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COMMENTARY

Predictive Value of Absent Septal q Wave in Patients with Significant Stenosis of Proximal Left Anterior Descending Coronary Artery

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Abstract

Aims: There is conflicting data about the predictive value of absent septal q wave in patients with significant stenosis of proximal Left Anterior Descending coronary artery. To clarify the exact role of this simple electrocardiographic sign we conducted this prospective descriptive study.

Methods: Patients who were referred for coronary angiography in Milad Hospital between December 2008 and September 2009 were chosen randomly. Standard ECG was performed and reviewed for presence or absence of septal q wave, and then the coronary angiography was done and reported by another cardiologist.

Results: Of 148 patients with absent septal q wave in ECG, 85 patients (57%) had significant stenosis of proximal LAD in coronary angiography. Statistical analysis showed that significant stenosis of proximal LAD could be predicted by absence of septal q wave in ECG with sensitivity of 59% and specificity of 47%. However, Kappa statistic (Kappa = 0.36) showed low agreement between them.

Conclusion: Absence of normal septal q wave in ECG could be a low value predictor of coronary artery disease mainly significant proximal LAD stenosis.

Keywords: septal q waves, proximal LAD, significant stenosis

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Introduction

The absence or particularly recent loss of septal q waves may be a sign of septal infarction, various forms of conduction defects, fibrosis of the middle third of the ventricular septum and proximal left anterior descending coronary disease, especially when combined with other electrocardiographic evidence of myocardial infarction and left ventricular mechanical dysfunction. However, absence of these septal q waves may also be a normal variant and not associated with any cardiac disease.[1–8]

Normal ventricular depolarization proceeds as a rapid, continuous spread of activation wavefronts. The first phase is depolarization of the interventricular septum from the left to the right and anteriorly that produces negative waves (septal q waves) in leads with axes directed to the left (leads I, aVL, V_5 and V_6). These initial forces are normally of low amplitude and are brief (less than 30 ms).[9–11]

In this study, we used these tests for diagnosis of coronary artery disease and the aim of this study was investigation of association of the absent septal q wave with the significant stenosis (more than 70% stenosis) of the proximal left anterior descending coronary artery (LAD).

If we could determine this relationship, we would suggest this noninvasive and inexpensive test (ECG) before application of other noninvasive but expensive tests and our results could be helpful to determine risk stratification and make decision for angiography and invasive procedures.

Methods

Patients who were admitted to Milad Hospital between December 2008 and September 2009 and according to ACC/AHA guidelines had class I to IIa indication for coronary angiography, were selected randomly. For every patient standard ECG was performed and reviewed for presence or absence of septal q wave, and then the coronary angiography was done and reported by another cardiologist. Patients with incomplete (QRS = 110 ms) or complete (QRS ≥ 120 ms) left bundle branch block in ECG and patients with recent acute coronary syndromes were excluded.

Septal q waves were defined as q waves of up to 30-ms duration in leads I, aVL, V_5 and V_6.

Stenosis of more than 70% in proximal LAD (before firs septal branch) was considered significant.

Diabetes mellitus was defined as two times fasting blood sugar more than 126 mg/dl or one time random blood sugar more than 200 mg/dl with diabetic symptoms.

Hypertension was defined as two times mean blood pressure more than 140/90 mmHg.

Kappa statistic was used and data processing was done by SPSS (version 16).

Results

Two hundred and sixty one patients with mean age 58.5 ± 10.1 year were studied. Some demographic characteristics were summarized in Table 1.

According to electrocardiographic data, 148 (56.7%) patients had absent septal q wave in ECG leads I, aVL, V_5 and V_6 and 113 patients did not.

According to coronary angiography data, 142 (54%) patients had significant stenosis of proximal LAD (≥70% stenosis) and 119 patients did not have important stenosis.

