

ORIGINAL ARTICLE

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The investigating of clinical and radiological findings of hepatic actinomycosis

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Abstract

Actinomycosis is a rare chronic suppurative granulomatous infection of the oropharynx, gastrointestinal, and urogenital tract. Infection most commonly manifests as a cervicofacial disease but less frequently in the thoracic and abdominopelvic region. Hepatic actinomycosis (HA) is rare and usually secondary to abdominal actinomycosis. It can mimic hepatic malignant tumors. There is not enough information in the literature about HA. In this study, radiological and clinical findings of HA cases were investigated. Between January 2013 and February 2021, a total of 12 patients diagnosed with HA were retrospectively analyzed. Significant clinical and laboratory findings and radiological findings related to current pathology were noted. The mean age of the patients ranged from 23 to 75 years (mean age, 52.2 years). There were 7 male and 5 female patients. 85% of these patients had fever, 67% anemia, and 53% weight loss. Peripheral blood leukocytes were increased in all patients. 8 of the patients (66%) had a secondary infection of HA in the lungs, and pelvis organs. Radiologically, they were mostly low-intensity changes (66%), making them easily misdiagnosed as metastatic cancer and primary liver cancer. 17% seen acute bacterial abscess-like changes. A few cases exhibited cystic mass-like changes. In 64% of the patients, a single lesion was found. The right lobe of the liver was the most common infection area. A definitive diagnosis was made by histopathological examination. The diagnosis of primary HA is difficult to diagnose because of the nonspecific clinical and radiological findings. Differential diagnoses should be made with diseases that include both benign and malignant conditions.

Keywords: Hepatic actinomycosis, computed tomography, magnetic resonance imaging

Introduction

Actinomycosis is a rare chronic, suppurative, granulomatous infection. *Actinomyces israelii* is the most common gram-positive anaerobic bacteria from the family of Actinomycetaceae isolated in human infection. These organisms are normally found in the pharynx, gastrointestinal tract, and female reproductive tract. Their pathogenicity is low. They cause infection in the face area, chest, abdomen, and pelvic cavity. When tissue integrity is disrupted, local invasion followed by endogenous infection occurs. It typically affects the cervical-facial area (50%), abdomino-pelvic region (20%), and thorax (15%-20%) [1]. Abdominal diseases include liver pathologies, pelvic abscesses, appendix infections, rectum, and anal disease. Hepatic actinomycosis (HA) is a rare condition that usually develops secondary to abdominal and pelvic infection [2]. It constitutes 5% of all actinomycosis cases and

15% of abdominal actinomycosis [3]. If a primary lesion is not found, it is considered primary HA. The clinical diagnosis of HA is difficult. Non-specific clinical and radiographic findings often delay diagnosis and treatment. The imaging features of HA were unclear. It can mimic hepatic malignant tumors [4]. They were mostly low-intensity changes making them easily misdiagnosed as metastatic cancer and primary liver cancer. Acute bacterial abscess-like changes and cystic mass-like changes were seen in a few cases [5]. In this study, we investigated the clinical features, common radiological findings, and diagnosis of HA.

Material and Methods

Subjects

This study was conducted following approval from the non-interventional clinical research institutional ethics committee (23/09/2021 2021/10-06). For the retrospective study, informed consent was not required.

We examined computed tomography (CT) and magnetic resonance imaging (MR) images on a PACS workstation (picture archiving and communication system) in our hospital retrospectively. We

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reviewed routine abdomen CT and MR images of the patient. CT and MR images of 12 patients were included in the study. Of these 7 males, 5 females; were aged, 23–75 years; (mean age, 52.2 years).

CT Procedure

The patient was examined in with a 128-detector row CT scanner (Aquilion, Toshiba, Japan). The parameters of CT scanning were as follows: kVp: 120, mA: 150-200, reconstruction interval: 0.3 mm, slice thickness: 0.5 mm, pitch: 1-1.5, a field of view: 30 cm. Following intravenous contrast, arterial and venous phase image was obtained after 30 and 60 s, respectively. Oral contrast material was used before CT examination.

