

Absent Initial Q Wave: Could It Be A Predictor Of Proximal Left Anterior Descending Coronary Artery Lesion?

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Abstract

Background- This study was performed to determine whether absence of initial septal q waves in ECG leads correlates with significant (more than 50%) stenosis in the proximal left anterior descending (LAD) coronary artery.

Methods- One hundred seventy patients who were referred to the catheterization department for coronary angiography were chosen randomly. All the cases had a standard twelve-lead ECG before angiography. According to their ECG, they were divided into two groups: group A: 69 cases who did not have septal q wave and group B: 101 cases who had q waves.

Results- Forty-one patients in group A and 14 patients in group B had significant lesions in the proximal LAD (P value 0.001 and 0.05). Statistical analysis showed that in group A, significant lesion in the proximal LAD could be predicted with 51.9% sensitivity and 62.2% specificity.

Conclusion- Absence of a normal q wave in the ECG of patients selected for coronary angiography could be a reliable predictor of a significant lesion in the proximal LAD coronary artery (*Iranian Heart Journal 2007; 8 (1): 20-23*).

Key words: Q wave ■ coronary artery disease ■ left anterior descending ■ predictors

The electrocardiogram (ECG), as used today, is the product of a series of technological and biological advances pioneered over the past two centuries.¹ More than 7 million ECGs are performed in the United States each year, making the ECG the most commonly performed as well as the oldest cardiovascular laboratory procedure.² The ECG remains a key test in the diagnosis of acute and chronic coronary syndromes.

The initial activation of the interventricular septum corresponds to a vector oriented from left to right in the frontal plane and anteriorly in the horizontal plane, so leads with axis directed to the left (leads I, AVL, V5, V6) will register initial negative waves (septal waves).

These initial forces are normally of low amplitude and are brief (less than 30 – 40 millisecond).

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In this study, we evaluated the septal q wave and its importance in ischemic hearts. Several other studies before have shown q wave changes or its absence in ischemic conditions.^{6,7} We sought to determine whether this ECG parameter could help in evaluating a person with ischemic heart disease.

If there are statistically significant relations between clinical data and prognosis on one hand and q wave changes or its absence on the other, evaluating this “small wave” could be a beneficial guide to more expensive and invasive paraclinical tools (e.g. nuclear studies and coronary angiography).

In this study, a possible correlation between absent initial q waves in the ECG with significant stenosis in the proximal left anterior descending (LAD) coronary artery was evaluated. The results of this study could give the clinician a chance to anticipate an LAD lesion before angiography and use this criterion as a tool for risk stratification before the procedure.

Methods

Our study was performed from 2003 to 2004. One hundred seventy cases referred for coronary angiography to our center were randomly chosen and studied prospectively by our team. Coronary angiography was performed with class 1 or 2a indications according to ACC guidelines. Major coronary risk factors were also evaluated in these cases for further statistical analyses. Demographic data are shown in Table I.

Table I. Demographic data in 170 cases

Variables		Frequency
Gender	Male	109
	Female	61
Smoker*		35
Diabetic**		28
Hypertensive***		78

*Smoker of 10 or more cigarettes per day.

** Two times fasting blood sugar >124 mg /dl

*** More than two times measurement of blood pressure >140/90

Electrocardiography was performed before angiography in all the patients. Patients with active chest pain and acute coronary syndromes were excluded from the study. Cases with artificial pacemakers were also excluded. Clinical and demographic data were analyzed with Fisher's exact test.

Results

The patients were classified into two groups: 69 cases of the total 170 who did not have septal q wave in their ECG (group A) versus 101 patients who had q wave (group B).

In 30 cases of group A, ECGs were normal from other aspects; but in group B, only 58 of 101 had normal ECGs. Prevalence of ECG abnormalities in group B is shown in Table II.

Table II. ECG changes in patients in group B. There is overlap between ECG abnormalities.

ECG changes	Frequency
Normal ECG	58
Poor R progression	30
LVH	9
LAHB	19
Pathological Q Wave	41
LBBB	11

Significant lesion (more than 50% stenosis) at the proximal (before first septal or diagonal) of LAD was studied in groups A and B.

Forty-one from the 69 patients in group A had a significant lesion at the proximal LAD and 28 cases did not (p value 0.001)

Fourteen patients from the 101 subjects in group B had a significant lesion at the proximal LAD and 87 cases did not (p value 0.05)

Statistical analysis showed that in group A, a significant lesion at the proximal LAD could be predicted with 51.9% sensitivity and 62.2% specificity.

It was also evident that the proximal lesions of the LAD were statistically more prevalent in group A than in group B.

Discussion

Absence of septal q waves is often a normal variant and not associated with any cardiac disease. However, absence or particularly, loss of septal q waves may be a sign of septal infarction, various forms of conduction defects or fibrosis, and commonly correlates with other ECG evidence of myocardial infarction and left ventricular mechanical dysfunction.²

Bruch et al. showed fibrosis due to infarction in the middle zone of interventricular septum in patients with absent initial q waves. In fact, in their patient series, not one of these absent initial q wave cases had normal septums.^{2,5} Bayes et al. proposed incomplete left bundle branch block as a reason for absent initial q waves; incomplete left bundle branch block may be due to fibrosis or infarction in the middle of the septum.^{6,7}

Zukoff proposed a strong relationship between absent initial q waves and lesions in the proximal LAD (except in diabetic patients).²

Bayes proposed that the mildest form of incomplete left bundle branch block deletes septal q waves because of the inversion of septal activation.^{5,7}

Tamura showed the disappearance of septal q waves in patients after the occlusion of a septal artery, accompanied by akinesia in the anterior interventricular septum.

