Iconographic Essay

UNUSUAL PRESENTATIONS OF HEPATIC HEMANGIOMA: AN ICONOGRAPHIC ESSAY*

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Abstract

In order to evaluate atypical aspects of hepatic hemangiomas at ultrasound (US), computed tomography (CT) and magnetic resonance imaging (MRI), we have retrospectively analyzed 300 cases of patients diagnosed with hepatic hemangiomas by means of combined imaging studies, clinical follow-up and/or biopsy results. Based on this analysis we have selected those cases with atypical findings at one or more imaging methods or those presenting an unusual evolution such as: hypoechoic nodules at US, giant, heterogeneous hemangiomas; rapidly filling hemangiomas; calcified hemangiomas; pedunculated hemangiomas; hypointense hemangiomas at T2-weighted images; causing perfusion defect; with central scar simulating focal nodular hyperplasia; hemangiomas with adjacent abnormalities such as arterial-portal venous shunt and capsular

retraction as well as hemangiomas enlarging over time. The hepatic hemangioma is the most common benign tumor affecting the liver and usually presents a typical aspect. However, atypical findings should be known aiming at supporting diagnosis guidance and clinical decisions.
Keywords: Hemangioma; Liver; Atypical findings; Ultrasound; Computed tomography; Magnetic resonance imaging.

INTRODUCTION

Hepatic hemangiomas are the most common benign lesions of the liver, occuring in up to 20% of cases of autopsy[1,2], and its aspect at ultrasound (US), computed tomography (CT) and magnetic resonance imaging (MRI) is well known.

Notwithstanding, in a considerable number of cases, its presentation may be atypical on several methods of imaging studies, difficulting the diagnosis, mainly in those patients undergoing tumor staging or neoplastic disease evolutive follow-up. Despite the occurrence of hepatic hemangioma unusual findings in up to 20% of imaging examinations, in most of cases, the diagnosis can be defined by a combination of results obtained through several methods of investigation, with emphasis on MRI[3]. With the purpose of achieving satisfactory results, it is important to identify such unusual findings and to familiarize with the main signs that lead to the diagnosis of hemangioma, in order to avoid biopsies and other unnecessary invasive procedures.

In the present study, our objective was to demonstrate the main atypical and the less frequent aspects of hepatic hemangiomas, by means of examples selected among 300 cases. The diagnosis was based on a combination of imaging studies results, evolutive studies and percutaneous biopsy, when necessary.

TYPICAL ASPECTS

At US, the hepatic hemangioma presents as a well defined nodular, peripheral, hyperechogenic, homogeneous lesion that, even when it is bulky, it does not cause vascular distortion (Figure 1)[2]. About 80% of hemangiomas present these characteristics at US. When larger than 4.0–5.0 cm, hemangiomas may present central heterogeneity corresponding to necrosis, hemorrhage or fibrosis, which may difficult its ultrasonographic diagnosis (Figure 2)[2].

At CT, the hemangioma typically appears as a well defined nodular, hypodense, homogeneous lesion in the non-contrast phase, presenting globular, peripheral, centripetal, enhancement in the portal phase, after contrast injection, tending to become homogeneous on

delayed slices (Figure 3)[4,5]. Lesions smaller than 3.0 cm may present a complete and homogeneous enhancement early in the arterial phase, reflecting the small caliber of their vascular spaces[5,6], and, for this reason, they are named capillary hemangiomas (Figure 4). On the other hand, when lesions are larger than 5.0 cm in diameter, a lack of homogenization is observed with a certain frequency on delayed slices, as a result of the presence of avascular areas of necrosis, fibrosis or hemorrhage (Figure 5)[7].

At MRI, the hepatic hemangioma presents as hypointense or hyperintense nodule or mass respectively at T1- or T2-weighted imaging, with signal uniformity on sequences obtained with longer echoes (TE > 140 ms). After gadolinium injection, the hemangioma presents contrast enhancement similar to that observed at CT examinations (Figure 6). About 90% of hemangiomas present these characteristics at MRI[7,8].

ATYPICAL ASPECTS

Hypoecogenicity at US – About 20% of hemangiomas are hypoechogenic at US, due to the increased echogenicity in steatotic livers[9] so simulating other lesions like metastasis and hepatocarcinomas (Figures 6A and 7A). Maybe, this is the atypical aspect most frequently observed and is a reason for supplementary CT and MRI studies.

