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Letter to the Editor

Ultrasound and hepatic abscess: A successful alliance for the internist

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Dear Editor,

even if liver abscess is a rare disease, with an incidence ranging from about 8 to 20 cases/100000 hospital admissions, it is related to high mortality rates. Mortality ranges between 8% and 31% [1,2], although the use of more effective antibiotics and percutaneous drainage (percutaneous puncture or puncture with a fine needle) [3–5] has improved survival rates. Clinical presentation is no specific, displaying several common manifestations, such as fever and malaise. Furthermore, laboratory tests such as increased white blood cell count and liver transaminases, low albumin levels, elevated bilirubin and increased international normalized ratio are nonspecific, depending on the degree of abscess extent.

Ultrasound is increasingly involved, not only in the diagnosis of hepatic abscess, but also in the clinical management of the patient in all phases of the diagnostic-therapeutic process. When the clinical symptoms and signs suggest a liver infection or abscess, ultrasound could be the instrument to guide the clinician to the diagnosis (Fig. 1).

Ultrasound can identify lesions more than 2 cm in diameter, thus showing a sensitivity of 85% to 95% [6]. Otherwise, computed tomography (CT) has a sensitivity of 95% and can detect abscesses as small as 0.5 cm [6]. When contrast-enhanced ultrasound (CEUS) is compared with CT and magnetic resonance (MR) in evaluating liver masses, the sensitivity, specificity, and accuracy was 83.3%, 87.5%, 84.0% for CEUS, 95.0%, 87.5%, 93.8% for CT, and 94.6%, 83.3%, 93.0% for MRI [7].When the lesions with poor acoustic sonographic windows were excluded, the sensitivity, specificity, and accuracy for CEUS were 94.6%, 87.5%, and 93.3% which was comparable to both CT and MRI [7].

In the work of Popescu et al., CEUS was conclusive for the diagnosis of liver abscess in 92.7% of 41 patients involved in the study [8]. All conclusive cases displayed rim enhancement in the arterial phase and no enhancement in the liquid areas [8] (Figs. 2 and 3). The honeycomb appearance with septa enhancement was present in 41.5% patients. Washout of the marginal rim was found in 53.6% lesions [8]. Similar data have been demonstrated by Kishina and colleagues; in 95.5% of cases, liver abscesses had been better detected on CEUS than on conventional ultrasound in regard to the extent of necrotic or liquefied lesions [9]. CEUS demonstrated perilesional enhancement in 86.4% lesions in the vascular phase and well-defined unenhanced areas in 100% lesions in the post-vascular phase [9]. CEUS revealed both cystic type and honeycomb type abscesses [9]. After therapy, 92.9% of patients followed up by CEUS displayed a significant reduction in lesion size [9]. In a recent work of Sun et al., the appearance of transient segmental enhancement in liver abscess was reliably detected by CEUS, which well correlated with the enhanced CT images [10]. In particular, CEUS sensitivity in showing transient segmental enhancement was 89%, and the specificity was 100% [10]. At the same time, ultrasound can help physician to detect the main disease responsible for liver abscess development, such as acute appendicitis, cholecystitis, dilatation of the biliary tract, inflamed colon diverticula, portal thrombosis.

Once the sonographic diagnosis of hepatic abscess has been established, it must be confirmed with a second-level method such as CEUS or CT or MR abdomen, simultaneously with the beginning of empiric antibiotic therapy. In our opinion, CEUS should be the first choice method because of its simplicity, low cost and lower risk of complications, especially in subjects with contraindications to iodinated contrast agent such as patients affected by chronic kidney disease (CKD) and heart failure and acute hemodynamically unstable patients. One of the few disadvantages to be referred to CEUS could be the lack of a global vision of the hepatic parenchyma, special in the case of multiple abscesses. If the diagnosis of liver abscess is confirmed by the second level method or alternatively the suspicion is quite clear immediately after the B-mode ultrasound, the clinician can also detect the main etiologic causes responsible for this complex diseaseby ultrasound and perform a percutaneous needle aspiration (PNA) for diagnostic and therapeutic purposes with drainage of the collection. The analysis of the collected material will allow to carry out the microbiological analysis and to perform the antibiogram in order to set the targeted antibiotic therapy. In the most severe cases requiring surgical therapy, ultrasound can highlight signs of a complicated liver abscess such as free fluid formation in the peritoneum, the onset of a hepatic subcapsular abscess until the determination of a transdiaphragmatic fistula communicating with the pleura and subsequent generation of pleural empyema. Moreover, ultrasound is clearly the reference method for the follow-up of liver abscesses, diagnosed primarily with both ultrasound and other

