

# **Contrast-enhanced ultrasound in the study of liver abscesses**

Type: Scientific Exhibit

Authors: R. Revert Espí<sup>1</sup>, I. Carbonell<sup>1</sup>, D. P. Gómez valencia<sup>1</sup>, Y. Fernandez Nuñez<sup>1</sup>, T. Ripollés<sup>2</sup>, M. J. Martinez<sup>1</sup>; <sup>1</sup>Valencia/ES, <sup>2</sup>46007/ES

## **Aims and objectives**

The purpose of the study is the description of the findings in patients with liver abscess by ultrasound after administration of contrast and evaluate the usefulness of its realization.

## **Methods and materials**

We retrospectively reviewed the ultrasonography before and after contrast administration in a total of 34 patients between march 2008 and august 2013, with a final diagnosis of liver abscess. We collected values of age, sex, size, basal echogenicity and imaging tests performed.

US examinations were performed by using a US unit (Aplio 80; Toshiba, Tokyo, Japan) by radiologists with wide experience in contrast-enhanced ultrasound (CEUS). The second generation echo-signal enhancer SonoVue® (Bracco, Milan, Italy) was injected as a bolus in units of 2.4 ml through a three-way 20 gauge catheter into an antecubital vein, immediately followed by injection of 10ml of normal saline solution (0.9% NaCl).

The enhancement of the lesion was assessed in the different phases compared to the liver parenchyma.

Of the 34 patients, 22 (64.7%) were men and 12 (35.3%) were women, with an average age of years 64 + 12.8 SD (range years: 34-88). Abscess were confirmed by percutaneous drainage, positive blood culture or improvement of symptoms after antibiotic treatment. In 23 cases had CT scan supported the diagnosis.

## Results

We describe three enhancement patterns (Fig 1):

Type I pattern: peripheral ring enhancement with absence of central enhancement.

Type II pattern: multiseptated pattern alternating with areas of no uptake.

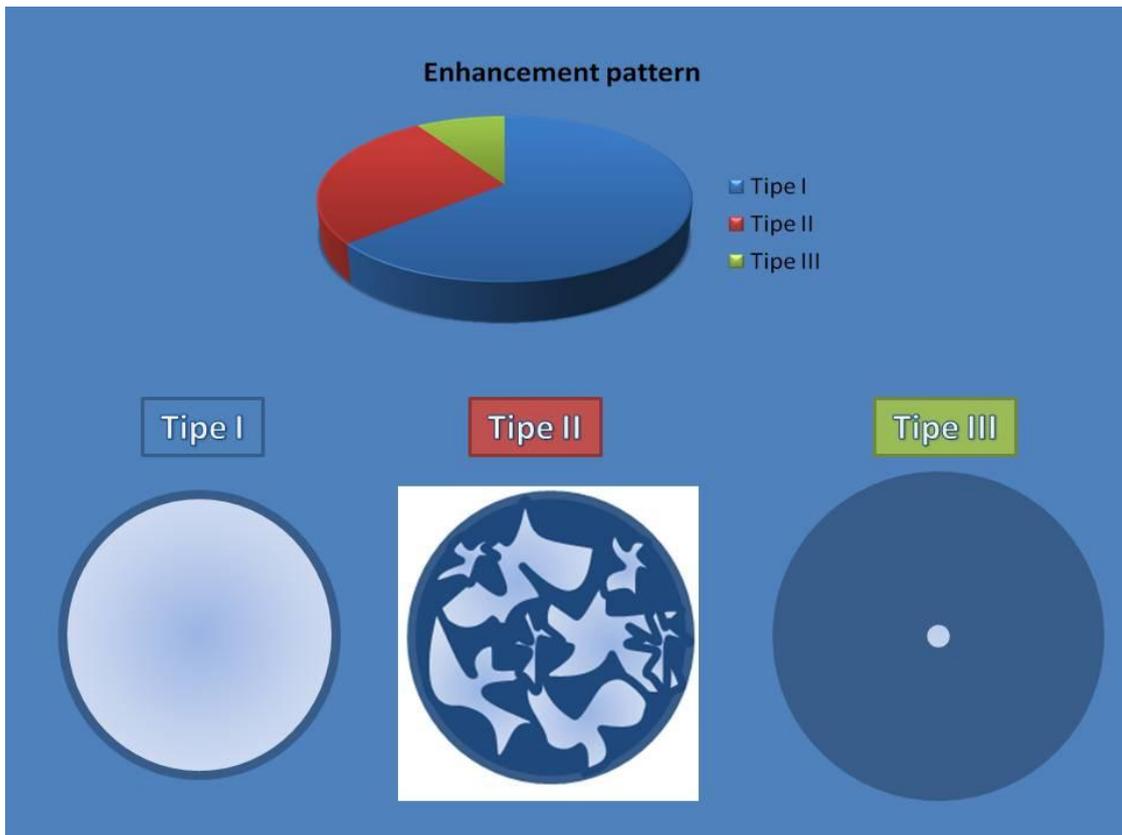
Type III pattern: enhancement in large areas of the lesion with low liquid component (Phlegmonosum area).