Target-shaped aspect – The target-shaped or "bulls eye" aspect is considered by some authors as the most reliable, specific and sensitive sign for differentiating a malign lesion from a benign lesion[10–12]. However, in about 10% of cases, it is possible to identify a feeble hyperechogenic halo surrounding the hemangioma resulting from the presence of a central hypoechogenic area corresponding to necrosis or bleeding (Figure 8)[8,13].

Giant hemangiomas – This term is very controversial since some authors consider as "giant" lesions measuring 4 cm, 6 cm and even > 12 cm in diameter[14,15]. In our case, we have avoided this expression, utilizing it only to describe lesions with > 10 cm. Usually, when bulky hemangiomas are heterogeneous and do not present a complete homogenization on delayed slices after contrast injection (Figure 9)[7]. But, even in these cases, it keeps its characteristic of presenting a high intensity signal on T2-weighted images and globular peripheral enhancement during the post-contrast portal phase at CT and MRI (Figure 9). The largest hemangioma that we have had the opportunity to follow-up measured more than 25 cm in its larger diameter (Figure 9) and the patient was asymptomatic. Even in cases of very large hemangiomas, frequently they do not bleed and do not produce symptoms.

Hyalinized or sclerosing hemangiomas – These hemangiomas are rare and usually hypovascularized, hyperintense at T2-weighted images. As a result their diagnosis is possible only by means of biopsy (Figure 10). This aspect is due to the presence of fibrotic tissue and occlusion of vascular spaces[16,17].

Pedunculated hemangiomas – Although there are few cases of pedunculated hemangiomas and their possible complications (for example, torsion or ischemia reported in the literature[18–21], we have seen, with a certain frequency, exophytic hemangiomas whose suspected diagnosis is due to their characteristic MRI signals and typical enhancement after contrast injection (Figure 11).

Calcified hemangiomas– Calcifications in hemangiomas are not usual. In our series of 300 hemangiomas, calcification was observed in only three cases (1%) and with an aspect of phlebolith (Figure 12). Apparently, calcifications are more common in bulky lesions[22].

Cystic hemangiomas – They are extremely rare, with few cases reported in the literature[23,24], resulting from lesion cystic degeneration. In our series, no case of cystic hemangioma has been identified[25].

Perfusional and perilesional alterations – In some cases, it is possible to identify intralesional exuberant arteriovenous anastomosis, which may increase the risk of hemorrhage[26]; in other cases, also perilesional perfusion defects are observed, resulting from these anastomosis (Figure 13) and that seemed only to be related to malign lesions[6,27].

Capsular retraction – This alteration has been described as a sign of malignancy in focal hepatic lesions[28–30]. However, in at least one case of our study, it was possible to identify a peripheral hemangioma associated with capsular retraction, as already described in the literature[3,31,32]. In these cases, the fibrosis associated to the hemangioma peripheral localization may be responsible for the capsular retraction[31].

Central scar – In the focal nodular hyperplasia, the central scar is considered as a quite specific signal and corresponds to the area of fibrosis[33]. The presence of central scars in hemangiomas also has been described and most frequently is related to necrosis and hemorrhage, distinguishable from the focal nodular hyperplasia by the absence of delayed enhancement of the scar. Hypersignal on T2-weighted images and persistent enhancement allow the differentiation between focal nodular hyperplasia and hemangioma (Figure 14)[34,35].

Evolutive growth – hemangiomas tend to remain with the same dimensions along time or present a minimal growth[2,36]. Exceptionally, cases of significant growth of hepatic hemangiomas have been described[36–38], like in two cases observed in our study (Figure 15). Notwithstanding an evident growth, the findings at CT and MRI were quite characteristic of hemangioma, allowing

their diagnosis. Additionally, an association between the lesion growth and estrogen endogenous or exogenous increase[39] and the use of interferon has been described[40].

Percutaneous biopsy – CT- or US-guided percutaneous puncture is occasionally necessary in cases of hemangioma with an atypical presentation (Figure 16) and may be safely performed provided some simple measures are adopted, such as: a) to use of a fine needle (18 or 20 gauge); b) to avoid more than two needle insertions; c) to try to interpose normal parenchyma on the needle course[41,42].

