Actinomycosis is an uncommon chronic infectious disease caused by Actinomyces. There are three distinct forms of the condition, namely cervicofascial, thoracic, and abdominal; the hepatic variety is an unusual form of abdominal actinomycosis, accounting for about 15% of cases of this type. Many reports of actinomycosis have been published, but few have detailed the MR findings of hepatic actinomycosis. We describe the contrast-enhanced CT and MR findings in one case of hepatic actinomycosis.

Index words: Actinomycosis, liver  
Actinomycosis, MR

Case Report

A 47-year-old woman presented with a history of chronic cough and fever extending over a two-month period, and pain in the right upper abdominal quadrant which had developed several days earlier. Her past clinical history was unremarkable. Physical examination showed that she was febrile and had tenderness in the right upper abdomen and right flank area, as well as lower chest pain. Plain radiography of the chest revealed multiple bilateral ground glass opacity and some nodular consolidation. Abdominal ultrasonography demonstrated the presence of an ill-defined, heterogeneous, mixed echoic mass, about 7 x 5 cm in size, in the right hepatic lobe just lateral to the right hepatic vein. Doppler sonography revealed no significant vascularity.

Precontrast abdominal CT scans showed that the liver contained a large, slightly attenuated mass, seen at arterial-phase contrast-enhanced CT as a relatively well demarcated, mildly enhancing lesion surrounded by highly attenuated liver parenchyma, and at delayed-phase imaging as an inhomogeneous, slightly attenuated mass with peripheral thin rim enhancement (Fig. 1A). One daughter nodular lesion was also present.
**Fig. 1.** 47-year-old woman with hepatic actinomycosis.

**A.** Arterial phase CT shows a mildly enhancing mass (arrow) surrounded with hyperemic inflammatory change of the adjacent liver parenchyma (arrowheads).

**B.** Delayed phase CT shows a slightly enhancing, low attenuated mass and weak rim enhancement.

**C.** Axial spin-echo T1-weighted MR image (TR/TE = 120/4.2) shows a well-defined, homogeneous low signal intensity mass in the liver (arrows).

**D.** Axial fast spin-echo T2-weighted MR image (TR/effective TE = 7500/104) shows a heterogeneous high signal intensity mass and hyperintense rim and increased signal intensities in the adjacent liver parenchyma.

**E.** Arterial phase contrast-enhanced axial echo fast gradient-echo 3D MR image (TR/TE = 6.1/1.4) shows inhomogeneous enhancement of the mass with hyperemic change of the adjacent liver parenchyma (arrows).

**F.** Delayed phase contrast-enhanced coronal echo fast gradient-echo 3D MR image (TR/TE = 6.1/1.4) shows enhancing central nodule and septa in the mass with rim enhancement and a daughter abscess (arrowhead).
T1-weighted MR imaging showed that the hepatic dome contained a homogeneous, low signal intensity mass (Fig. 1B), while T2-weighted imaging revealed the presence of a relatively homogeneous, high signal intensity mass with some bright dots and a hyperintense rim (Fig. 1C). Dynamic arterial-phase MR imaging (Fig. 1D) after IV administration of a gadobenate dimeglumine (MultiHance®; Bracco, Milano, Italy) demonstrated a heterogeneously enhancing mass surrounded by hyperintense liver parenchyma. Delayed-phase MR imaging (Fig. 1E) demonstrated strongly enhancing solid nodular components in the central portion of the mass, and numerous fine septa and thin rim enhancement mimicking a congested bull’s eye.

The patient underwent US-guided fine-needle aspiration biopsy of the hepatic mass. Pathologically, the specimen obtained contained sulfur granules and a granulomatous inflammatory process with aggregates of filamentous gram-positive organisms consistent with Actinomyces. Acid-fast stains of the smears were negative, and no malignant cells or other pathogens were detected.

After diagnosis, the patient was treated with intravenous and oral penicillin-based antibiotics. Her symptoms improved and follow-up examination showed that the liver and lung had decreased in size and their shape had changed.

Discussion

In humans, Actinomyces israelii is the most common cause of actinomycosis and is found in normal flora of the mouth, in gastric aspirates, and in bronchial secretions (1, 2). Actinomycosis commonly occurs in the cervicofacial, thoracic, and abdominal regions. Pulmonary actinomycosis is usually caused by aspiration of infected materials in the oropharynx (5, 6). Abdominal actinomycosis is known to be associated with abdominal surgery, bowel perforation, trauma, or the long-standing presence of an intrauterine device. The ileocecal region, including the appendix and sigmoid colon, are commonly involved abdominal areas, and liver involvement reported in 15% of abdominal cases (1, 3, 7, 8). Actinomycosis of the liver usually arises via the portal vein due to mucosal bowel injury, but may also arise via direct extension or from the hepatic artery during disseminated infection (1, 3, 7).

The CT findings of hepatic actinomycosis include single or multiple abscesses with a thickened wall or septa, the presence of a heterogeneously enhancing solid mass with irregular areas of low attenuation, or a complex cystic lesion (5, 7, 9). Because of the presence of granulations and fibrous tissues, the solid components of actinomycotic masses are seen at delayed contrast-enhanced CT imaging as markedly enhanced lesions (1, 9). In our case, dynamic arterial-phase contrast-enhanced CT scanning demonstrated minimal enhancement within the mass and inflammatory reaction in adjacent liver parenchyma, while delayed-phase CT depicted an inhomogeneously enhancing, slightly attenuated lesion with a thin enhancing rim.

Kasano et al. (3) reported the MR findings of one case of hepatic actinomycosis as the presence of a low-intensity tumor at T1-weighted imaging and a high-intensity tumor at T2-weighted imaging, but did not describe the contrast-enhanced MRI findings. In our case, T1-weighted MR images depicted a low signal intensity mass, while T2-weighted images revealed the presence of a heterogeneous high signal intensity mass with a hyperintense thin rim. Because they are usually composed of abundant granulations and dense fibrous tissues, the central solid components of the mass were seen at delayed contrast-enhanced imaging as markedly contrast-enhanced lesions. Delayed MR imaging also revealed numerous enhancing septa within the mass and an enhancing rim, though tissue contrast such as enhancing solid components or septa was not demonstrated by CT. This, we believe, was because MR, with the assistance of a liver-targeted contrast agent, is better able to analyze tissue characteristics.

Hepatic actinomycosis has a nonspecific clinical manifestation and radiologic features. Its differential diagnosis includes amebiasis, pyogenic abscess, necrotic or cystic neoplasm, and old hematoma (4). Pyogenic and nonpyogenic abscesses rarely extend into adjacent organs, so findings of diaphragmatic penetration of abdominal wall extension of a liver lesion can help rule out both these types of abscess. Early recognition of hepatic actinomycosis can prevent infiltration of adjacent organs and subsequent surgical treatment of the involved hepatic lobe (2, 3–5). A diagnosis of hepatic actinomycosis should be based on microscopic visualization of typical sulfur granules or recovery of Actinomyces organisms present in anaerobic culture (3).

In conclusion, MR imaging usefully demonstrates the enhancing septa and nodular lesions found in hepatic actinomycosis. Even though we have reported the MR findings of only one case of this, the condition can be in-
cluded in a differential diagnosis if contrast-enhanced MR images depict enhancing solid portions and numerous septa with rim enhancement in a patient with suspected infectious liver disease.

References


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