MR Procedure

1.5T MR device (Philips Ingenia, USA) was used for MR scanning. A four-channel phased-array Torso-PA coil was used. After the acquisition of scout image in transverse, sagittal, and coronal planes, fat-suppressed axial T2-weighted fast spin-echo image, coronal T2-weighted fast spin-echo image without fat suppression, and axial T1-weighted fast gradient echo contrast-enhanced image with fat suppression was obtained.

Statistical Analysis

Statistical analyses were conducted with statistical package for social sciences (SPSS), version 22.0 (SPSS, Chicago, Illinois, USA). All data were analyzed. All data were expressed as mean, minimum, maximum, and standard deviation values. Provided study data were in the parametric distribution. Variables were defined as mean $\pm$ S.D. value. The distribution frequencies of the data were expressed as percentages. For categorical variables, the chi-square test was preferred. Mann-Whitney U test was used for age distribution. $P < 0.05$ was accepted as statistically.

Results

The clinical features of HA were as follows. The shortest duration was 4 days and the longest was 6 months, mean time was 73.4 days. Some of the patients had complications, including a history of previous abdominal surgery, including 3 patients with gastrointestinal surgery and 2 patients who had a gynecologic operation. Oral disease, diabetes, and the use of intrauterine devices (IUD) were other concomitant diseases. 85% of these patients had fever, 67% anemia, and 53% weight loss. Peripheral blood leukocytes were increased in all patients. 8 of the patients (67%) had a secondary infection of HA in the lungs, and pelvis organs. The imaging features of HA were as follows. They were mostly low-intensity changes in 8 patients (66% of cases), making them easily misdiagnosed as metastatic cancer and primary liver cancer (Figure 1-3a, b). Acute bacterial abscess-like changes were seen in 2 patients (17%) (Figure 4a, b). Two cases exhibited cystic mass-like changes (17%) (Figure 5a, b). In 64% of the patients, a single lesion was found. The right lobe of the liver was the most common infection area. The clinical and imaging findings are summarized in table 1.

None of the 12 patients could be diagnosed based on clinical findings and radiographic changes alone. Ultrasonography (US) and CT-guided liver puncture drainage (54%) or liver biopsy (36%), and surgical biopsy (10%), were included for pathological

and etiological investigations. A definitive diagnosis was made by histopathological examination (Figure 6). The imaging characteristics and diagnostic methods of HA are summarized in Table 2. The patients were treated as follows; anti-infection + puncture drainage, anti-infection + resection and, anti-infection alone. The diagnostic methods and treatments are summarized in table 2.

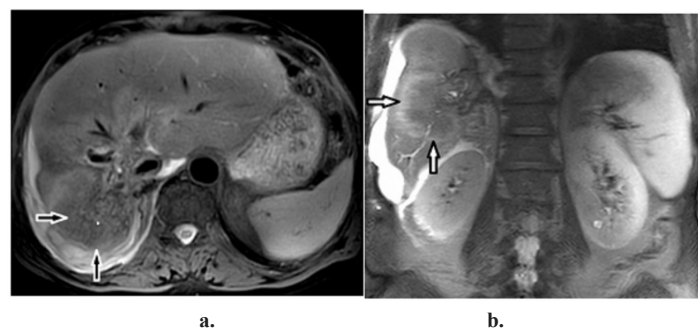


Figure 1. In axial (a) and coronal (b) T2-fat-sat weighted abdomen MR, the affected areas were mild hypointense in the liver (arrow)

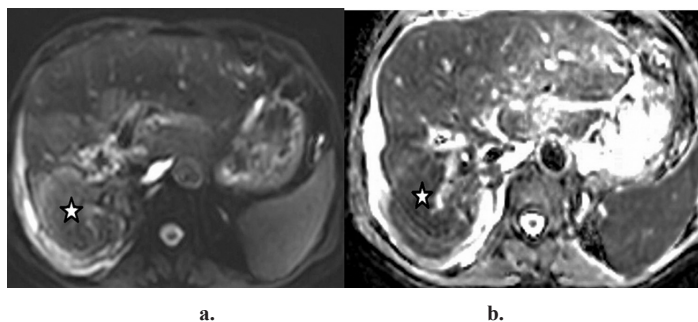


Figure 2. Diffusion MR showed mild diffusion restriction in the posterior segment of the right liver (a), and ADC map (b) (st ar)

