CASE REPORT

Q Wave in the Inferior Leads: There Is More Than Scar

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Q waves can regularly be observed in the 12-lead electrocardiogram either due to heart axis underlying pathology such as subacute myocardial infarction, myocardial scar, or accessory pathways. Rarely, other entities such as circumscribed hypertrophy can induce significant Q wave and represent an important differential diagnosis especially in younger patients. In the setting of atypical chest pain determination of the correct diagnosis can be challenging. Therefore, circumscribed hypertrophy should be taken into account to avoid unnecessary invasive procedures.

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In the surface ECG, the Q wave represents an excitation of the septum from left to right. Small Q waves can physiologically occur depending on the heart axis, that is in leads I and aVL with a left axis or in leads II, III, and aVF with an inferior or right axis. A pathological Q wave can be the result of a local deviation of electrical excitation due to myocardial scar.

CASE REPORT

A 31-year-old woman presented in our department with atypical chest pain. With obesity and regular smoking two cardiovascular risk factors were present. The patient did not report syncope or palpitations. The resting ECG (Fig. 1) revealed deep Q waves in the inferior leads with slight ST-elevations in leads III and aVF, suggesting subacute myocardial infarction. Echocardiography revealed a normal left ventricular function accompanied by hypertrophy of the basal anterior wall. Repetitive laboratory tests showed negative troponin and D-dimer levels. Cycle ergometer stress test did not

reveal any changes of the ECG. The patient did not report typical chest pain or dyspnoea. Cardiac magnetic resonance imaging including stress testing did not detect any ischemia or scars in late enhancement sequences. However, a circumscribed hypertrophy of the basal anterior wall without obstruction of the left ventricular outflow tract was observed (Fig. 2). The maximum wall diameter of the hypertrophic region measured 28 mm as compared with 8 mm septum diameter. The patient was discharged without specific therapy. Regular follow-up remained inconspicuous and the patient did not report any further disorders. The initial atypical chest pain was therefore attributed to musculoskeletal affections due to significant obesity.

DISCUSSION

Occurrence of Q waves in the inferior leads usually suggest a subacute inferior myocardial infarction,¹ a scar of the inferior wall,² or the presence of an inferior accessory pathway.³ A more

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Figure 1. Resting 12-lead ECG: significant Q wave in the inferior leads (arrow).

Figure 2. Cardiac magnetic resonance imaging: circumscripted hypertrophy of the basal anterior wall (arrow).

marked Q wave has also been reported during second and third trimester of normal pregnancy due to anatomic axis deviation.⁴

In this study, the underlying cause of the significant Q wave was the circumscripted hypertrophy of the basal anterior wall. The possible way of excitation resulting in this distinct Q wave is displayed in Figure 3.

A hypertrophic nonobstructive cardiomyopathy has been reported before as a possible reason for Q wave in a small cohort of 17 pediatric patients.⁵ In this study, an abnormal Q wave in the inferior leads occurred in 75% of patients with hypertrophy in the ventricular anterior septum. This case report suggests a circumscripted hypertrophy as an important differential diagnosis of

Figure 3. Schematic outline of cardiac excitation: (A) normal heart; (B) inferior scar; and (C) circumscribed basal thickening. Arrows depict direction and magnitude of excitation wave, as a result of the underlying substrate. In B, a deep Q wave appears in the inferior ECG leads due to scar (absence of conducting myocardium) in the inferior wall; in C, a deep Q wave appears in the inferior leads due to presence of hypertrophic myocardium in the basal anterior wall.

significant inferior Q waves especially in younger individuals.

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