Liver abscesses are typically poorly demarcated with a variable appearance on US, ranging from predominantly hypoechoic to hyperechoic. In our series, 27 abscesses were hypoechoic (79 %); 4 were isoechoic (11 %) and 3 were hyperechoic (9%) (Fig 2).

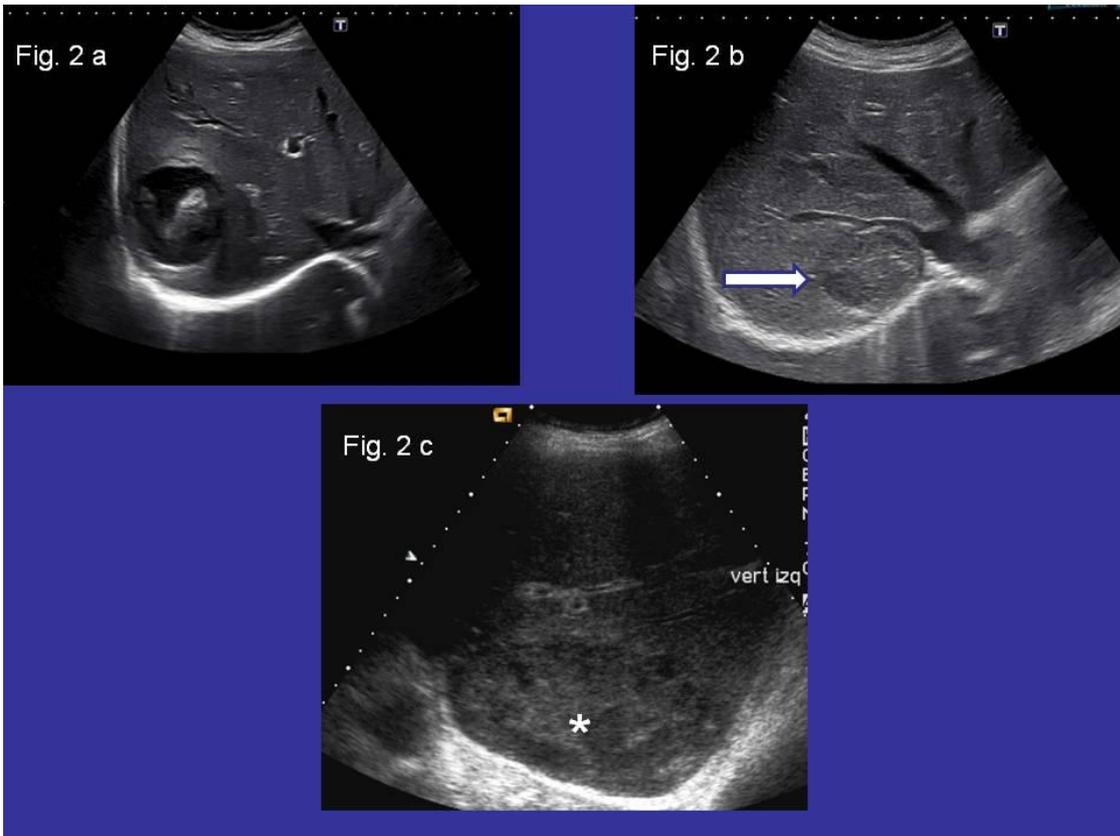
In 61.7% of cases (n = 21) showed the typical pattern (peripheral ring with no central enhancement) (Fig 4), in 26.5% (n = 9) showed an enhancement with internal septa (Fig 5) and 8.8% (n = 3) showed an enhancement in large areas of the lesion with low liquid component (Fig 6).

