

Whether the Valve or the Septic Embolus Is Actively Infectious: A Possible Role of Gallium-67 Scan in a Patient of Infective Endocarditis Complicated with Septic Emboli

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We reported a case of infective endocarditis involving the mitral valve and complicated with septic embolus to the right popliteal artery. After 6 weeks of antibiotic treatment, hemodynamic condition of the patient was stable but fever persisted. Echocardiography showed disappearance of the vegetation that was seen on the initial echocardiogram. Occlusion of the right popliteal artery by septic emboli was suspected by clinical findings and proved by duplex and magnetic resonance angiogram. Gallium-67 (⁶⁷Ga) scan revealed increased uptake over the right leg but not the heart. After embolectomy (without open heart surgery), the fever subsided. This case report suggests the possibility that ⁶⁷Ga scan may play a role in this situation to find the infectious focus and avoid unnecessary open heart surgery.

Key words: infective endocarditis, septic embolism, ⁶⁷Ga inflammation scan

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Infective endocarditis may be complicated by embolization of vegetation fragments or hematogenous spread of microorganism to a distant site, causing another focus of infection. When this happens, it is often difficult to differentiate whether the cardiac valves and/or the distant site are actively infective. Recognizing which site is actively infective is important because it helps in planning for further management. If the cardiac valve is actively infective, then open heart surgery is commonly suggested. This surgery is controversial when the distant site is the only infective site. We present a case of infective endocarditis involving the mitral valve complicated by septic embolism to the right popliteal artery. Peripheral embolectomy without cardiac valve replacement was performed, successfully eradicating all infectious signs. The role of gallium scan in this case for determining the actively infective site is discussed.

Case Report

A 72-year-old female was admitted to our ward in September 2001 with the chief complaint of fever for 1 week. She was known to have valvular heart disease since youth without activity limitation. She also had a history of hypertension for 10 years without medical treatment. She had no history of other major diseases. She had an endoscopic examination for peptic ulcers with bleeding 10 days before she came to our hospital. On admission, physical examination revealed a grade 3/6 systolic murmur over the apex. Limb pulsation was strong and symmetric. Echocardiography showed moderate to severe mitral regurgitation and a free-

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floating vegetation (19×13 mm) on the posterior mitral leaflet (Figure 1). Blood culture later revealed oxacillin-resistant *Staphylococcus epidermidis*. Infective endocarditis was diagnosed and vancomycin was given. Because of deterioration of renal function, the antibiotic was changed to teicoplanin 1 week later, with dose adjustment according to body weight and renal function.

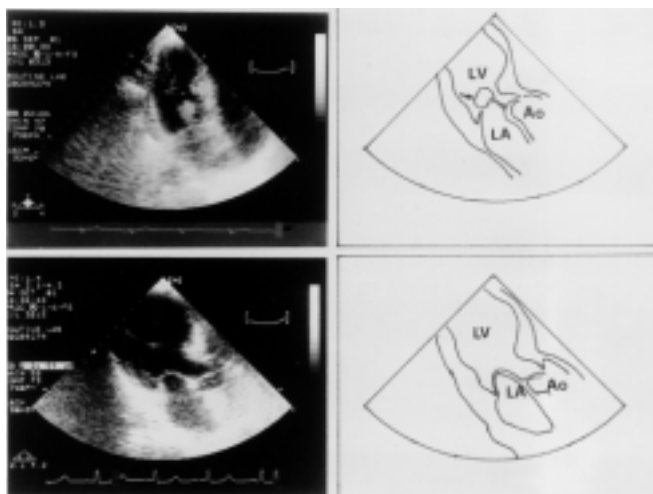


Figure 1. Echocardiogram shows vegetation over mitral valves (upper); no vegetation found after antibiotics treatment for 4 weeks (lower).

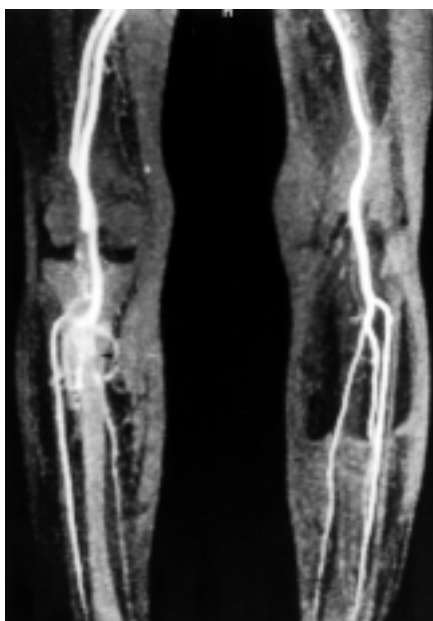


Figure 2. Magnetic resonance angiogram shows occlusion over right popliteal artery (arrow head).