CONCLUSION

Hemangioma is a lesion that usually presents a quite characteristic aspect, but, due to its high frequency, atypical presentations are not rare and may pose a difficulty for the work of the radiologist who is not familiarized with these findings. Recognizing the different hemangioma forms of presentation at the several imaging diagnosis methods not only will speed up the diagnosis, but also minimize the need of invasive procedures that eventually will be indispensable.

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APRESENTAÇÕES INCOMUNS DO HEMANGIOMA HEPÁTICO

Figuras

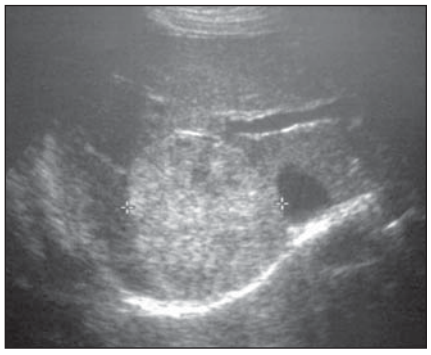


Figure 1. Typical bulky, hyperechogenic and homogeneous hemangioma, without vascular distortion.

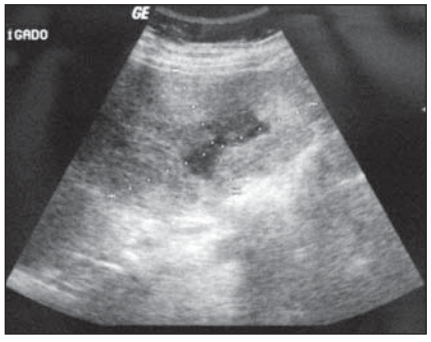


Figure 2. Bulky hepatic hemangioma, heterogeneous due the presence of central necrosis.

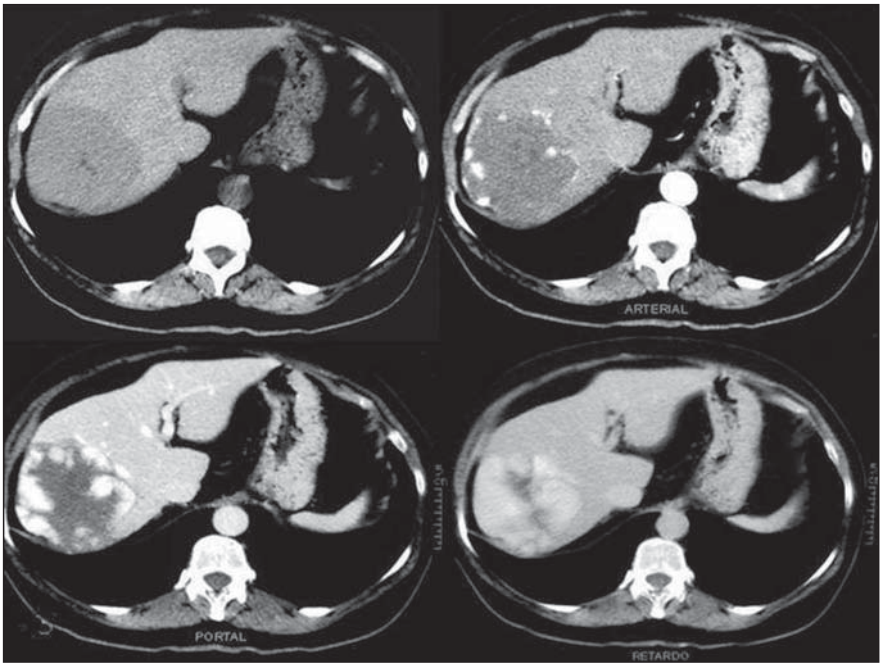


Figure 3. 3-phase contrast-enhanced CT demonstrating globular, peripheral and centripetal enhancement tending to homogenization in the equilibrium phase.

