

# **A case report: simple papillary muscle vegetation caused by infective endocarditis and confirmed by PET-CT**

## **[Abstract]**

Infective endocarditis was a cause that can not be ignored in patients with clinical fever, which was often missed and misdiagnosed because of the diversity of clinical manifestations. This paper reported a case of infective endocarditis diagnosed by echocardiography and PET-CT due to recurrent fever. The patient was an elderly woman with a history of 20 years of type 2 diabetes and 5 years of hypertension. The first symptom was recurrent fever. After admission, the relevant examination did not determine the cause, and later echocardiography found that the papillary muscle vegetation was attached and diagnosed as infective endocarditis.

## **[Abbreviations]:**

LV = left ventricular, LA = left atrial, RV = right ventricular, AA = aorta ascendens

## **[Keywords]**

Infective endocarditis; recurrent fever; echocardiography; PET-CT

## **1 Clinical data**

The patient was a 68-year-old female with a history of type 2 diabetes for 20 years and hypertension for 5 years. The patient had no obvious cause of fever 4 days ago, the highest body temperature was 38.4 °C, with general muscle pain, head swelling, no cough, expectoration, hemoptysis, no abdominal pain, diarrhea, chest tightness, suffocation, no chest pain, no urgent urination, frequent urination, pain, no night sweats. She was diagnosed as “upper respiratory tract infection” in the community hospital. The effect of cefotaxime sodium and levofloxacin injection was not good, and there was no decrease in body temperature. In the fever clinic of the respiratory department of the third B Hospital, routine blood examination: WBC count  $18.97 \times 10^9 / L$ , neutrophil count  $16.28 \times 10^9 / L$  Magi C-reactive protein 66.18mg/L. Chest CT examination showed thickening of bronchovascular bundles in both lungs, micronodules in the left upper lobe and nodules in the anterior superior mediastinum. Diagnosed as “fever”. It was recommended that the patient be hospitalized, refuse, and

continue to return to the community for intravenous infusion treatment. The body temperature still had no obvious downward trend, and the symptoms of muscle soreness were not relieved. The blood routine examination was performed in the emergency department of our hospital. The white blood cell count was  $21.85 \times 10^9 / L$  and the neutrophil count was  $18.71 \times 10^9 / L$ . Blood glucose: 16.3 mmol shock L; urine routine: urine glucose 3%, ketone body 3+. Diagnosed as "fever, diabetic ketosis". The effect of piperacillin tazobactam on anti-infection, hypoglycemia and fluid replacement was not good. For further diagnosis and treatment, the department of geriatrics in our hospital was admitted to the geriatrics department of our hospital with "fever". Physical examination: T 38.4 °C , P: 122bpm, R18bpm, BP140/73mmHg. Clear mind, no swelling of superficial lymph nodes, no rash in skin and mucous membrane, clear breath in both lungs, no dry-wet rale, arrhythmia, no pathological murmur in each valve auscultation area, flat and soft abdomen, no tenderness and rebound pain.

Sputum smear, sputum culture, respiratory pathogen antibody, nucleic acid detection of Mycobacterium tuberculosis complex, vasculitis antibody, antinuclear antibody (ANA), antinuclear antibody spectrum, seven items of thyroid function and tumor standard were all normal. White blood cells (WBC)  $21.15 \times 10^9 / L$ , neutrophils  $18.37 \times 10^9 / L$ , neutrophils 86.8%, C-reactive protein 243.55mg/L, erythrocyte sedimentation rate 96mm/h, procalcitonin 0.83ng/mL. Chest CT showed small nodules in the upper lobe of the left lung, which did not change much, and a little effusion in the pericardium. Transthoracic echocardiographic (TTE) examination on the same day showed mild aortic regurgitation, a very small amount of pericardial effusion, left ventricular ejection fraction (LVEF) :56%. Ten days later, transthoracic echocardiography showed that the echo at the junction of mitral papillary muscle and chordae tendineae was significantly enhanced (figure 1), a very small amount of pericardial effusion, LVEF:58%. In order to make a definite diagnosis, transesophageal echocardiography ((TEE),) showed that strong echo attachment was found in the mitral papillary muscle (figure 2), the range was about  $1.0 \times 0.7\text{cm}$ ,  $0.8 \times 0.6\text{cm}$ , the swing was not obvious, the shape of each valve was normal, and no obvious abnormal echo attachment was found. TEE diagnosis: infective endocarditis (mitral papillary myophyte formation). PET-CT showed that a large and a small increased area of fluorodeoxyglucose (FDG) metabolism was seen in the mitral papillary muscle area of the left ventricle (figure 3). During this period, many blood cultures were negative. Clinical anti-infective treatment such as vancomycin was

given. 4 weeks later, transthoracic echocardiography showed that the hyperechoic area of mitral papillary muscle was smaller than that before (figure 4).