With antibiotic treatment, the patient's general condition improved and her white blood cell count (WBC) and erythrocyte sedimentation rate (ESR) decreased. Nonetheless, she still had episodes of spiking fever. Cardiac valve surgery was suggested to her for fear that the large vegetation might cause septic embolization but she refused. At the beginning of the 5th week of antibiotic treatment, the patient complained of pain in the posterior aspect of the right knee. Physical examination revealed local heat and tenderness in the popliteal fossa of the right leg. The right lower leg was slightly colder than the left and the pulse of the dorsal pedal artery of the right leg was weaker than the left. Follow-up examinations revealed WBC count, ESR and body temperature rose again. Occlusion of the right popliteal artery was suspected and was confirmed by duplex examination and magnetic resonance angiogram (Figure 2). Repeated echocardiography showed moderate to severe mitral regurgitation, as before, but the vegetation on the mitral valve seen on the previous echocardiogram was absent (Figure 1). A gallium-67-citrate (^{67}Ga) scan was performed and it revealed increased uptake in the right knee, but not in the heart (Figure 3).

Under the impression of distal embolization of the

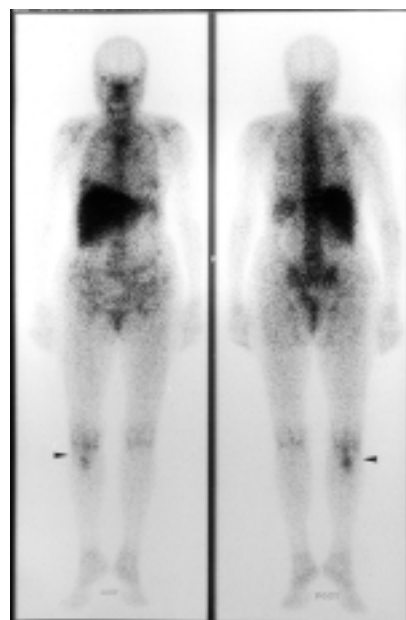


Figure 3. Anterior (left) and posterior (right) views of ^{67}Ga scan show increased uptake over right knee (arrow head).

mitral valve vegetation to the right popliteal artery, peripheral embolectomy was suggested but the patient refused. Fever and elevated WBCs and ESR persisted even after a complete 6-week course of antibiotic treatment. An embolectomy in the right popliteal artery was finally performed. During surgery, frank pus was found around the popliteal artery and necrotic disruption of the peroneal artery was noted. The pus culture showed no growth of bacterial.

After surgery, the patient's fever subsided, and the WBC count and ESR returned to normal. Antibiotic therapy was continued for 1 more week. The patient was discharged and was uneventfully monitored at the out patient clinic. Echocardiography done 3 months later revealed no vegetation on the mitral valve.

Discussion

Vegetations on heart valves are potential sources for systemic embolization. The incidence of distal embolization in infective endocarditis is reported to be about 30% [1]. Embolization may be related to incomplete sterilization of large vegetations. Patients with large floppy vegetations in the left heart on echocardiography are at high risk of embolization, with a peak at about 2 to 3 weeks after the onset of endocarditis [2].

It is generally accepted that cardiac valve replacement is necessary in patients with infective endocarditis and septic embolism when persistent large vegetations, recurrent embolization, or unstable hemodynamics are noted [1,3,4]. However, in the absence of the above conditions, management for patients with infective endocarditis and septic embolism is controversial. Becker et al. [5] suggested cardiac valve replacement after only one major embolic event because many patients have multiple embolizations and some of them will have a crippling embolism under medical treatment only. Nakayama et al. [2] reported 4 patients with infective endocarditis and septic embolism who were managed with medical therapy only. Two of them died later due either to ruptured aortic aneurysm or recurrent cerebral embolism; the last patient even had no visualized cardiac valve vegetation on echocardiogram after the first embolism. Thus, early cardiac valve replacement has been suggested to prevent recurrent embolization [2]. In our patient, embolec-