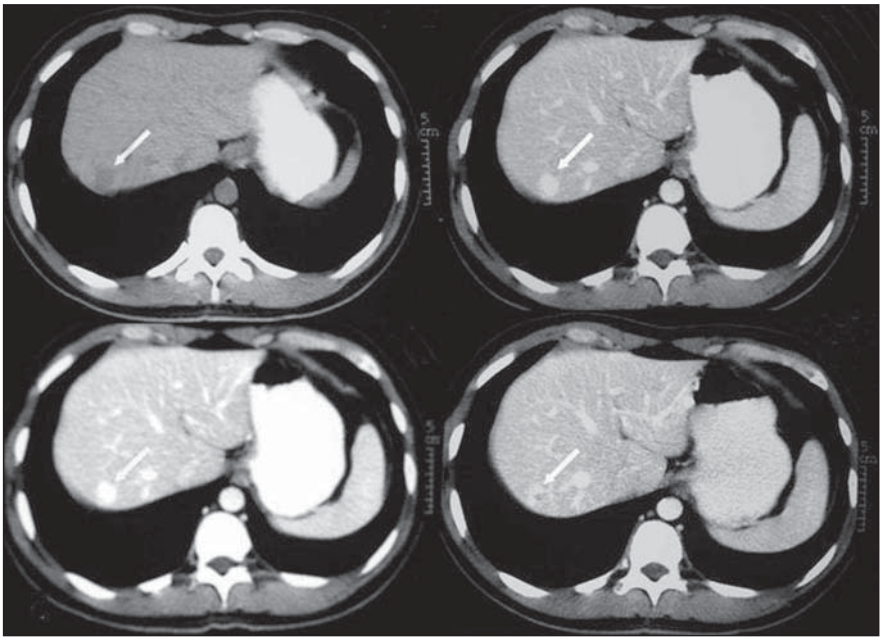


Figure 4. Small hepatic hemangioma (arrow) presenting an intense, early and persistent enhancement.

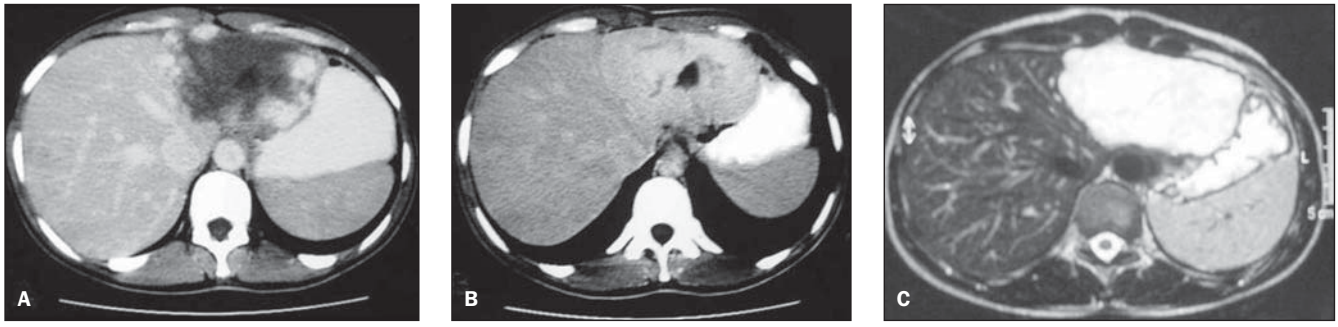


Figure 5. Hemangioma measuring 8.0 cm in diameter, with central hypovascularized area on delayed slices (**B**). MRI T2-weighted (TE = 140) images confirm the diagnosis of hemangioma (**C**).

