Double Risks, Double care

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Abstract

Electrocardiogram (ECG) is the most readily available objective data from patients, it contains a wealth of connotation, but rapid and accurate identification of high risk ECG is still a challenge for most practitioners. We present an interesting case with two types high risk ECG patterns, de Winter like ECG pattern and J wave, which implied acute occlusion of coronary artery and sudden cardiac death. The patient was treated promptly and quickly (within 40 min, from first touch to complete the operation), and the patient took a turn to be out of danger.

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Short Title: de Winter like pattern and J wave

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Abstract

Electrocardiogram (ECG) is the most readily available objective data from patients, it contains a wealth of connotation, but rapid and accurate identification of high risk ECG is still a challenge for most practitioners. We present an interesting case with two types high risk ECG patterns, de Winter like ECG pattern and J wave, which implied acute occlusion of coronary artery and sudden cardiac death. The patient was treated promptly and quickly (within 40 min, from first touch to complete the operation), and the patient took a turn to be out of danger.

Key Words: electrocardiogram, de Winter like pattern, J wave, acute occlusion, sudden cardiac death

Case Presentation

A 53-year-old male presented to the emergency department with oppressive chest pain and diaphoresis, which had been persistent for 2 hours. In addition, an initial 18-lead ECG was performed immediately on admission (Figure1).

The patient's initial ECG on admission revealed a sinus rhythm of 75 beats /min, with upsloping ST-segment depression at the J waves continuing into tall positive T waves in leads V4 to V6, coupled with upsloping ST-segment elevation in leads V1 to V3, slight ST-segment elevation in lead aVR, and Q waves in leads V3 and V4. There exist deep q waves (<0.04 msec) in inferior leads without ST-T changes. The ECG showed both de Winter like ECG pattern and J waves, which show close association with acute occlusion of the proximal left anterior descending coronary artery (LAD) and sudden cardiac death. An emergent coronary angiography was performed immediately, presenting an occlusion of the proximal-LAD (thrombolysis in myocardial infarction 0-graded flow, TIM-0) (Figure2, A) and an approximately 90% stenosis in the middle-distal site of the right coronary artery (RCA) (Figure2, B). The culprit lesion (the proximal-LAD) was successfully dilated. Meanwhile, a 2.75 × 23mm drug-eluting stent was placed with good angiographic results (TIM-3) (Figure2, C). The patient's symptoms were getting better after the operation. Peak cardiac-specific troponin T (cTnT) was 6679 ng/L (normal range is 0-14ng/L). The second ECG was recorded at 2 hours after stent implantation (Figure3).

Discussion

The initial ECG is similar in appearance with a ST elevation myocardial infarction (STEMI) equivalent ECG pattern associated with proximal LAD occlusion which was firstly reported by de Winter et al[1]. The de Winter ECG pattern can be observed in a minority (2%) of symptomatic LAD artery occlusion, which is upsloping ST-segment depression at the J point followed by peaked and positive T waves, without ST-segment elevation across the precordial leads, often accompanying with a slight elevation of the ST-segment in Lead aVR and a loss of the precordial R-wave. However, contrary to previous reports, the initial ECG in our case showed upsloping ST-segment elevation in leads V1 to V3, and the specific 'de Winter ECG pattern' of ST-segment changes just the appearance in leads V4 to V6. Furthermore, the typical de Winter pattern J point changes to J wave. Therefore, our case showed distinct different characteristics to others.

The initial ECG in our case showed the feature of both STEMI ECG pattern and 'de Winter ECG pattern'. It is suggested that 'de Winter ECG pattern' may be a transition stage towards STEMI ECG pattern. As reported by Goebel M et al.[2], in a case of the de Winter ECG pattern evolving to a STEMI ECG pattern within hours. Furthermore, in our case, the specific feature of 'de Winter pattern' only appeared in leads V4 to V6 (lateral leads instead of anterior leads), but coronary angiography showed the same proximal-LAD occlusion as that in typical de Winter ECG pattern. Therefore, we wonder if 'de Winter ECG pattern' could appear in any lead and could not be exclusively associated with LAD occlusion, but has high positive predictive value for acute occlusion. Fortunately, several reports recently, further supporting this speculation[3,4,5].

J wave, which associate with sudden cardiac death. It is caused by a transmural voltage gradient created by the presence of a notch in the epicardial, which has been revealed by Prof. Yan[6]. Although J wave has been typically associated with many pathophysiological conditions, ischemic heart disease has been rarely reported.

Practitioners should recognize this complex pattern as a high-risk ECG pattern and an urgent angiography is of great necessity.

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Figure1 The patient's initial ECG on admission. Upsloping ST-segment elevation in lead V1 to V3, and upsloping ST-segment depression at the J waves followed by peaked, positive T waves in lead V4 to V6, coupled with a slight ST-segment elevation in lead aVR, and Q waves in leads V3 and V4. There exist deep q waves (<0.04 msec) in inferior leads without ST-T changes.

Figure2 Emergent Coronary Angiographic Results at Presentation and Resolution

A. An occlusion of the proximal-LAD with TIM-0 (white arrowhead).

B. An approximately 90% stenosis in the middle-distal site of RCA (white arrowhead).

C. The culprit lesion (the proximal-LAD) was treated by percutaneous coronary intervention with a drug-eluting stent with TIM-3(white arrowhead).

Figure3 The second ECG was recorded at 2 hours after stent implantation. Abnormal Q waves and upsloping ST-segment elevation in Leads V1 to V4, There exist deep q waves (<0.04 msec) in inferior leads without ST-T changes.