

Technetium-99m-ubiquicidin scintigraphy in the detection of infective endocarditis

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Abstract

We present a case of infective endocarditis diagnosed by the increased ^{99m}Tc-UBI specific uptake in the tricuspid valve region. Our case data may indicate a first pass-like distribution with strong avidity of the tracer to infective endocarditis region, facilitating image interpretation.

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Introduction

Technetium-99m labeled cationic antimicrobial peptides, like ubiquicidin 24-41 (^{99m}Tc-UBI) significantly bind to microorganisms [1-3]. This radiopharmaceutical may be considered an alternative agent besides echocardiography [4] and other nuclear medicine techniques, like fluorine-18 fluorodeoxyglucose positron emission tomography (¹⁸F-FDG PET), technetium-99m-labelled antigranulocyte monoclonal antibody Fab fragments or indium-111 leukocyte scintigraphy, in the detection of infective endocarditis (IE) [5-7].

Case report

We present a case of infective endocarditis diagnosed by the increased ^{99m}Tc-UBI specific uptake in the tricuspid valve region. A 24 years old woman, a known case of Down syndrome was referred to our department for confirmation of the diagnosis of IE. The diagnosis of IE was based on modified Duke's criteria [8, 9]. Duke's criteria are a group of major criteria e.g. positive blood culture with typical IE microorganisms, evidence of endocardial involvement with positive echocardiogram and also minor criteria e.g. fever >38°C, or evidence of embolism, all applied to establish the diagnosis of endocarditis. The patient had fever, malaise and endurance fatigue [8, 9]. A systolic murmur was audible upon her physical examination. The patient had undergone trans-thoracic echocardiography (TTE), which showed: perimembranous ventricular septal defect (VSD) about 7mm with left to right shunt, thick and myxomatous tricuspid valve (TV) with moderate tricuspid regurgitation, a large highly mobile mass (24×14mm) on the atrial side of septal leaflet, most probably vegetation and also pericardial effusion (Fig. 1). Scintigraphic scans were performed immediately after the intravenous (i.v.) injection of 740MBq of ^{99m}Tc-UBI, using a γ-camera (E. Cam, Siemens, Germany). Dynamic images were acquired for 100sec for each frame up to 30min over the precardium (Fig. 2). Spot views and also SPET imaging of the heart region were acquired at 60, 120, and 240min post-injection to identify the most favorable imaging time (Fig. 2). Furthermore, a spiral chest CT scan was carried out. It showed mild to moderate pericardial effusion and mild cardiomegaly. In addition, significant mediastinal lymphadenopathy in preaortic and right paratracheal regions was seen on chest CT. The patient received intravenous cefixim for one month until the general condition stabilized, and then she was discharged from the hospital.

Technetium-99m UBI has been used as a diagnostic agent in mediastinitis after cardiac surgery [10], in fever of unknown origin [11], in bone infection [12] and in other diseases being able to distinguish infection from inflammation as early as few minutes post injection [2]. It was also shown that ^{99m}Tc-UBI uptake was correlated with the number of viable bacteria, and could be applied for monitoring the result and effectiveness of antibiotic treatment [2, 3].

Technetium-99m-labeled UBI 29-41 is a small synthetic peptide which derives from human UBI and binds to bacteria in vitro [1, 3]. This radiopharmaceutical does not localize in sterile inflammation and may be an option for leukocyte labeling [13]. It may detect IE as described in the present case and also other infections in our body [3]. On the other hand, the poor spatial resolution of such a scan may cause lower sensitivity in detecting IE.

There was a study regarding the role of ^{99m}Tc -UBI scans in IE in an animal model [13]. To our knowledge, this is the first clinical case report to present ^{99m}Tc -UBI scan in the detection of IE in humans.

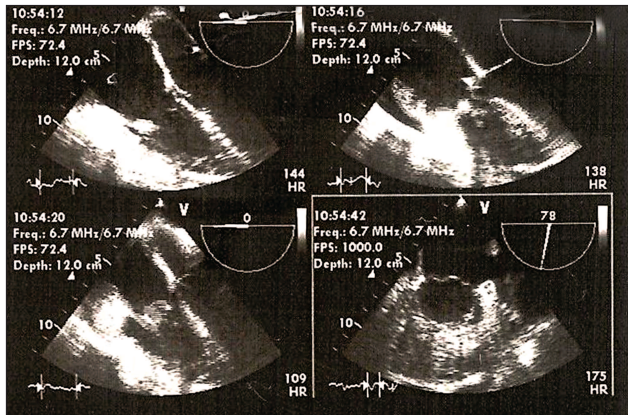


Figure 1. The trans-thoracic echocardiography (TTE) showed perimembranous VSD about 7mm with left to right shunt; thick and myxomatous tricuspid valve (TV) with moderate tricuspid regurgitation, a large highly mobile mass (24×14mm) on the atrial side of septal leaflet, most probably vegetation; and also pericardial effusion.

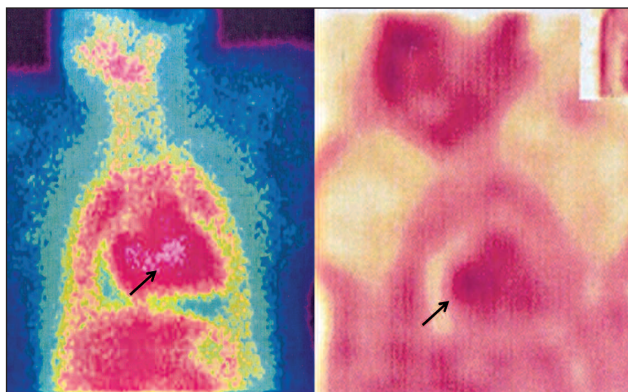


Figure 2. There is significant activity in the tricuspid valve region in the anterior planar views of ^{99m}Tc -UBI (SPET) scintigraphy of a 24 years old woman which is most striking immediately after the intravenous injection. Also, a coronal view using SPET mode at 60min of the ^{99m}Tc -UBI scintigraphy showed activity at the same site.

In conclusion, our data indicated, using SPET scan, first pass distribution of ^{99m}Tc -UBI, strong avidity of the tracer to infective endocarditis region and also enabled fast image interpretation.

The authors declare that they have no conflicts of interest.

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