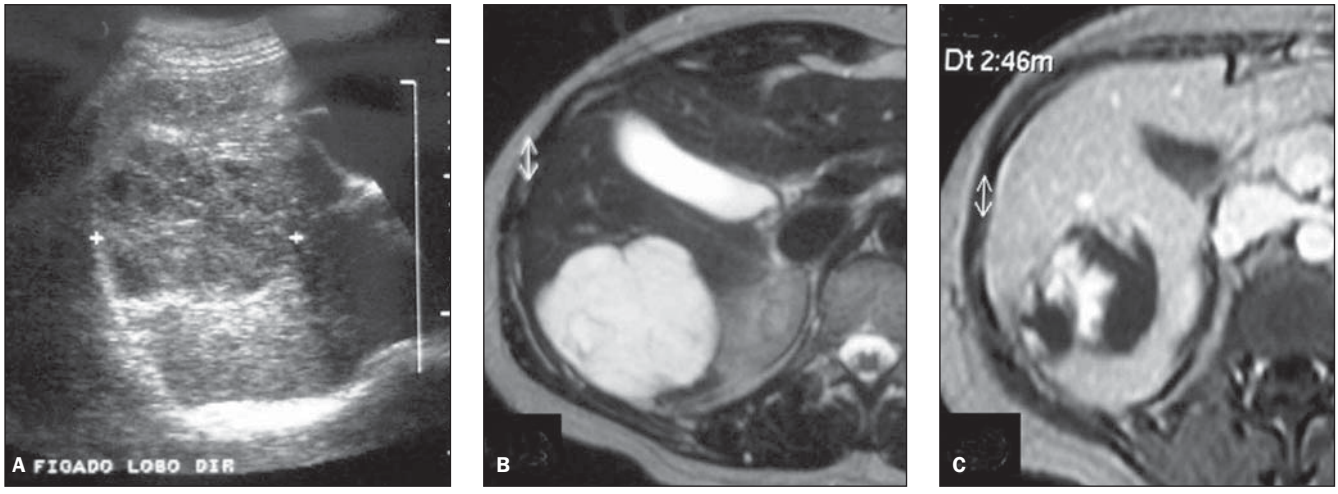


Figure 6. Atypical hemangioma at US (**A**) and with typical aspect at MRI (**B,C**). The mass presents hyperintense on T2 (**B**), with uniformity of signal in longer echoes with TE = 140 and globular, peripheral and centripetal enhancement (**C**).

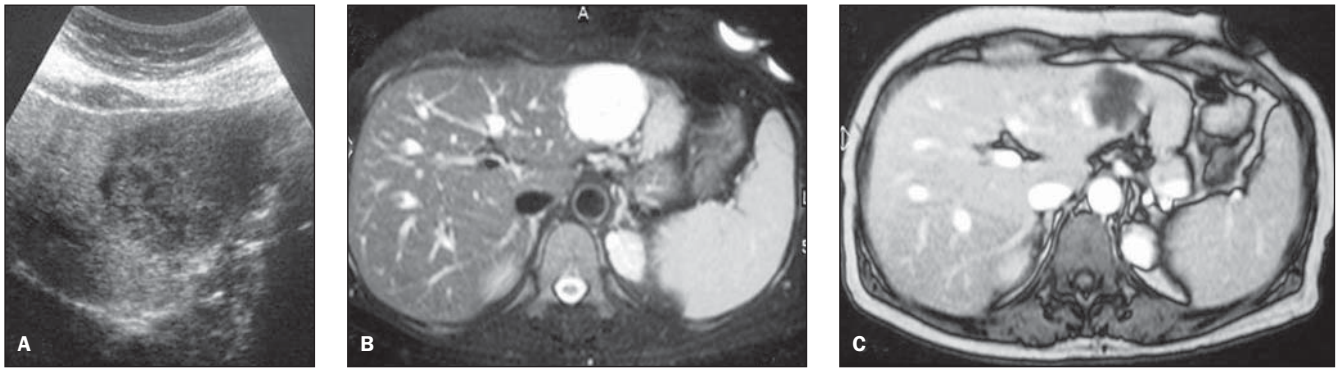


Figure 7. Atypical hemangioma at US (**A**) in a slightly steatotic liver, with typical aspect on MRI T2-weighted images (**B**) and after contrast injection (**C**).

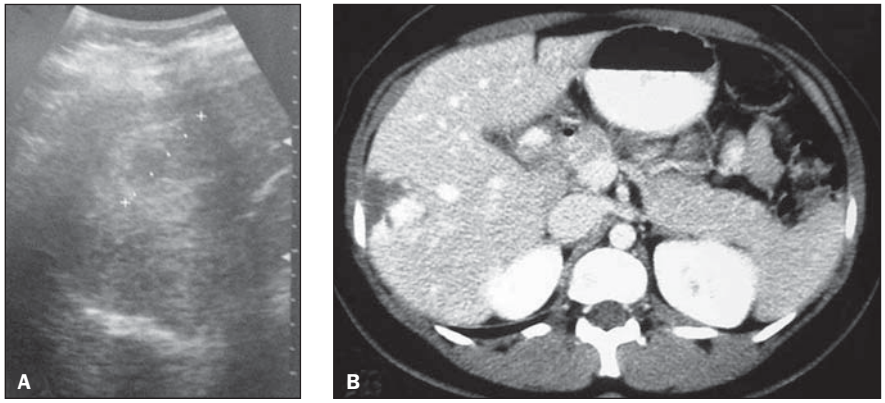


Figure 8. Hepatic nodule with a target-shaped aspect at US (**A**) ant whose aspect at CT is compatible with a typical hemangioma (**B**).