In 50% (n = 17) contrast-enhanced ultrasound allowed for drainage of the lesion (Fig 7).

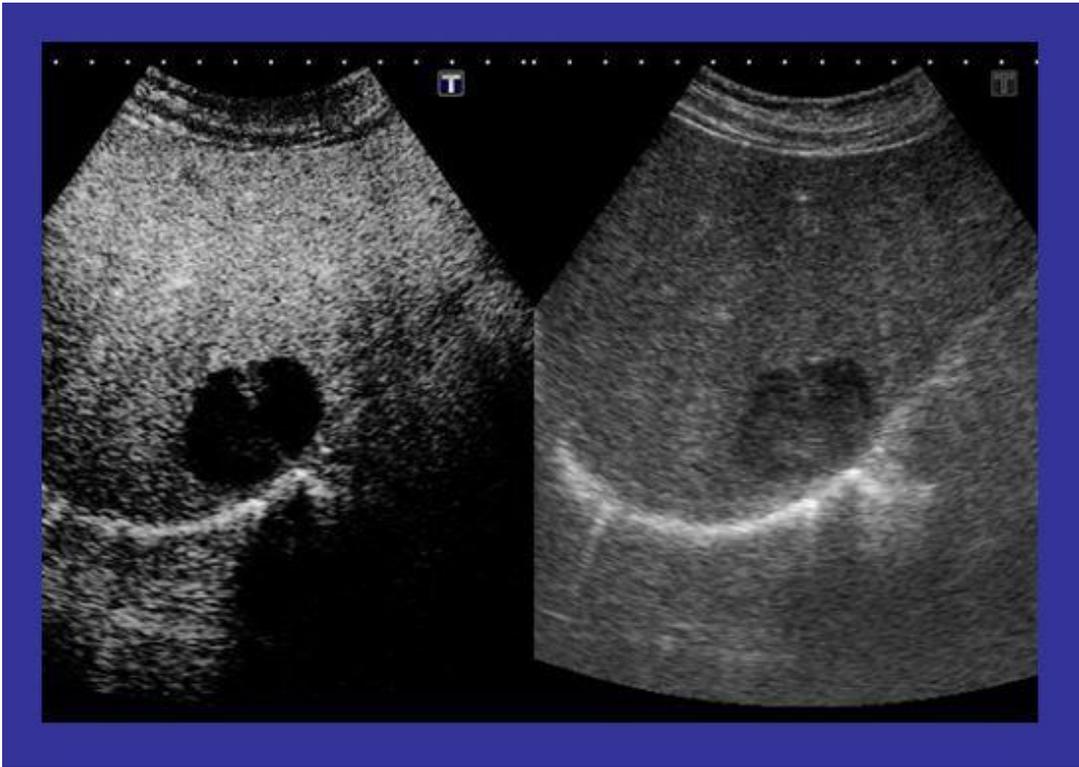
In 14.7% (n = 5) of patients undergoing cholecystectomy, contrast-enhanced ultrasonography was used to detect residual abscesses (Fig 8).