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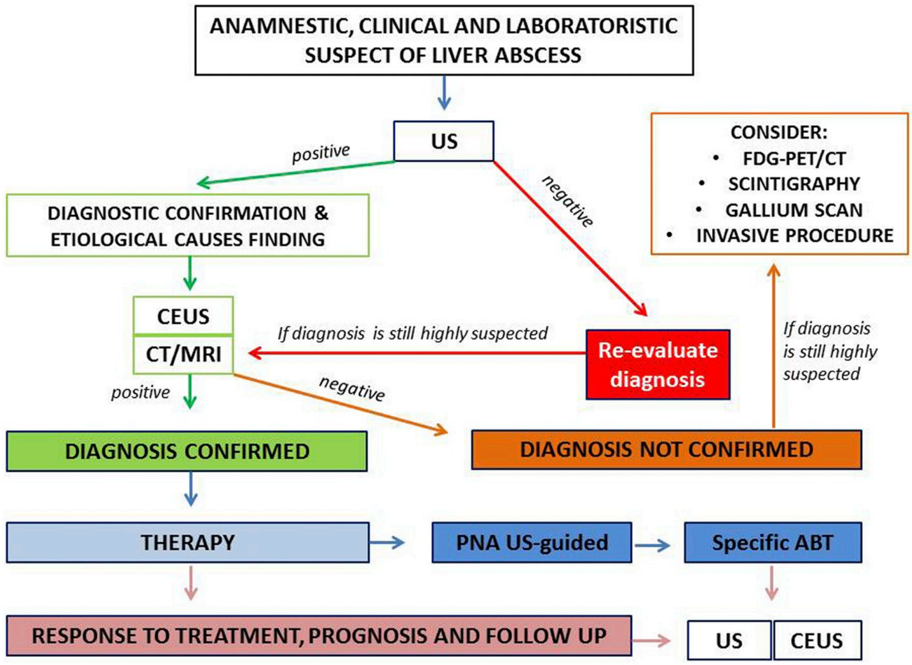

Fig. 1. Suggested ultrasound-based algorithm to diagnose and treat hepatic abscess.

radiological methods, in order to decrease the rate of exposure to radiation and risks deriving from the infusion of the contrast medium. In our opinion ultrasound follow-up can be performed at a distance of one week from the PNA and, in case there is evidence of clinical and sonographic improvement, at one month, three months, six months until resolution of the disease. If there is a need to repeat the CEUS, it should not be performed again before one month and to follow every three months until the disease is resolved. If abscess persists and becomes chronic, due to an ineffective therapy, ultrasound check can be repeated every six months.

In conclusion, ultrasound represents a fundamental instrument to guide the clinician to correct and faster diagnosis of hepatic abscess in order to administrate a specific therapy. CEUS has demonstrated significant specificity and sensibility in liver abscess diagnosis and follow up after treatment. Therefore, in our opinion, the future of liver abscess management will involve ever closer collaboration between clinician,

