AS, *et al*, 2006)**. After adjustment for potential confounders, recent use of statins (adjusted odds ratio 0.45, 95% CI 0.32-0.62) and beta blockers (adjusted odds ratio 0.26, 95% CI 0.19-0.35) was associated with a lower likelihood of presenting with an acute MI rather than stable angina. This effect might be mediated at least in part by a lower likelihood of plaque rupture.

3- Pathophysiology of Acute Coronary Syndrome

During the last decades the complexity of acute coronary syndromes has been appreciated and to a great extent unraveled Briefly, acute coronary