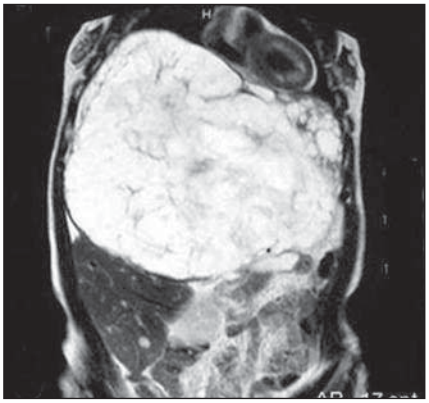
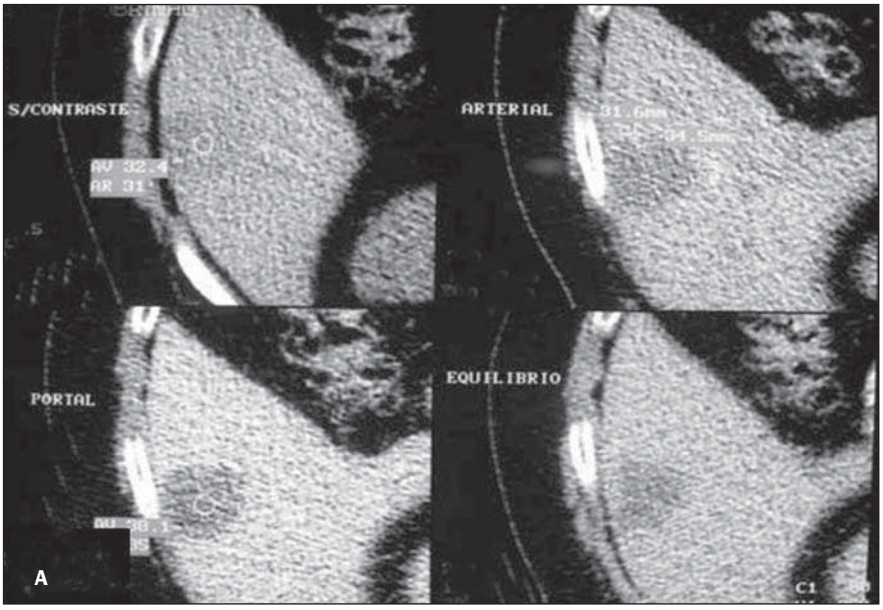


Figure 9. Asymptomatic 45-year old woman in follow-up for five years due to stable giant hemangioma on imaging examinations. Despite its large dimensions, the mass presents an aspect characteristic of hemangioma.



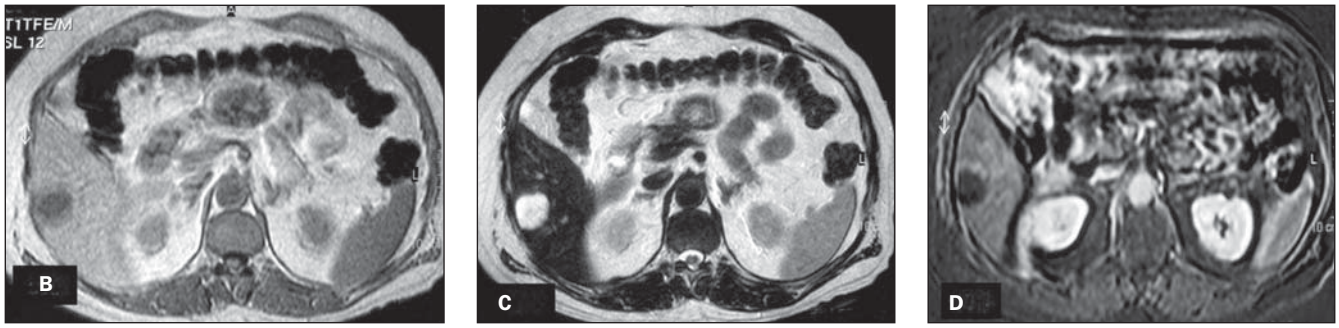


Figure 10. Asymptomatic 65-year old man presenting hypovascular nodule at CT (**A**) and MRI (**B–D**). Subtraction images after contrast injection do not demonstrate significant enhancement (**D**). Percutaneous biopsy has confirmed the diagnosis of sclerosing hemangioma with the presence of empty vascular channels lined by endothelium and fibroconjunctival tissue with hyalinized stroma.