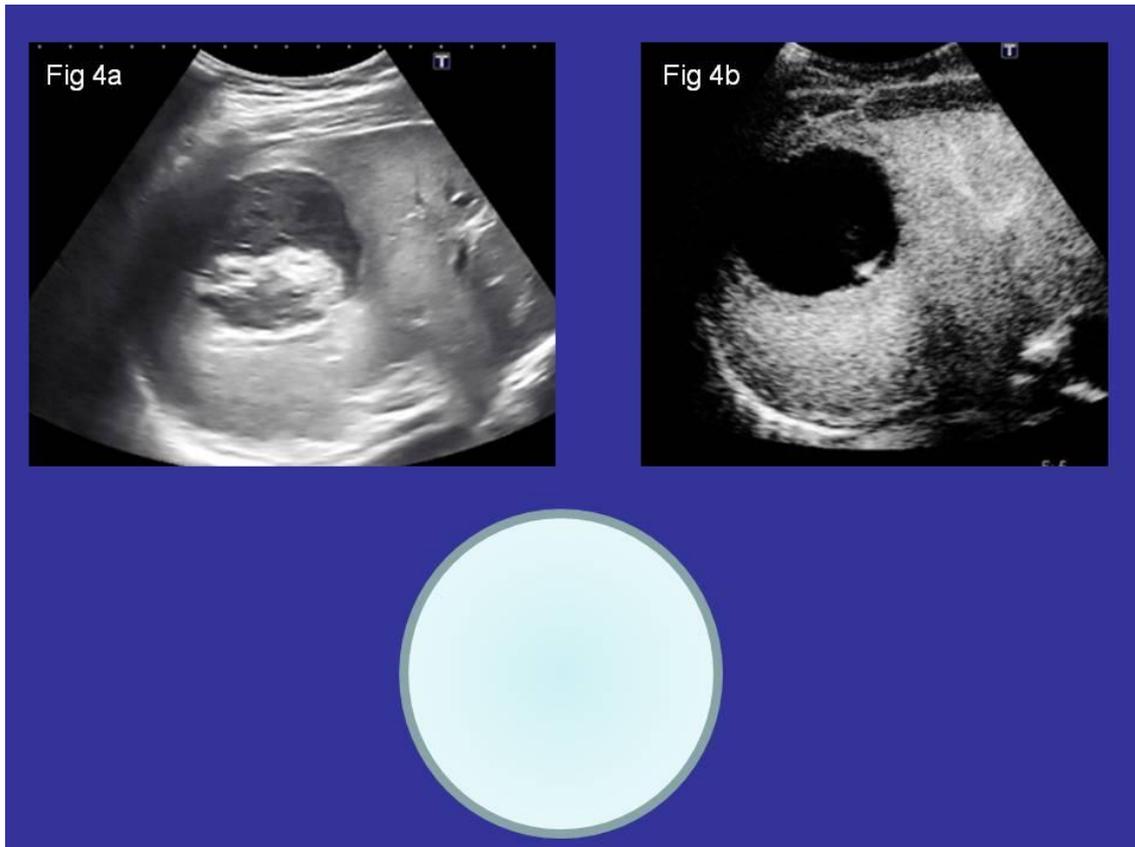
**Fig. 1:** Three types of enhancement pattern in the liver abscesses. Type I pattern shows peripheral ring enhancement with absence of central enhancement. Type II shows an enhancement with multiseptated pattern alternating with areas of no uptake. In type III pattern, there is a higher proportion of phlegmonous area with short collection.