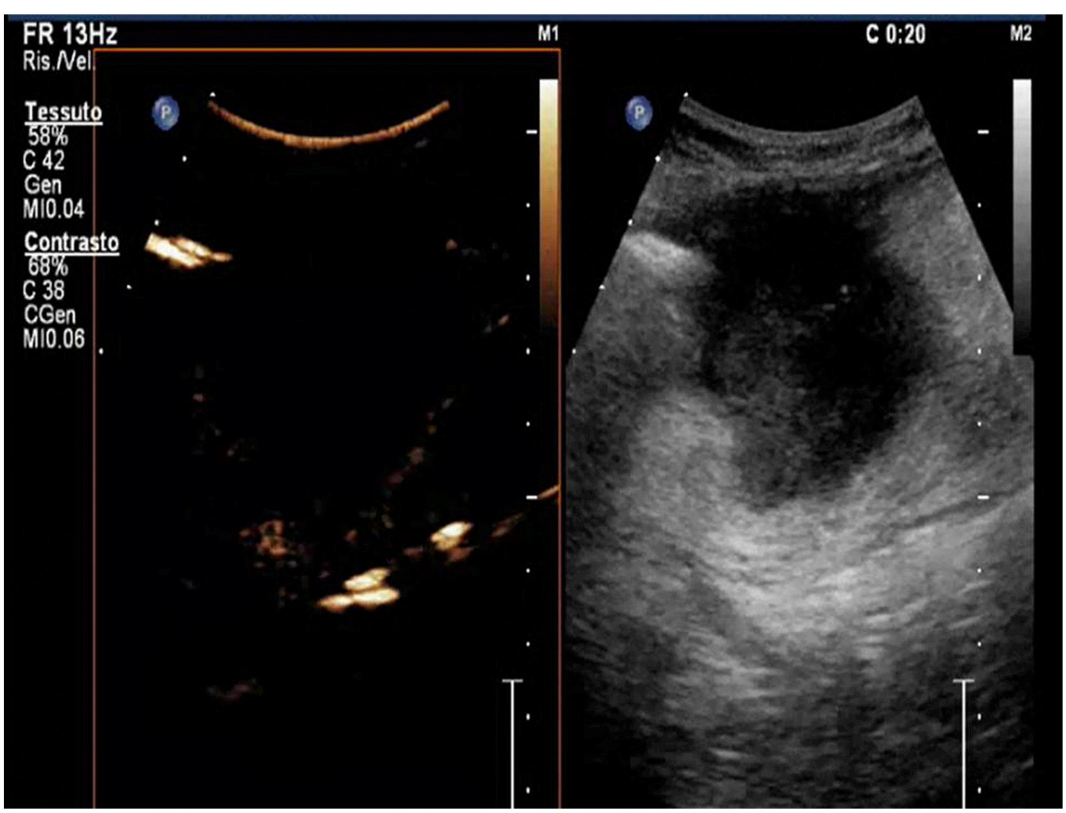

Fig. 2. Early phase of contrast enhanced ultrasound (CEUS) on a hypoechoic lesion in patent with clinical suspicion of liver abscess.

