Case Report

Journal of Clinical Cases

A Case of MINOCA Associated With Swimming

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Received Date: 27 Dec 2023
Accepted Date: 10 January 2024
Published Date: 15 January 2024

Citation:
Yang Lixia. A Case of MINOCA Associated With Swimming. Journal of Clinical Cases 2024.

1 Objects and Methods:

1.1 The patient was 24 years old with body mass 72 kg, height 175 cm and body mass index 21kg / m 2.

One day before the onset of the preheart area pain, dull pain, lasting for several minutes to several hours. Accompanied by palpitation symptoms, no cough, expectoration, no muscle soreness and other symptoms. He went to the emergency department of our hospital with electrocardiogram indicating "extensive anterior wall T wave high tip, AVL pathological Q wave, ST segment elevation 0.1-0.2mv", and "CK 1862U / L, CKMB 50U / L, TnI 0.0042 mg / L", which was considered as acute coronary syndrome. hospitalization was recommended, but the patient refused to be hospitalized. On the second day of onset, the patient went to our hospital again due to chest pain and palpitation, consistent with the initial visit. The myocardial enzyme spectrum was reviewed "CK 1212U / L, CKMB 35U / L, TnI 0.0038 mg/L", and he was hospitalized for further treatment. Previous history of myocarditis (18 years ago). Physical examination for admission: body temperature: 36.6℃, pulse: 106 times / min, breath: 19 times / min, blood pressure: 116 / 76mmHg, SPO 2:98%. It was clear, a little wet rales could be heard in the lower lungs, with complete heart rhythm, no noise in the auscultation area of the valve, no friction sound of the pericardium, and mild edema in both lower limbs.

1.2 Disease changes and main treatment :

After the first day of admission (d1), another electrocardiogram indicated "sinus tachycardia (heart rate 106 times / min), V1-V6 T wave high tip, AVL pathological Q wave, ST elevation 0.1-0.2mv", review of myocardial zymogram (see Table 1), WBC: 12.97 * 10 ^ 9 / L, N%: 71.9%, lymphocyte percentage: 21.5%,CRP:3.90mg/L, BNP: 8 pg / ml, and temporary tanshinone to improve circulatory therapy. In d2, cardiac ultrasound indicated no obvious abnormality, coronary angiography indicated "left trunk: no obvious abnormality; anterior descending branch: 30% stenosis, middle muscle bridge; spiral branch: small; RCA: large, near lining not smooth". And d3, nicdil was given to improve coronary microcirculation and vitamin C anti-oxidative stress therapy. In d5, myocardial core scanning was performed for the clavicle implantation. The results indicated that when the left ventricular heart cavity was slightly larger, the radioactivity of the lower left ventricular myocardial was sparse, and the myocardial perfusion of the lower left ventricular myocardial decreased in the resting state. And d6, review of myocardial enzyme dropped to normal. And d11, symptoms disappeared, normal indicators, and he was discharged from recovery.

1.3 Follow-up discharge regular oral Nick dil tablets.

At follow-up after 1 month, ECG indicated "sinus rhythm; T wave high tip (heart rate 61 beats / min)", test "BNP 12.4pg/ml, CK 78U / L, CKMB 8U / L" and cardiac ultrasound "LA 31mm LV49mm EF65.1%". Three months after discharge, myocardial nuclear scan was reviewed and myocardial perfusion returned to normal.

Number of admission days	d1	d2	d3	d5	d6	d8	d11
K+ mmol/L	4.96	4.34	4.16	4.17	4.30	4.03	4.2
CK U/L	577	261	165	150	108	98	71
CKMb(U/L)	45	10	12	10	9	8	8
cTnI(ng/ml)	0.053	0.100	0.062	0.058	0.049	0.0045	0.0043

2. Key words:
Coronary non-obstructive myocardial infarction; coronary function; caIMR; caFFR

Coronary non-obstructive myocardial infarction (MINOCA) is a myocardial infarction occurring in the absence of a coronary artery obstruction lesion. This case analyzes a case of MINOCA associated with swimming, which aims at the diagnosis of MINOCA, revealing its etiology, and functional and anatomical "one-stop" accurate evaluation of the overall coronary situation as a reference.

3. Discussion

3.1 Coronary non-obstructive myocardial infarction (MINOCA) MINOCA :

The clinical findings and laboratory examination supported the diagnosis of AMI, but the coronary angiography results indicated that the degree of vascular stenosis was <50% or completely normal [1]. A prospective study showed that MINOCA was about 11% of AMI patients and was younger

and more common in women. The diagnosis of MINOCA should meet [2]: [1] according to the diagnosis of acute myocardial infarction, that is, the increase of troponin exceeds the 99% percentile of the reference limit, accompanied by definite clinical evidence of myocardial ischemia; [2] coronary angiography confirmed no coronary stenosis or stenosis <50%; [3] excluding other special diseases that can cause AMI, such as pulmonary embolism. In this case, the patient was a young male with troponin above the upper limit and myocardial dysfunction, and emergency coronary angiography indicated 30% vascular stenosis, consistent with the diagnosis of MINOCA.

3.2 Main occurrence Mechanism:

The occurrence mechanism of MINOCA is relatively complex, associated with coronary atherosclerotic plaque rupture, thromboembolism, coronary dissection, coronary spasm and coronary microcirculation. A study showed that 91% of patients with coronary artery spasm smoke. This case patient had a history of swimming before disease onset, which may be related to oxidative stress, psychosomatic stress, cold exposure, and autonomic dysfunction [3]. The blood flow velocity is significantly slower, and the mechanism may be related to the coronary microcirculation dysfunction (coronary microvascular dysfunction, CMD).

3.3 Causes Japanese scholars proposed that MINOCA is only a temporary diagnosis, and further investigation should be conducted.

Plaques can be detected and evaluated by advanced intraluminal imaging methods such as endovascular ultrasound (IVUS), optical coherence tomography (OCT), and thrombus tendency detection, coronary spasm provocation test, and cardiac magnetic resonance examination (CMRI) to identify the underlying ischemic cause [4]. In recent years, with the advent of the era of precision medicine, coronary functional assessment of [5] plays an important role in guiding revascularization and evaluation of coronary microcirculation. Coronary angiography-based microcirculation resistance index (caIMR) is recommended as an indicator for the assessment of coronary microcirculation, which is simple, rapid, and requires no pressure wire or adenosine. Using automatic caFFR algorithm based on X-ray contrast images, select the contrast results of 2 individual positions (2 individual positions 30), extract coronary angiography images by offline software FlashAngio, generate coronary 3 D model, calculate coronary flow velocity, coronary mesh, and calculate caFFR, caIMR, where caIMR> 40 can be considered to be coronary microvascular disorder [6].caFFR 0.95, caIMR 46.0. Therefore, the patient had coronary microcirculation disorders.

This case is a case of swimming-related MINOCA, and a diver-related MINOCA case has been reported abroad, whose prolonged exposure to water may cause sympathetic excessive excitation and autonomic dysfunction. However, chest pain related to swimming or diving may consider arterial gas embolism or decompression disease, but at the same time, acute coronary events cannot be excluded. Due to the presence of metal in the patient, CMR could not be performed, but coronary microcirculation disorder was suggested by the functional evaluation based on coronary angiography. The patient took nikridil regularly outside the hospital to improve the microcirculation, and after 3 months of follow-up, the myocardial perfusion returned to normal, and the prognosis was good. This case aims at the diagnosis of MINOCA, revealing its etiology, and the “one-stop” accurate evaluation of the overall coronary condition with function and anatomy.

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