Case 14622

Pyogenic liver abscess: value of MRI including diffusion-weighted imaging for diagnosis and follow-up
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Section: Abdominal imaging
Area of Interest: Liver
Procedure: Diagnostic procedure
Imaging Technique: CT
Imaging Technique: MR
Special Focus: Abscess Case Type: Clinical Cases
Authors: Tonolini Massimo, MD.
Patient: 39 years, male

Clinical History:

Young adult man, immigrated from a western African country, with unremarkable medical history. Currently hospitalized because of high fever (40°C), worsening of his long-standing back pain, without significant physical findings. Laboratory abnormalities included leukocytosis (16,000 cells/mmc), increased C-reactive protein (180 mg/L). Haemocultures and empiric antibiotic therapy were started.

Imaging Findings:

Requested to search for infectious focus, CT (Fig. 1) detected an ill-defined 2-cm hypoattenuating lesion of unclear significance in the 8th liver segment, characterised by faint, progressive contrast enhancement.

Further investigation with MRI (Fig. 2) confirmed a 2-cm markedly T1-hypointense, T2-hyperintense fluid-like lesion surrounded by faint oedematous hypersignal; diffusion-weighted imaging showed a visually hyperintense region measuring approximately 4x3 cm, with a smaller, central portion with low signal from restricted diffusion in the apparent diffusion coefficient map; the lesion did not enhance internally and showed thin, regular peripheral and septal enhancement persisting over arterial, portal venous and equilibrium phases of the dynamic study; findings were interpreted as consistent with a solitary liver abscess.

Despite negative haemocultures, the patient improved on intensive intravenous antibiotics (tazobactam-piperacilline + metronidazole). Extensive serology tested negative including Pneumococcus, Legionellosis, Entamoeba histolytica, fecal protozoa.

Repeated MRI (Fig. 3) showed near-complete regression of the liver abscess.

Discussion:

Pyogenic liver abscesses (PALs) represent uncommon but potentially severe occurrences which are associated with 15% mortality if not timely diagnosed and properly treated. Currently, most PALs develop in patients with cholelithiasis, cholangitis or other biliary diseases, in the setting of intra-abdominal infections (such as appendicitis, diverticulitis, Crohn’s disease), during bacteraemia or following abdominal surgical or interventional procedures. PALs may range from small-sized disseminated to clustered lesions to sizeable cavities, and contain bacteria, necrotic tissue and proteinaceous exudates centrally, surrounded by inflammatory infiltrate. Multiplicity suggests haematogenous dissemination either from gastrointestinal infection via the portal vein or in the systemic arterial circulation. However, solitary PALs may be encountered in patients without predisposing factors. [1, 2]. PALs mostly occur in middle and advanced age, and may be variably symptomatic from acute (high fever, rigors,
upper abdominal pain) to insidious (weight loss, vague discomfort) presentations. Therefore, nowadays imaging plays a pivotal role in the diagnosis, therapeutic choice and follow-up of liver infections, which often require consultation between diagnostic and interventional radiologists, surgeons and infectious disease specialists. Most PALs are effectively treated by antibiotics; percutaneous aspiration and drainage is reserved for larger cavities (>5 cm) and surgery is reserved for refractory cases and associated disorders [1, 2]. Small-sized PALs are inconsistently detected by ultrasound and show variable echogenicity. At CT, typical PALs appear single or multiloculated with internal hypoattenuation, peripheral “rim” and septal enhancement. As this case exemplifies, compared to CT MRI may offer superior tissue contrast, higher sensitivity for small-sized PALs and additional valuable information without use of ionising radiation. Albeit signal features may sometimes vary depending on protein content, the internal pus generally appears fluid-like with low T1-, high T2-weighted signal. Depending on stage, thin (2-5 mm) uniform peripheral wall and septa without nodularities are detected, and characteristically show peripheral enhancement unchanged from arterial to portal and delayed acquisition phases. Infectious nature is supported by circumferential or wedge-shaped perilesional oedema with subtle increase of T2-weighted signal in the surrounding liver [2-4].