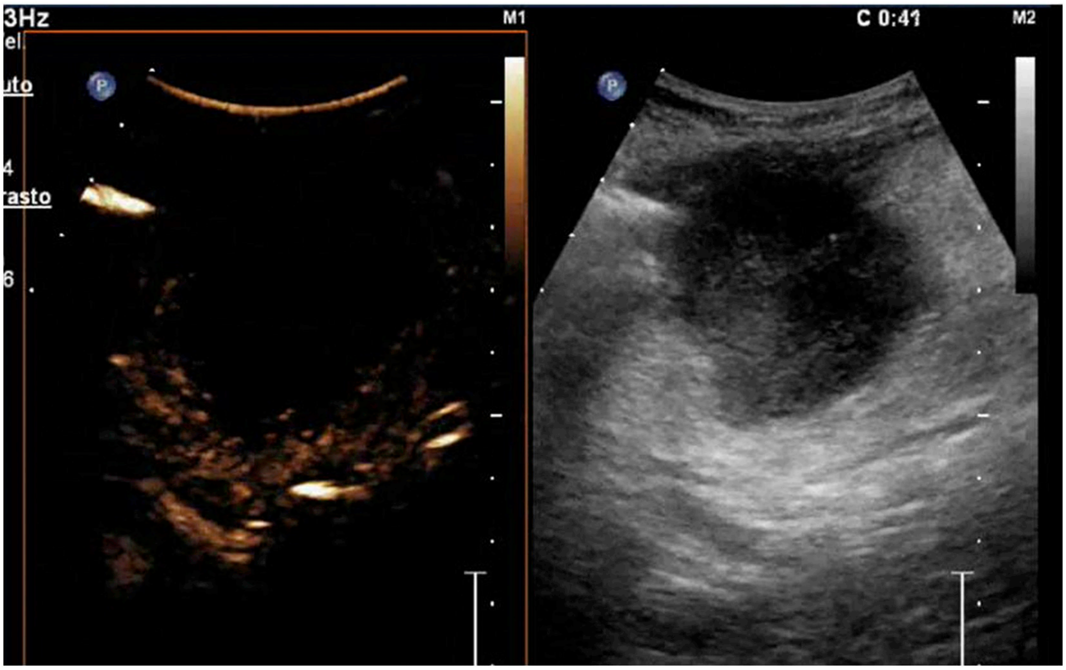

Fig. 3. Portal phase of contrast enhanced ultrasound (CEUS) showing a clear rim enhancement, which is a sonographic sign suggestive for liver abscess.

sonographer, interventional radiologist and surgeon and ultrasound will be a valuable tool to employ in the diagnostic and therapeutic work-up of this disease.

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Ethical approval

This article does not contain any studies with human participants or animals performed by any of the authors.

Declaration of Competing Interest

The authors declare that they have no conflict of interest.

References

[1] Johannsen EC, Sifri CD, Madoff LC. Pyogenic liver abscesses. Infect Dis Clin North Am 2000;14:547–63. [vii].
[2] Beckingham IJ, Krige JE. ABC of diseases of liver, pancreas, and biliary system. BMJ (Clin Res Ed) 2001;322:477–80.
[3] Fazili T, Sharngoe C, Endy T, Kiska D, Javaid W, Polhemus M. *Klebsiella pneumoniae* liver abscess: an emerging disease. Am J Med Sci 2016;351:297–304.
[4] Cai YL, Xiong XZ, Lu J, Cheng Y, Yang C, Lin YX, et al. Percutaneous needle aspiration versus catheter drainage in the management of liver abscess: a systematic review and meta-analysis. HPB 2015;17:195–201.
[5] Gonzalez-Alcaide G, Peris J, Ramos JM. Areas of research and clinical approaches to the study of liver abscess. World J Gastroenterol 2017;23:357–65.
[6] Malik AA, Bari SU, Rouf KA, Wani KA. Pyogenic liver abscess: changing patterns in approach. World J Gastrointest Surg 2010;2:395–401.
[7] Ryu SW, Bok GH, Jang JY, Jeong SW, Ham NS, Kim JH, et al. Clinically useful diagnostic tool of contrast enhanced ultrasonography for focal liver masses: comparison to computed tomography and magnetic resonance imaging. Gut Liver 2014;8:292–7.
[8] Popescu A, Sporea I, Sirli R, Danila M, Mare R, Gradinaru Tascau O, et al. Does contrast enhanced ultrasound improve the management of liver abscesses? A single centre experience. Med Ultrason 2015;17:451–5.
[9] Kishina M, Koda M, Tokunaga S, Miyoshi K, Fujise Y, Kato J, et al. Usefulness of contrast-enhanced ultrasound with Sonazoid for evaluating liver abscess in comparison with conventional B-mode ultrasound. Hepatol Res 2015;45:337–42.
[10] Sun K, Zhu W, Luo Y, Li Y, Zhou X. Transient segmental enhancement of pyogenic liver abscess: a comparison between contrast-enhanced ultrasound and computed tomography. J Comput Assist Tomogr 2018;42:133–8.

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