FIG.1

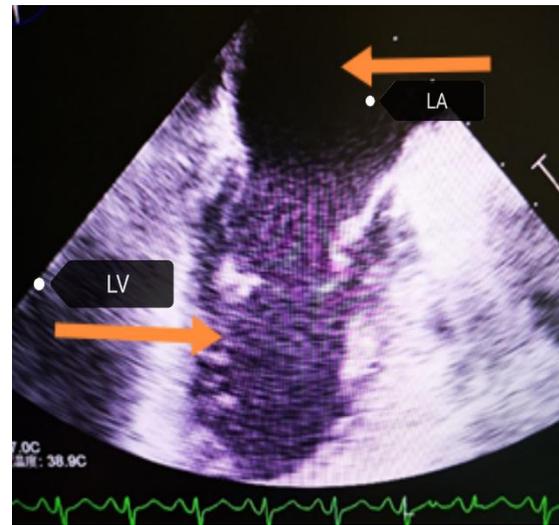


FIG.2

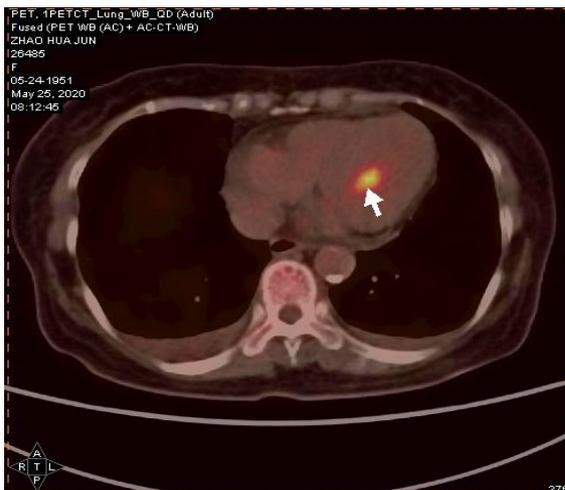


FIG.3

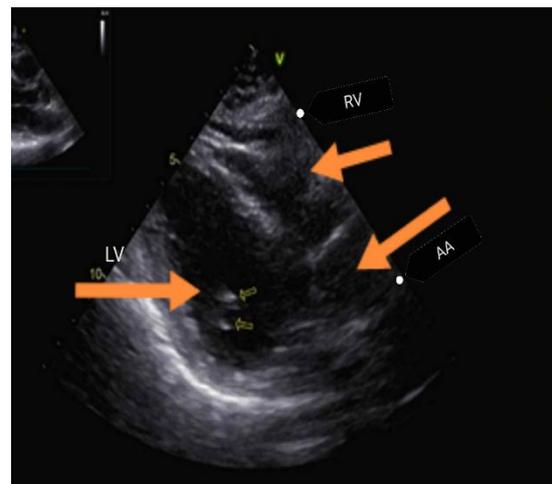


FIG.4

## 2 Discussion

Infective endocarditis ((IE)) was a disease caused by bacteria, fungi and other pathogens that infect the endocardium of the heart, which was easy to involve the heart valve to form vegetations. The pathogenic bacteria could be bacteria, fungi, viruses, Rickettsia, chlamydia, spirochetes and other microorganisms. The pathogenic bacteria directly infect the heart valve or the intima of the ventricular wall, and the most easily affected site was the valve, especially the damaged valve. Therefore, the clinical

symptoms and ultrasonic manifestations were mainly valve damage and the formation of vegetations [1], most of the clinical manifestations were recurrent fever as the first symptom. There may be shortness of breath, chest tightness, palpitation and so on. At the same time, cardiac insufficiency, embolism, cerebral hemorrhage, chronic kidney disease and multiple organ dysfunction syndrome may occur in the course of the disease [2]. In this case, such vegetations that occur only on the papillary muscle were relatively rare. If the vegetations fall off, it was easy to cause arterial thrombosis and even lead to death, so it was particularly important to make early diagnosis of IE, especially to determine whether there were vegetations and to determine the location and size of the vegetations.

Echocardiography was an important method for the diagnosis of IE. Transesophageal echocardiography put the probe in the middle and lower part of the esophagus, which avoids the interference of lung gas, fat thickness and other factors, and can improve the diagnostic sensitivity. Some studies had shown that the sensitivity of transthoracic echocardiography ((TTE)) and transesophageal echocardiography ((TEE)) in the diagnosis of IE is 40%, 63% and 90%, respectively [3]. In recent years, with the continuous improvement of ultrasound diagnostic equipment, the continuous improvement of the diagnostic level of ultrasound doctors and the in-depth understanding of IE, the diagnostic rate of IE by transthoracic echocardiography has been improved. This case was the first case in which TTE found echo enhancement at the junction of mitral papillary muscle and chordae tendineae and further diagnosed by TEE.

PET/CT was the most advanced combination of nuclear medicine and CT. At present, it was mainly used for early diagnosis of tumors. It was of great value in determining the nature of lesions, surgery and radiotherapy. In terms of cardiovascular diseases, PET/CT was more widely used in the diagnosis of occult, high-risk and difficult coronary heart disease, judging cardiomyocyte activity and monitoring before and after interventional therapy[4]. In 2015, ESC flowchart mentioned that PET/CT can be used in the diagnosis and identification of endocarditis or instrument infection, but there were few reports. On the basis of the combined application of TTE and TEE, and further confirmed by PET-CT, the diagnosis of this case was more definite.

To analyze the reasons why no vegetations were found in the first transthoracic echocardiography on the day of admission, there were mainly the following points: (1)

it was rare for vegetations to occur on the papillary muscle, and the diagnostic doctors did not have enough experience or knowledge about it. (2) the history of the patient was short, and the vegetations were not formed or too small, so it was not easy to find TTE. (3)The self-reported patients took antibiotics before admission and the blood culture was negative for many times, and the clinical symptoms were not typical. (4) It was ignored that the patient had a 20-year history of diabetes, which was a potential factor for the occurrence of IE [5].

Therefore, although the clinical diagnostic value of TEE in infective endocarditis was significantly higher than that of TTE, because TTE had the advantages of non-invasive, simple and good reproducibility, it was more suitable for clinical routine application and curative effect observation. For IE patients with atypical clinical symptoms, ultrasound doctors should be more vigilant in the process of TTE examination, not only multi-section, multi-site careful exploration, but also detailed inquiry of medical history and symptoms. If conditions permit, PET-CT can be further diagnosed on the basis of the combined application of TTE and TEE, so as to make a diagnosis as soon as possible and point out the correct direction for the treatment of the patients.

## References

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