Additionally, diffusion-weighted imaging (DWI) may be helpful: compared to non-infected fluid collections, PALs content appears markedly DWI-hyperintense with corresponding low apparent diffusion coefficient (ADC) values. Conversely, cystic or necrotic portions of tumours are DWI-hypointense from unrestricted diffusion due to low viscosity and cellularity; albeit considerable overlap exists between ADC values, the viable tumour periphery shows DWI-hyperintensity with low ADC values due to hypercellularity [5-9].

**Differential Diagnosis List:** Solitary bacterial liver abscess, Amoebiasis, Cystic echinococcosis, Inflammatory myofibroblastic pseudotumour, Cystadenoma or cystoadenocarcinoma, Necrotic metastasis, Intrahepatic haematoma, Intrahepatic biloma

**Final Diagnosis:** Solitary bacterial liver abscess

**References:**


Description: Arterial-phase images (a, b) showed an ill-defined hypoattenuating lesion (arrowheads) in the 8th liver segment, measuring approximately 2 cm in size. Origin: Tonolini M, Radiology Department, "Luigi Sacco" University Hospital – Milan (Italy)
Description: On portal (c, d) and equilibrium (e) phase images the solitary 2-cm lesion (arrowheads) in the 8th liver segment showed faint, progressive contrast enhancement. Origin: Tonolini M, Radiology Department, “Luigi Sacco” University Hospital – Milan (Italy)
Description: On portal (c, d) and equilibrium (e) phase images the solitary 2-cm lesion (arrowheads) in the 8th liver segment showed faint, progressive contrast enhancement. Origin: Tonolini M, Radiology Department, "Luigi Sacco" University Hospital – Milan (Italy)
Description: On portal (c, d) and equilibrium (e) phase images the solitary 2-cm lesion (arrowheads) in the 8th liver segment showed faint, progressive contrast enhancement. Origin: Tonolini M, Radiology Department, “Luigi Sacco” University Hospital – Milan (Italy)
Description: T2-weighted images (a, b) showed a 2-cm markedly hyperintense fluid-like lesion (arrowheads) in the 8th liver segment, surrounded by faint oedematous hypersignal (*). Origin: Tonolini M, Radiology Department, “Luigi Sacco” University Hospital – Milan (Italy)
Description: High b-value (800) diffusion-weighted imaging (DWI) showed a visually hyperintense region (arrowheads) in the 8th liver segment, measuring approximately 4x3 cm in size. Origin: Tonolini M, Radiology Department, “Luigi Sacco” University Hospital – Milan (Italy)

Description: Corresponding apparent diffusion coefficient (ADC) map image showed a hypointense area of restricted diffusion (arrowhead), moderately smaller than the visually DW-hyperintense area in c and corresponding to its central portion. Origin: Tonolini M, Radiology Department, “Luigi Sacco” University Hospital – Milan (Italy)
Description: Precontrast T1-weighted image confirmed a 4x3 cm ovoid hypointense lesion (arrowheads) in the 8th liver segment. Origin: Tonolini M, Radiology Department, "Luigi Sacco" University Hospital – Milan (Italy)
**Description:** Dynamic contrast-enhanced study including arterial-dominant (f) acquisition showed internally nonenhancing lesion with thin, regular peripheral and septal enhancement (thin arrows), which persisted over the portal venous (g) and equilibrium (h) phases. **Origin:** Tonolini M, Radiology Department, “Luigi Sacco” University Hospital – Milan (Italy)
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Description: Follow-up showed near-complete regression of the liver abscess, with residual subtle T2-weighted hyperintensity (arrowhead in a), normalisation of high b-value DWI signal (b), homogeneous parenchymal enhancement in post-contrast T1-weighted acquisition (c). Origin: Tonolini M, Radiology Department, “Luigi Sacco” University Hospital – Milan (Italy)
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