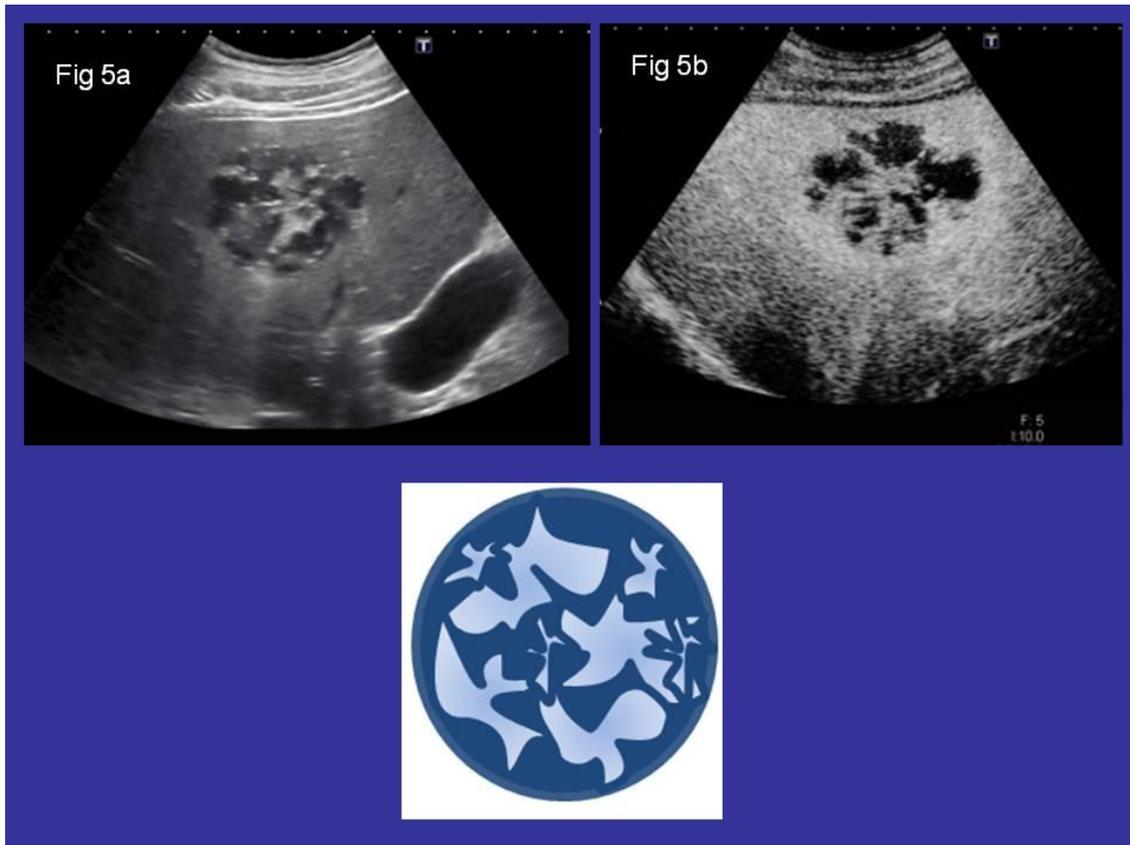
**Fig. 2:** Echogenicity of the lesions before CEUS study. Image 1a shows a hypoechoic lesion. Image 1b shows a isoechoic lesion compared with liver parenchyma (white arrow). Image 1c shows a large hyperechoic lesion (\*) located in liver segment VI.