tomy but not cardiac valve replacement, was performed due to the patient's refusal of open heart surgery. Embolectomy successfully eradicated infection signs, including fever, leukocytosis and elevated ESR. No evidence of recurrence of infective endocarditis or repeated septic embolization was noted after a follow-up period of 4 months. When combined with the two other cases reported by Nakayama et al. in which medical treatment resulted in an uneventful course [2]. Our case may further suggest that open heart surgery is not always necessary in patients with infective endocarditis complicated by distal embolization. Detection and eradication of the infection source may be the most important key to successfully treating these patients. Because embolization may be related to incomplete sterilization of large vegetations [2]. If a cardiac valve was actively infectious, valve replacement would be necessary to halt the inflammation process that leads to new vegetation formation and further embolization. In the absence of an infected cardiac valve, treatment of only the infected peripheral site may be adequate.

⁶⁷Ga scan has been used to detect inflammation and/or infection. For patients with infectious endocarditis, it is reported to detect newly developed infectious endocarditis [6], infectious endocarditis before the onset of clinical symptoms [7] or local spread to the pericardium [8]. Furthermore, ⁶⁷Ga scan is reported to show intense inflammatory activity around valves in which the echocardiography did not demonstrate vegetation or abscess formation, but it was later confirmed by autopsy findings [9]. To detect infectious activity when vegetation is not visualized on echocardiogram is important. One of the four patients treated medically by Nakayama et al. had no visual vegetation on echocardiogram when the first episode of embolization occurred [2]. He then had a second embolism in the cerebral circulation. In our patient, echocardiogram didn't show vegetation on the mitral valve leaflets and a ⁶⁷Ga scan showed no infectious activity on the cardiac valves. The patient was treated with embolectomy only but the infection disappeared thereafter. Taking these two patients into account, ⁶⁷Ga scan may be helpful to detect infectious activity even there is only subtle valvular change on echocardiography. Perhaps, it will help us to differentiate which patients have a higher risk for an ongoing infectious process and further complications and who

deserves open heart surgery.

For patients with peripheral embolism, Kitts et al. [10] suggested: (1) embolectomy with simultaneous cardiac valve replacement; (2) embolectomy if the cardiac condition is stable; (3) medical treatment if there is no threatening ischemia. They treated 4 of 10 patients with infectious endocarditis complicated with septic embolism medically; ischemia of all the 4 patients resolved successfully. One of them had an embolism occluding the left common iliac artery. They treated him with antibiotics and anticoagulant only and the patient regained full femoral and distal pulse later [10]. Nakayama et al. [2] suggested that if there were sufficient bacteria in the embolus, septic vasculitis might lead to mycotic aneurysm; early embolectomy might prevent formation of infected aneurysm. Our patient, refused to undergo embolectomy for septic embolism because she had slight claudication but no threatening ischemia, although the embolus occluded the right popliteal artery. ^{67}Ga scan revealed increased uptake over the popliteal artery. When she agreed to surgery 2 weeks later, there was necrotic disruption of the peroneal artery and frank pus around the popliteal artery. It seems logical that if we could differentiate which embolus is actively infectious and has a larger amount of bacteria, then early embolectomy may be helpful to prevent mycotic aneurysm formation. The pus culture of our patient showed no growth of bacterial, it might be that the amount of bacterial decreased after antibiotic treatment for two more weeks (the time between the ^{67}Ga scan and the surgery).

In conclusion, with the aid of ^{67}Ga scan we might be able to identify those patients at lower risk and treat them medically. Further study is necessary.

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區別心臟瓣膜或菌塊栓塞確實在感染中：鎳-67掃描在心內膜炎 合併菌塊栓塞患者可扮演的角色

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我們提出一位患有二尖瓣心內膜炎合併菌塊栓塞到右腳脛動脈的患者。病人在六週有效的抗生素治療後仍持續發燒但是血行動力學狀況穩定。心臟超音波顯示原本在二尖瓣上的菌塊已經消失，臨床現象及超音波和核磁共振血管攝影證實菌塊栓塞到右腳脛動脈。鎳-67掃描顯現出在右腳脛動脈而不是二尖瓣有較強的發炎反應。在栓塞摘除術後，病人的燒就退了。我們認為鎳-67掃描在這個情況下可能可以幫忙找出真正的感染源而避免不必要的心臟手術。

關鍵詞：感染性心內膜炎，菌塊栓塞，鎳-67炎症掃描

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