In our study, 69 of 170 cases had absent initial q waves; 41 of 69 had significant lesions at the proximal LAD and 28 did not. Sensitivity of absent initial q wave for the prediction of a significant lesion in the proximal LAD was 51.9% and specificity was 69.9% (Fig. 1).

Relation of absent initial q waves with a lesion in any part of the LAD was also studied. From a total of 170 cases, 120 patients had lesions in at least one part of the

LAD. 49.6% of these had absent initial q waves and 50.6% did not (Fig. 2). Effect of age on the relation between absent initial q waves and significant lesion at the proximal part of the LAD was evaluated.

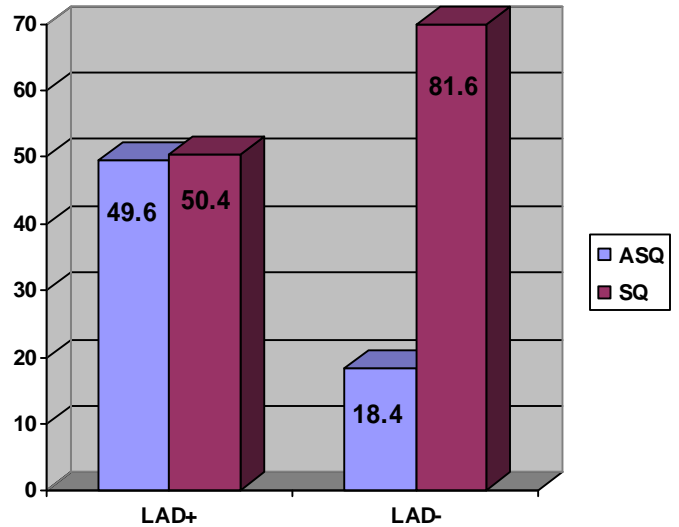


Fig. 1. Frequency of absent septal q wave in proximal LAD lesion (ASQ: absent septal Q wave. SQ: septal Q wave. LAD +: lesion at proximal of LAD. LAD - : No lesion at proximal of LAD).

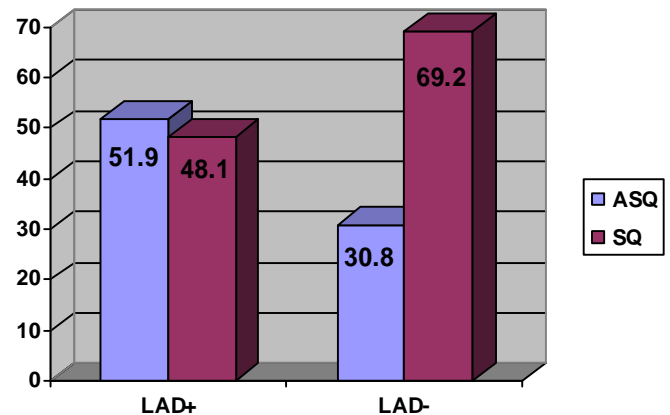


Fig. 2. Frequency of absent septal q wave in LAD at any part (ASQ: absent septal q wave. SQ: septal q wave. LAD +: lesion at any part of LAD. LAD - : No lesion at any part of LAD).

From a total of 170 patients, 141 cases were younger than 60, and 29 cases were more than 60 years old.

The predicative value of absent septal q wave was higher in patients less than 60 years old.

Absent initial q wave as a criterion which is easy to define by electrocardiography could be a valuable predictor for a significant lesion in the proximal part of the LAD.

In patients with ischemic heart disease (IHD) or those highly suspicious for IHD, inspecting the ECG for this sign could help the cardiologist to estimate the risk of angiography and possibility of need for coronary interventions at the same time.

Future studies in electrocardiography could help us to use this noninvasive and easy method more practically in our everyday practice.

ventricular diastolic function. *Br Heart J* 1994; 72: 51.

References

1. Fisch C. Centennial of the string galvanometer and the electrocardiogram. *J Am Coll Cardiol* 260: 1737; 2000.
2. Mirvis DM, Goldberger AL. Electrocardiography. In: Braunwald E, Zipes DP, Libby P, Bonow RO, (eds.). *Heart Disease: A Textbook of Cardiovascular Medicine*. 7th ed. Philadelphia, W. B. Saunders Co., 2005, pp. 107-51.
3. Mathew TC, Shankariah L, Spodick DH. Electrocardiographic correlates of absent septal q waves. *Am J Cardiol* 82: 809; 1998.
4. MacAlpin RN: In search of left septal fascicular block. *Am Heart J* 144: 948; 2002.
5. Spodick DLT. Absent q wave: the neglected deflection. *Am J Cardiol* 1999; July 15; 84(2): 219-22.
6. Gorgels AP, Engelen D, Wellens HJJ: The electrocardiogram in acute myocardial infarction. In Fuster V, Alexander RW, O'Rourke RA, (eds)., *Hurst's The Heart*. 11th ed., New York, McGraw-Hill, 2005.
7. Xiao HB, Gibson DG. Absent q wave: a marker of effects of abnormal activation pattern on left