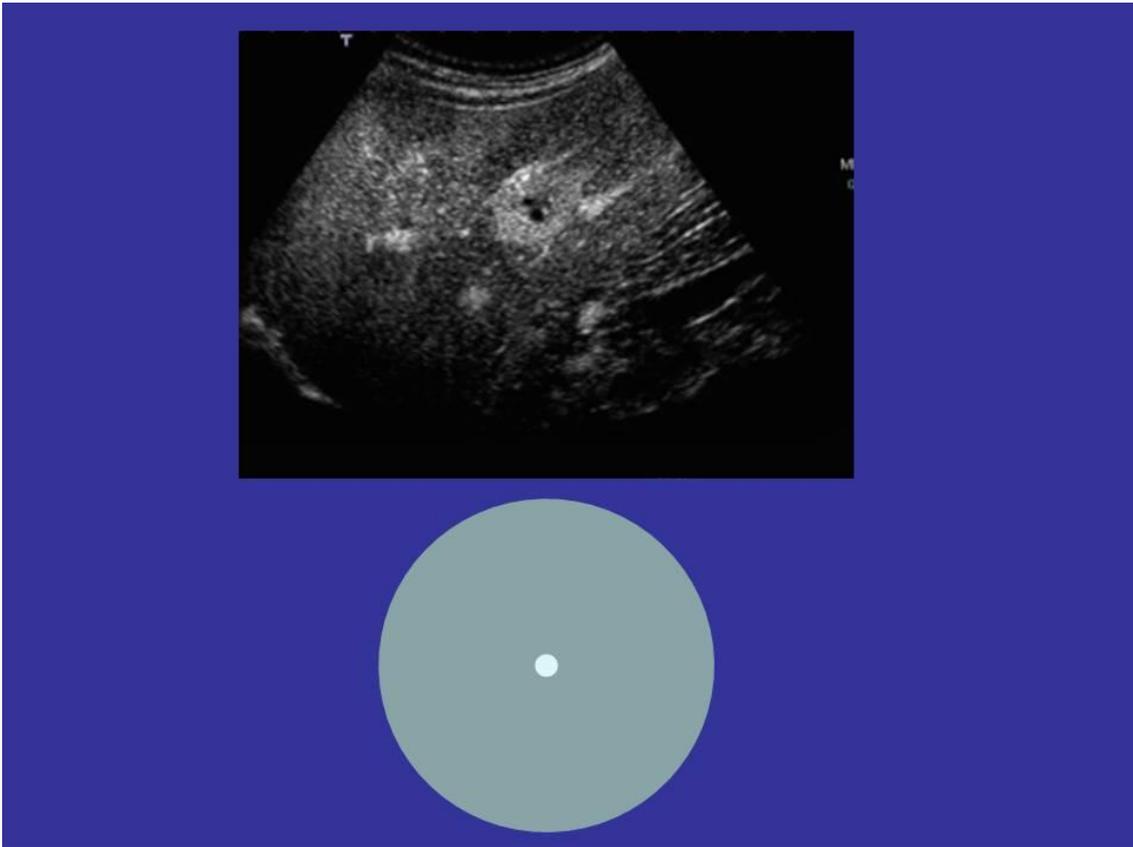
**Fig. 3:** Patient of Figure 2 b. 44 years old woman with isoechoic lesion in B-mode US. Following administration of CEUS, the lesion shows absence of central enhancement, with a final diagnosis of hepatic abscess. Ultrasound allowed the drainage of the lesion, with improvement of symptoms.



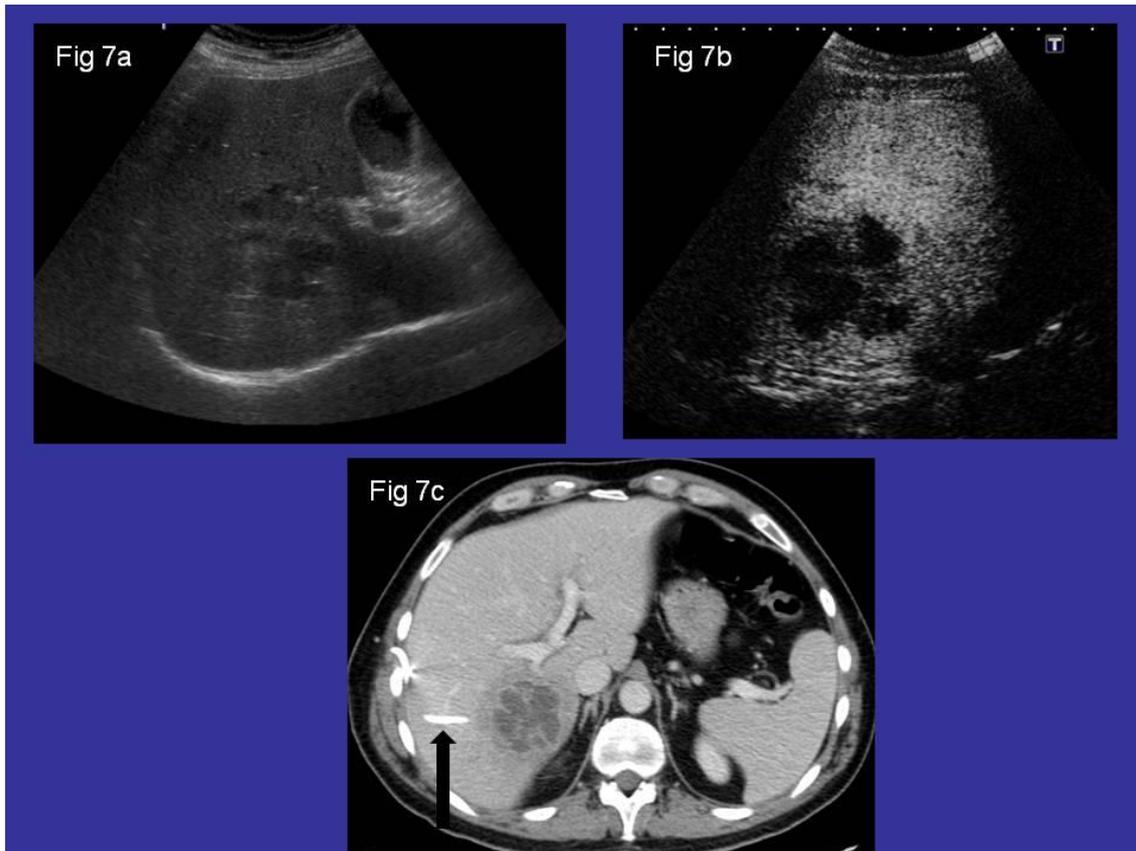
**Fig. 4:** Patient showing the type 1 enhancement pattern. This is a 34 year old male patient with a predominantly hypoechoic lesion with echogenic areas inside (Fig. 4a). The differential diagnosis of hydatid cyst was raised, but CEUS (Fig. 4b) showed hypoenhancement with respect to the surrounding liver. The patient was subjected to percutaneous drainage.