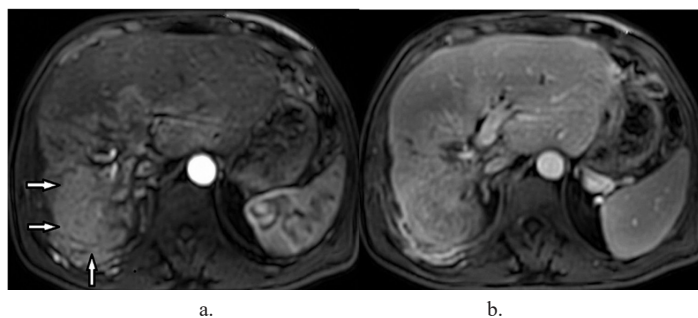


Figure 3. Dynamic abdomen MR shows progressive enhancement in the arterial phase in the affected area of the liver (a) (arrows), and in the late venous phase (b)



Figure 4. Axial (a) and coronal (b) enhanced abdominal CT showed acute bacterial abscess-like changes in the liver (arrows)

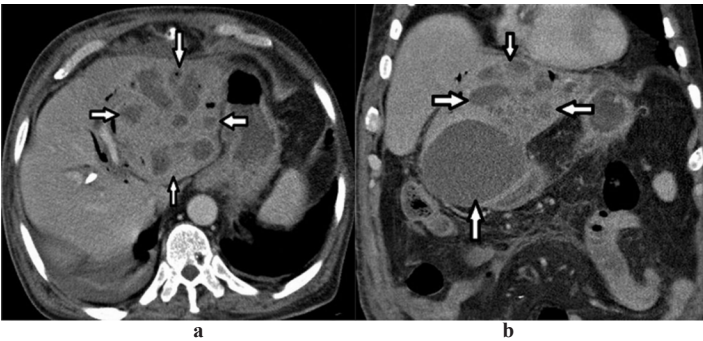


Figure 5. Axial (a) and coronal (b) enhanced abdomen CT shows cystic mass-like changes in the left lobe of the liver (arrows).

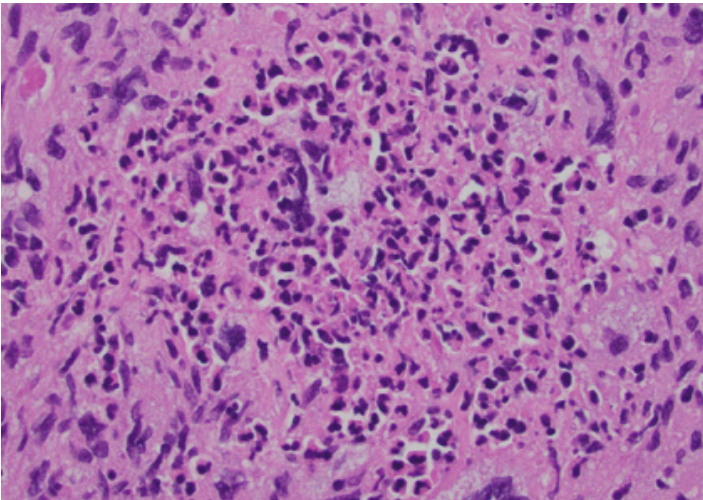


Figure 6. Hematoxylin and eosin-stained sections of the liver wedge biopsy. The necrotizing granuloma is seen as a central collection of neutrophils and cellular debris surrounded by histiocytes and filled pink cytoplasm (40x magnification)

Table 1. The clinical and imaging findings of hepatic actinomycosis

Age (years)	23–75 years; (mean age, 52.2 years)
Gender (F/M)	5/7
Clinical presentation	Fever (85%), anemia (67%), weight loss (53%)
CT/MR presentation	Low-intensity changes (66%) Acute bacterial abscess-like changes (17 %) Cystic mass-like changes (17%)
Lesion numbers	Single lesion (64%), Multiple lesion (36%)
Lesion distribution	Liver right lobe (67%), Liver left lobe (33%)

Table 2. The diagnostic methods and treatments of hepatic actinomycosis

US and CT-guided liver puncture	(54%)
Liver biopsy	(36%)
Surgical biopsy	(10%)
Anti-infection + puncture drainage	n:7
Anti-infection + resection	n:3
Anti-infection alone	n:2

Discussion

Actinomycosis is a rare cause of intra-abdominal infection. The main risk factors are loss of integrity of the gastrointestinal mucosa, intra-abdominal infection, previous abdominal surgery, immunosuppression, and presence of a foreign body. The

involvement of the liver occurs by hematogenous spread through the portal vein from infection or mucosal injury [1,5,6].