Relationship between absent septal q wave in ECG and significant stenosis of proximal LAD was considered in which 148 patients with absent septal q wave in ECG, 85 patients (57%) had significant stenosis of proximal LAD in coronary angiography and 63 patients (43%) did not have. 57 (50.5%) out of 113 patients without absent septal q wave in ECG had significant stenosis of proximal LAD and 56 patients (49.5%) did not have. (Chart 1)

Statistical analysis showed that prediction of significant stenosis of proximal LAD by finding septal q wave in ECG could be possible with 59% sensitivity, 47% specificity, positive predictive value of 57%, and negative predictive value of 49%.

There were not any significant differences in hypertension and diabetes mellitus between patient groups with and without septal q wave. (52% of diabetic patients did not have septal q wave and 48% had septal q wave. 54% of hypertensive patients

Table 1. Patients' demographic data.

Variables	N (%)
Gender	
Male	169 (64.8%)
Female	92 (35.3%)
Diabetic patient	89 (34.1%)
Hypertensive patient	96 (36.8%)

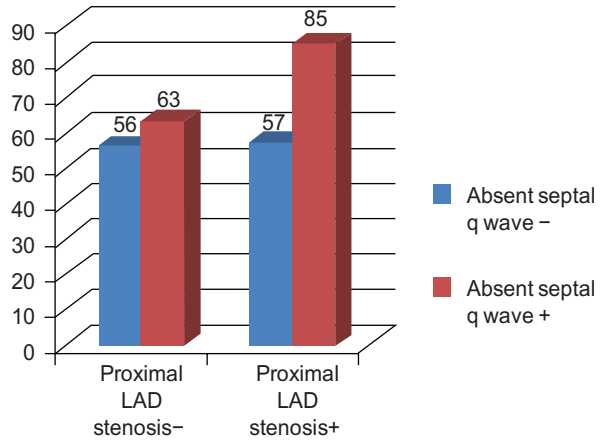

Chart 1. Prevalence of absent septal q wave in patients with Proximal LAD stenosis.

did not have septal q wave and 46% had septal q wave).

Statistical results showed there is significant agreement between these two tests but Kappa statistic value (Kappa = 0/36) is less than to be able to recommend to replace ECG instead of angiography for proximal LAD Stenosis diagnosis.

Discussion

Not only may the absence of septal q waves be a sign of septal infarction, but also may be a normal variant without any cardiac disease. There are some controversial studies about correlation of absent septal q waves with cardiac disease. The electrocardiographic correlates of absent septal q wave in one study emphasized its significant association with other initial QRS abnormalities, particularly Q-wave infarction.[4,9]

Gibson and Xiao pointed out, "the septal Q wave has received little detailed study." It is widely neglected in clinical practice and unknown in computerized interpretation (probably because it can be a very small deflection easily lost in baseline artifact.[9,12]

Prieto Solis JA et al, showed one of the most useful parameters in predicting the site of the lesion in the left anterior descending coronary artery in acute anterior myocardial infarction is absent septal q wave in V_4–V_6.[7] However, absence of septal q waves that was defined as the simultaneous absence of q waves from all of leads I, V_5 and V_6 was mentioned by Mac Alpin RN as a variant of normal in ECG.[3]

Yotsukura investigated the relationship between the disappearance of septal q waves after myocardial infarction (MI) and the location of the culprit lesion. If septal q waves that were detected before MI disappeared after MI, the culprit lesion was located proximal to the origin of the first septal branch (S1) in 76% of the patients. This finding may be clinically useful in caring for patients following MI.[13]

Shabestari et al, showed absence of septal q waves in the ECG of patients selected for coronary angiography could be a reliable predictor of a significant lesion in the proximal LAD with 51.9% sensitivity and 62.2% specificity.[14]

In our study, from 148 patients who had absent septal q wave in electrocardiography; 85 patients had significant lesions in the proximal LAD ($P < 0.001$) and 63 patients did not have. Also, from 113 patients who had septal q wave in electrocardiography; 57 patients had significant lesions in the proximal LAD and 56 patients did not have.