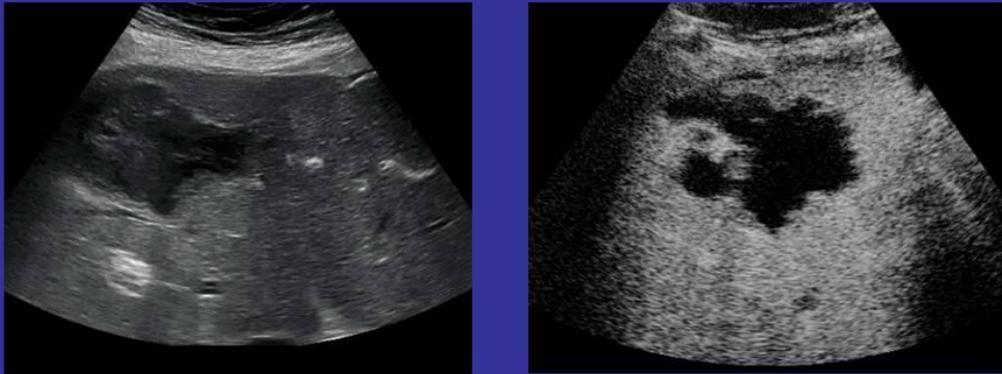
**Fig. 5:** Abscess in a 75 years-old male patient. Baseline sonogram shows a poorly defined lesion with hypoechoic areas alternating with hyperechoic areas (Fig 5a). On CEUS imaging (Fig 5b), multiseptated pattern alternating with areas of no uptake were obtained, resulting in a type II pattern.



**Fig. 6:** 64 year old man with focal liver lesion. The differential diagnosis with other entities (such a metastasis) were proposed. The evolution of the patient and other imaging tests (CT and MRI) showed that it was an infectious process. It is therefore important to know that liver abscesses may occur with this type of presentation.



**Fig. 7:** Hepatic abscess in a 48 years old male patient. Figure 7a shows a hypoechoic lesion in the right hepatic lobe. Following administration of contrast (fig 7b), the lesion shows no central enhancement. The patient underwent percutaneous drainage (black arrow in Fig 7c).



**Fig. 8:** 88 years old male with a gangrenous cholecystitis. Contrast-enhanced ultrasound showed a liver abscess, which was drained. CEUS is useful for finding possible complications in patients with cholecystitis or post-cholecystectomy.

## Conclusion

Hepatic abscess are localised collections of necrotic inflammatory tissue caused by bacterial, parasitic or fungal agents, with a variable appearance, and may mimic primary or secondary neoplasms.

Contrast-enhanced ultrasonography is a useful tool to improve the diagnosis of liver abscesses. It lets made the differential diagnosis with other entities, choose the type of treatment (drainage or medical treatment) and possible complications in patients post-cholecystectomy.

## References

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