

Detection of an Infected Abdominal Aortic Aneurysm With Three-Phase Bone Scan and Gallium-67 Scan

Chien-Chin Hsu, MD,* Ying-Fong Huang, MD,†‡ and Ya-Wen Chuang, MD†

Abstract: Infected aortic aneurysm is an uncommon life-threatening disease. A 68-year-old man had a history of type 2 diabetes mellitus and repeated urinary tract infections. He presented with fever, chills, low back pain, leukocytosis, and *Salmonella* group B bacteremia. For evaluation of suspected lumbar vertebral osteomyelitis, a 3-phase bone scan and a gallium-67 scan were performed. An abdominal aortic aneurysm was noted incidentally on the blood flow and blood pool phase images. Gallium-67 scan demonstrated increased radioactivity within the soft tissues surrounding the aneurysm, which was suggestive of an infected abdominal aortic aneurysm. The previously unsuspected infected abdominal aortic aneurysm was confirmed by computed tomography.

Key Words: infected abdominal aortic aneurysm, three-phase bone scan, gallium-67 scan, mycotic aneurysm, vertebral osteomyelitis

(*Clin Nucl Med* 2008;33: 305–307)

Received for publication July 18, 2007; revision accepted November 1, 2007. From the *Department of Nuclear Medicine, Pingtung Christian Hospital, Pingtung, Taiwan; †Department of Nuclear Medicine, Kaohsiung Medical University Hospital, Kaohsiung, Taiwan; and ‡Department of Nuclear Medicine, College of Medicine, Kaohsiung Medical University, Kaohsiung, Taiwan.

Reprints: Ya-Wen Chuang, MD, Department of Nuclear Medicine, Kaohsiung Medical University Hospital, No.100, Tzyou 1st Road, Kaohsiung 807, Taiwan. E-mail: ywchuang@kmu.edu.tw.

Copyright © 2008 by Lippincott Williams & Wilkins
ISSN: 0363-9762/08/3304-0305

REFERENCES

1. Ailawadi G, Eliason JL, Upchurch GR. Current concepts in the pathogenesis of abdominal aortic aneurysm. *J Vasc Surg.* 2003;38:584–588.
2. Müller BT, Wegener OR, Grabitz K, et al. Mycotic aneurysms of the thoracic and abdominal aorta and iliac arteries: experience with anatomic and extra-anatomic repair in 33 cases. *J Vasc Surg.* 2001;33:106–113.
3. Carson BJ, McEwan AJ, Hoskinson ME, et al. Detection of an abdominal mycotic aneurysm on three-phase bone scan. A case report. *Clin Nucl Med.* 1995;20:267–269.
4. Duarte PS, Zhuang H, Aldighieri F, et al. Incidental detection of an abdominal aortic aneurysm during evaluation of gastrointestinal bleeding with Tc-99m tagged erythrocytes. *Clin Nucl Med.* 2002;27:824.
5. Chua R, Rees D. Mycotic coronary artery aneurysm detected by gallium-67 scintigraphy. *Heart Lung Circ.* 2004;13:101–105.
6. Ben-Haim S, Seabold JE, Hawes DR, et al. Leukocyte scintigraphy in the diagnosis of mycotic aneurysm. *J Nucl Med.* 1992;33:1486–1493.
7. Cortes J, Alonso JI, Ruiz-Oliva F, et al. Tc-99m HMPAO-labeled leukocytes in the diagnosis of mycotic aneurysm. *Clin Nucl Med.* 2002;27:817–818.
8. Vijayakumar V, Shah RK. Role of delayed Tc-99m HMPAO labeled leukocyte scintigraphy in the diagnosis of coronary mycotic aneurysm. *Clin Nucl Med.* 2005;30:682–684.
9. Davison JM, Montilla-Soler JL, Broussard E, et al. F-18 FDG PET-CT imaging of a mycotic aneurysm. *Clin Nucl Med.* 2005;30:483–487.
10. Azizi L, Henon A, Belkacem A, et al. Infected aortic aneurysms: CT features. *Abdom Imaging.* 2004;29:716–720.