In this study, we studied this relationship more precisely by utilizing more patients and applying all ECG leads (I, AVL, V_5 and V_6).

Statistical analysis showed that the significant proximal LAD lesion in patients who had absent septal q wave in electrocardiography could be predicted with 59% sensitivity and 47% specificity.

Other imaging modalities such as LV angiography and MRI could be helpful to study this hypothesis precisely. Our study does not have appropriate control group in order that further studies with larger sample size and appropriate control group are required.

Conclusion

Although, absence of a normal septal q wave in ECG could be a low value predictor of significant proximal LAD lesion but our study highlights the ECG's value as a noninvasive, inexpensive, and highly versatile test.

We do not suggest avoiding angiography in indications for angiography but we suggest paying more attention to ECG finding for decision making.

Disclosure

This manuscript has been read and approved by all authors. This paper is unique and is not under consideration by any other publication and has not been published elsewhere. The authors and peer reviewers of this paper report no conflicts of interest. The authors confirm that they have permission to reproduce any copyrighted material.

References

1. Shamim W, Yousufuddin M, Xiao HB. Septal q waves as an indicator of risk of mortality in elderly patients with chronic heart failure. *Am Heart J*. 2002 Oct;144(4):740–4.
2. Spodick DLT. Absent q wave: The neglected deflection. *Am J Cardiol*. 1999 Jul 15;84(2):219–22.
3. MacAlpin RN. Absent septal q wave in otherwise normal electrocardiograms, a variant of normal. *Am Heart J*. 2001 Jul;34(3):207–13.
4. MacAlpin RN. Clinical significance of QS complexes in V1 and V2 without other electrocardiographic abnormality. *Ann Noninvasive Electrocardiol*. 2004;9(1):39–47.
5. Miyano Shoko, Fujoka Haruto. Precision of EKG diagnosis of MI in the ventricular septal area. Comparison with 201-TICI scintigraphy and coronary angiography. *Juntendo Medical Journal Year*. 45(4):554–62.
6. MacAlpin RN: In search of left septal fascicular block. *Am Heart J*. 2002;144(6):948–56.
7. Prieto Solis JA, Gonzalez. Electrocardiography prediction of the site of lesion in the LAD in acute MI. *Rev Esp Cardiol*. 2002 Oct;55(10):1028–35.
8. Akakabe Y, Kawasaki T, Yamano M. Septal q wave as a marker of septal ischemia in hypertrophic cardiomyopathy. *Circ J*. 2008 Jun; 72(6):953–7.
9. Mathew Tc, Shankariah L, Spodick DH. Electrocardiographic correlates of absent septal q waves. *Am J cardiol*. 1998;82(6):809–11.
10. Mirvis DM, Goldberger AL. Electrocardiography. In: Braunwald E, Zipes DP, Libby P, Bonow RO, edtiors. *Heart Disease*. 8th ed. Philadelphia, W.B. Saunders; 2008. p. 158–9.
11. Andrew P, Braunwald E. In: Kasper, Braunwald, Fauci, Hauser, Longo, Jameson, edtiors. Harrison's Principles of Internal Medicine. 17th ed. New York, McGraw-Hill, 2008. p. 1389–90.
12. Xiao HB, Gibson DG. Absent q wave: A Marker of effects of abnormal activation pattern on left ventricular diastolic function. *Br Heart J*. 1994 Jul;72(1):45–51.
13. Yotsukuram M, Toyofukum M, Tajino K. Clinical significance of the disappearance of septal q waves after the onset of myocardial infarction, correlation with location of responsible coronary lesion. *J Electrocardiol*. 1999;32(1):15–20.
14. Shabestari M, Dadgar A. Absent initial q wave: could it be a predictor of proximal LAD coronary artery lesion. *Iranian heart J*. 2007 spring; 8(1):20–3.