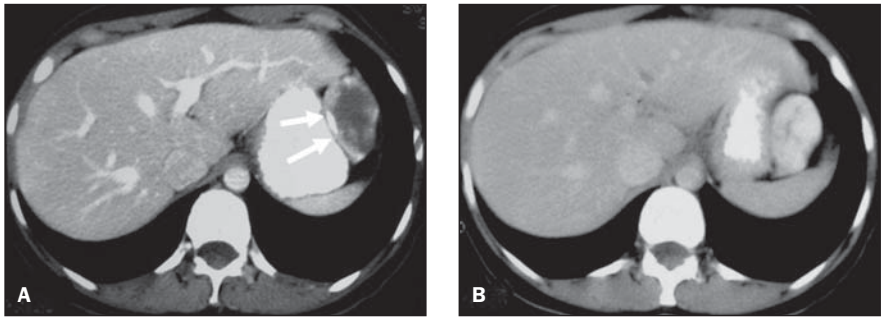


Figure 11. Hypodense mass adjacent to left hepatic lobe (arrows), laterally to the stomach. After contrast injection, the mass presents globular peripheral and centripetal enhancement.

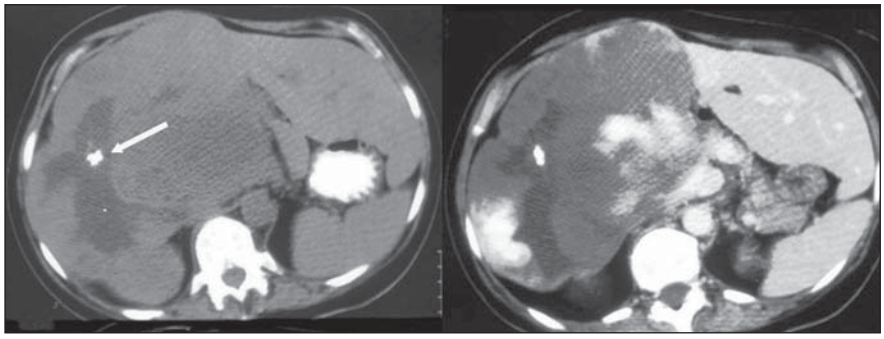


Figure 12. Giant hemangioma with gross calcifications (arrow) and area of central necrosis. The enhancement aspect is quite characteristic of hepatic hemangioma.

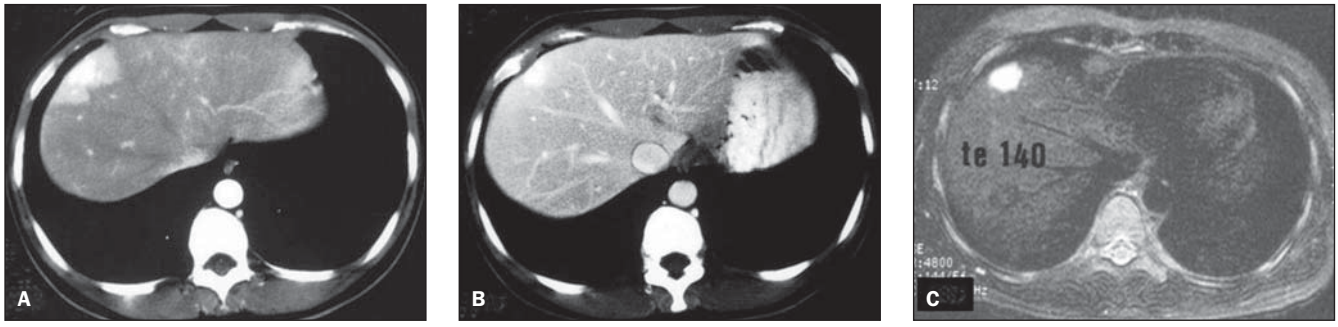


Figure 13. Hypervascularized nodule on the IV segment (**A**), with perilesional perfusion defect (**B**) and hypersignal on long echo T2 weighted image (TE = 140) (**C**), compatible with hemangioma. Nodule stable for three years.