In the laboratory, increased leukocytes (75%), high erythrocyte sedimentation rate, and alkaline phosphatase (83.3%) are observed. CA 19.9 values may be slightly elevated [5,7].

In radiological imaging studies, particularly on US, CT, and MR, HA presents with a single lesion in the majority of cases. In the remainder, it may occur as more than one liver abscess. Therefore, a differential diagnosis of the lesion should be made from both malignant lesions (primary or secondary tumors) and benign lesions (amebiasis, cystic lesions, pyogenic abscesses, and echinococcosis). It mimics a malignant lesion in about half of the cases. The right lobe is the most affected. MR is characterized by a hypointense signal on T1weighted and a hyperintense signal on T2 weighted sequence. It may suggest malignancy due to heterogeneous contents of the lesions [8].

Approximately 20% of cases with actinomycosis present with the abdomino-pelvic form of the disease. Abdominal involvement usually occurs after disruption of intestinal mucosal integrity secondary to appendicitis, diverticulitis, penetrating trauma, and bowel surgery [9]. In our cases, similar to the literature, 3 patients had a history of gastrointestinal surgery and 2 patients who had a gynecologic operation. The infection preferably involves the ileo-cecal region of the intestine and extends to adjacent structures along the connective tissue and fascial planes.

In cases involving the intestines, the common pelvic CT finding is wall thickening accompanied by a solid or cystic mass near the affected intestinal loop. This mass is surrounded by prominent inflammatory infiltrates. The invasive nature of the mass often suggests a tumor. It may be accompanied by regional lymphadenopathy [10]. Also, in our liver cases, a high rate of lesions (66%) mimics malignancy making them easily misdiagnosed as metastatic cancer or primary liver cancer.

Pelvic actinomycosis is common in those who have used an intrauterine device for more than 2 years. The fallopian tubes and ovaries are most commonly affected in the pelvic region. Radiological imaging findings of tubo-ovarian actinomycosis are strong contrast enhancement in the solid portion of the mass after contrast agent administration, and small abscesses and diffuse peripheral inflammatory changes within the mass. On MR imaging, tubo-ovarian actinomycosis appears more solid than a usual abscess in the adnexal region [11]. Pelvic actinomycosis may also spread widely to the bladder, rectal region, uterus, peritoneum and abdominal wall. When the disease progresses, it may result in a frozen pelvis resembling endometriosis or pelvic malignancy [12].

A definitive diagnosis is made by blood cultures and microscopic and macroscopic examination. The presence of basophilic filament aggregates and yellow “sulfur granules” makes the diagnosis. Despite advanced imaging techniques, the preoperative diagnosis rate is less than 10%. The blood cultures are positive in only 15% of cases, and the diagnosis of percutaneous biopsy is not always certain [2,5,13]. Current therapeutic options are antibiotics, percutaneous drainage, or surgical resection. Starting antibiotics early is usually effective. In particular, there are no current guidelines on the surgical indication. Surgery should be performed

when percutaneous drainage is not possible also for larger lesions with more necrotic tissue and therefore less antibiotic penetration [14].

Recommended antibiotics are a clindamycin, penicillin derivative, and tetracycline. The duration of treatment can vary from 3 to 6 months. Although there is a delay in diagnosis and therefore in the initiation of treatment, the results are quite good. The mortality rate is around 7% [14,15].

Conclusion

In conclusion, primary HA is a rare disease that is difficult to diagnose because of nonspecific clinical and radiological findings. Differential diagnoses should be made with diseases that include both benign and malignant conditions. The prognosis after appropriate treatment is quite good.

Patient Consent:

Since there was no invasive procedure, verbal consent was obtained from the patient.

Conflict of interests

The authors declare that there is no conflict of interest in the study.

Financial Disclosure

The authors declare that they have received no financial support for the study.

Ethical approval

Ethics committee approval received from the Institutional Ethics Committee of University (23/09/2021 2021/10-06)

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