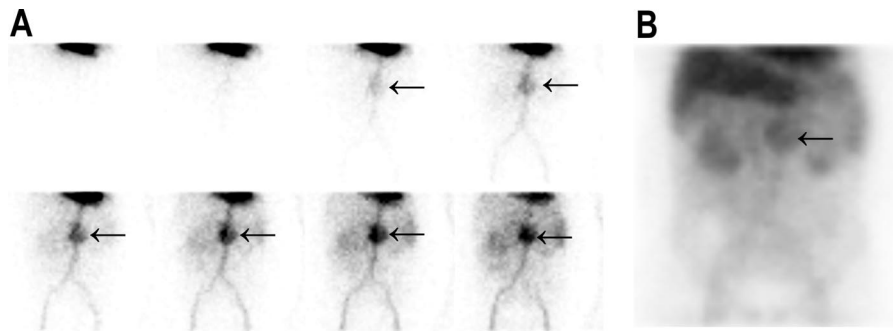


FIGURE 1. A 68-year-old man who had a history of type 2 diabetes mellitus presented with fever and chills with a 3-day duration. He had repeated urinary tract infections for 3 months. At our emergency room, leukocytosis (white blood cell count, 20,860 cells per cubic millimeter) was noted and urinalysis showed pyuria. During his admission to the hospital, he complained of low back pain. Physical examination revealed knocking pain over the lumbar spine area. Both urine and blood cultures grew *Salmonella* group B. For evaluation of suspected lumbar vertebral osteomyelitis, a 3-phase bone scan and a gallium-67 scan were performed. After intravenous bolus injection of 740 MBq (20 mCi) Tc-99m methylene diphosphonate (MDP), dynamic blood flow, and static blood pool images were obtained. An unsuspected abdominal aortic aneurysm (AAA) with sacular tracer accumulation in the midabdomen (arrows) was seen on the anterior view of the dynamic blood flow (A, 2-second frames) and static blood pool images (B).

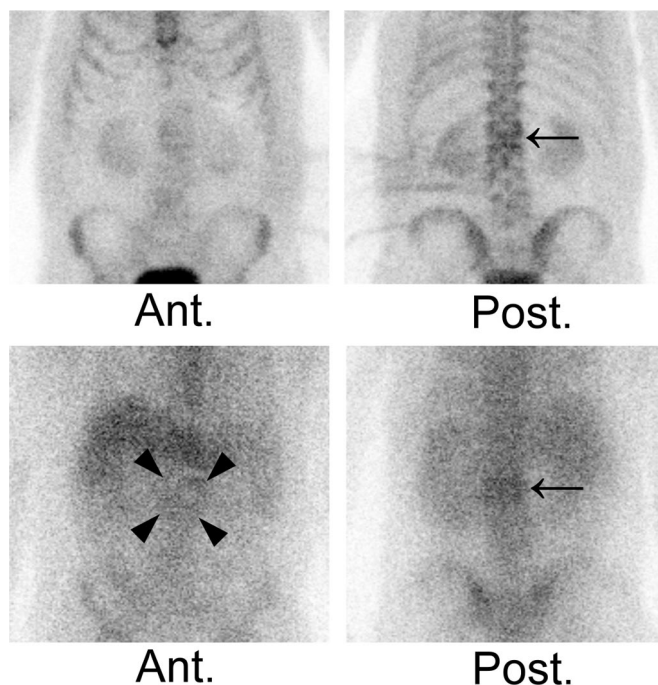


FIGURE 2. The delayed phase (3-hour) images of the bone scan (upper row) revealed mildly increased radioactivity in the lumbar spine (arrow). After completion of the bone scan, 111 MBq (3 mCi) gallium-67 citrate was administered intravenously. The 24-hour gallium-67 images (lower row) showed increased radioactivity in the lumbar spine (arrow). The gallium-67 images also showed mildly increased radioactivity in the midabdomen (arrowheads) with central photopenia. The abnormal gallium-67 accumulation corresponded to the soft tissues surrounding the aneurysm, which was suggestive of an infected AAA.

AAA is thought to be a degenerative process of the abdominal aorta. AAAs occur more frequently in males than in females, and the incidence increases with age. AAAs may affect 1% to 2% of men older than 50 years. The pathogenesis of AAAs is complex and multifactorial.¹ Infected AAA is a rare but life-threatening condition.² The infection damages and weakens the arterial wall and accelerates a rapid dilation of the aneurysm. Two main routes result in infected aneurysms. The first route refers to a source of septic emboli or bacteremia. The second route refers to an extra-aortic infection, such as spondylodiscitis, with secondary invasion of the adjacent aorta. Infected AAAs have a high mortality rate if diagnosis is delayed or missed. There are, however, few early signs or symptoms other than those of occult infection.

In nuclear medicine images, aneurysms have been reported as an incidental finding in the blood flow and blood pool studies using Tc-99m MDP or Tc-99m tagged erythrocytes.³⁻⁴ Infected aneurysms can also be detected with radiotracer for localizing infection, such as gallium-67, In-111 leukocytes, Tc-99m hexamethylpropylene amine oxime (HMPAO) labeled leukocyte, and F-18 fluorodeoxyglucose (FDG).⁵⁻⁹ Gallium-67 scan is widely used for imaging infection but is not reliable in the abdomen because of physiological bowel activity. In this case, the abnormal gallium-67 accumulation in the midabdomen can be misinterpreted as normal bowel activity if unaware of the aneurysm.



FIGURE 3. Computed tomography (CT) with contrast is the first choice of imaging studies to disclose vascular and associated perivascular abnormalities.¹⁰ According to the findings of nuclear medicine images, an emergent contrast-enhanced abdominal CT was performed. The CT images showed a large, saccular abdominal aortic aneurysm (arrow) and a periaortic hypodense soft tissue mass with gas formation (arrowheads) surrounding the aneurysmal aorta. The patient was transferred to our medical center for surgical intervention. Cultures from operative specimens also grew *Salmonella* group B. The patient died on the third day after operation.