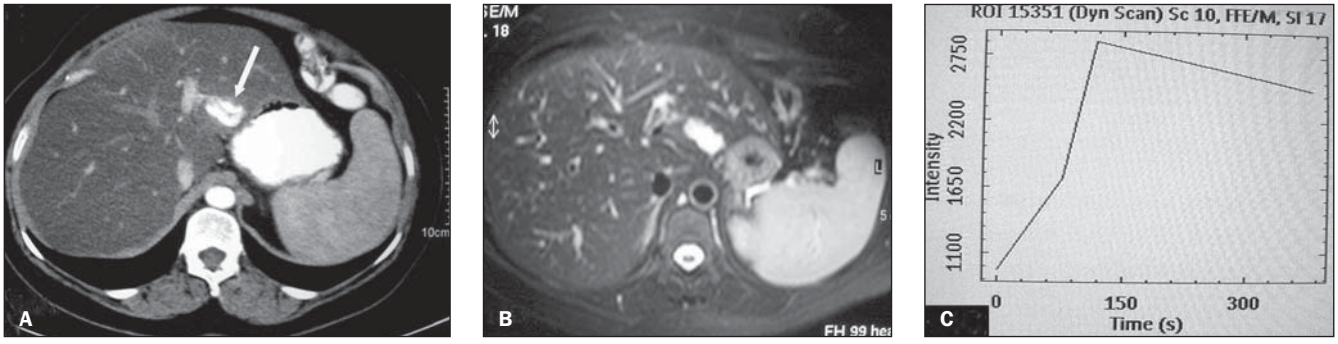


Figure 14. Hypervascularized hepatic nodule with a central scar on arterial phase (arrow on **A**) and hypersignal on T2 (**B**). The enhancement curve obtained by means of dynamic MRI shows the lesion slow clearing, compatible with hemangioma (**C**).

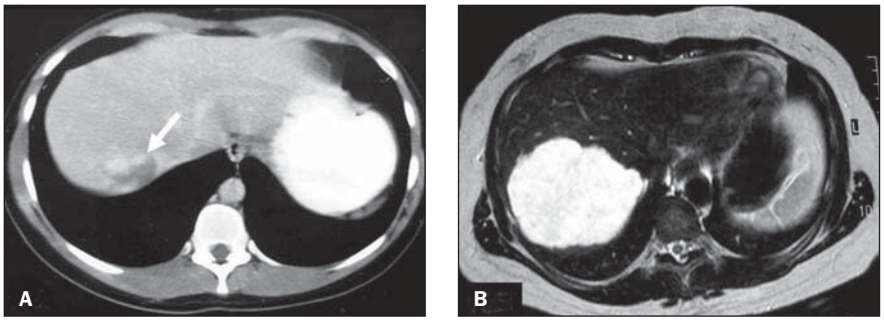


Figure 15. Hemangioma with significant growth along nine years. CT scans were performed in 1992 (**A**) demonstrating nodular lesion (arrow) with globular enhancement. MRI images obtained in 2001 (**B**) demonstrated significant growth of the lesion that keeps a typical aspect of hemangioma.

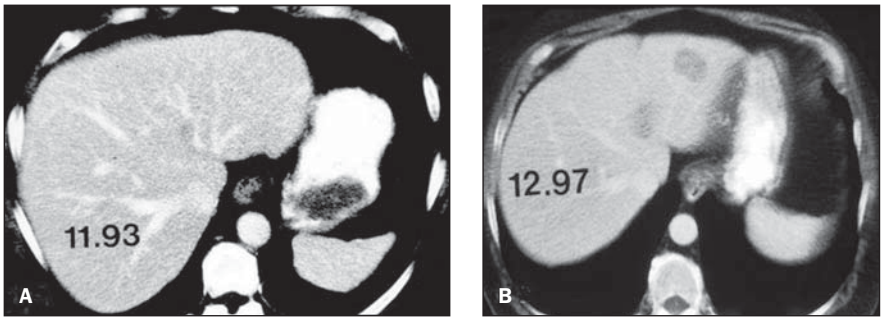


Figure 16. Hepatic nodules with a four-year growth and non-characteristic aspect at CT (**A,B**). Option was for fine-needle biopsy that has confirmed the diagnosis of hepatic hemangioma.