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CT and MRI imaging at the acute phase of inaugural non-traumatic hepatic haemorrhages

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Abstract
Purpose: Although rare, non-traumatic hepatic haemorrhage is a known complication of liver tumors. In cases where the haemorrhage is the first clinical event, diagnostic work-up is critical.
Material and methods: This retrospective study was conducted between July 2001 and March 2011. Acute phase CT-scan and MRI imaging in patients diagnosed with non-traumatic liver hematomas were interpreted with particular attention to the radio-semiotic characteristics of hematomas and liver lesions. Those findings were then confronted to the patients' final diagnoses.
Results: Twelve patients were included (mean age of 42 years). In seven of them a suspect liver lesion was discovered in the acute CT-Scan or MRI imaging. All lesions were strongly hyper vascular.The haemorrhage revealed hepatocarcinoma in four patients, liver adenoma in two and focal nodular hyperplasia in an other.
Conclusion: It is important in spontaneous liver haemorrhage to consider the high probability of hepatocarcinoma or potentially malignant lesions even when the patient has no known hepatic disorders, and especially in young patients. The results of this study show that imaging is a key issue at the acute phase of inaugural non-traumatic hepatic haemorrhages and requires a simple but complete triphasic injected protocol.

Spontaneous liver haemorrhage is defined as any hepatic haemorrhage occurring without any traumatism. It is a rare disorder, potentially fatal, associated with a high morbidity [1].

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Non-traumatic intrahepatic haemorrhages can occur in the natural history of any liver tumor but hepatocellular carinomas and hepatic adenomas widely dominate the other histological types. [2—4].

Exceptionally, focal nodular hyperplasia [5], liver metastases [4] and, to a lesser extent, any type of intrahepatic tumoral processes (angiomyolipoma...) are likely to give rise to spontaneous liver haemorrhages.

Beyond the tumoral causes, other pathological conditions, whether local or general, isolated or associated, are likely to be the cause of hepatic bleeding. They are summed up by the HELLP syndrome [6,7], all congenital, acquired or iatrogenic coagulation anomalies, amylosis [8], hepatic peliosis [9], and certain connective tissue diseases [10]. Diagnostic work-up of spontaneous intrahepatic haemorrhage is easy when there is an underlying tumoral lesion or known pathological condition at a risk of haemorrhage [11,12] although, for some patients, haemorrhage is the first clinical manifestation [13] hence aetiological diagnostic work-up is critical, especially at the acute phase as the heavy therapeutic solutions are associated with high morbimortality [1,14,15]. This retrospective, single centre case study aims at:

- determining efficiency of CT and MRI imaging in acute phase diagnosis work-up of spontaneous inaugural hepatic haemorrhages (that is, occurring without any traumatism in patients until then free of any known situation involving a risk of liver hemmorrhage);
- specifying the radio-semiological elements at stake in the diagnosis work-up of this clinical situation.

Materials and methods

This study is a retrospective analysis of cases between July 2001 and March 2011.

During this time period, all patients presenting with spontaneous liver haemorrhage, for which CT and MRI imaging during the acute phase (i.e., the first 15 days) was available in digital format, were included. Patients were recruited by using a keyword search in all CT or MRI imaging reports.

The medical file of each patient was then studied to exclude patients presenting at least one of the following criteria:

- peripartum patients, with a HELLP syndrome, whether or not confirmed;
- patients with a history of liver lesion, whatever the type;
- patients with a recent history of abdominal surgery;
- patients that recently underwent a traumatism, surgical intervention, biopsy or any invasive hepatic procedure;
- patients without follow-up information after baseline imaging.

Imaging datas of the acute phase was examined blind to the final diagnosis and the following elements of radio-semiological interest were assessed:

- haematoma: location, size (greatest axial diameter), attenuation before and after contrast injection, homogeneity, hepatic capsule's rupture, haemoperitonium;
- hepatic lesions (when visible): number, size, location, MRI signal, intralesional vascularisation;
- hepatic parenchyma: signs of chronic liver condition (steatosis, cirrhosis, other), permeability of the afferent and efferent vessels, haemodynamic disorders (localized or extensive);
- any other abdominal lesion discovered on the baseline imaging.

The last phase of the analysis consisted, in a confrontation between the CT and MRI imaging in the acute phase with the final diagnosis determined for each patient.

Results

Thirty-five patients were eligible for inclusion between January 2001 and March 2011. Among them, eight presented with known hepatic lesions with (adenoma, hepatocellular carcinoma, hepatic actinomycosis), three were in a peripartum context (including two with a confirmed HELLP syndrome), two had a post-traumatic liver haemorrhage, and one underwent a cholecystectomy a month prior to the diagnosis. Imaging data was not available in digital format for six patients and three patients only had one imaging examination without any follow-up. Therefore, 12 patients were recruited since they did not present any of the exclusion criteria.

Among them, 10 benefited from an abdominal CT with injection of contrast (83.3%) at the acute phase and five (41.7%) of an MRI.

The mean age at the time of diagnosis was 41.9 years (SD = 17.1 years), with a mean age of 43.5 years for the women (SD = 16.9 years) and 34.4 years for the men (SD = 15.5 years). There were 10 women and two men.

Characteristics of the haemorrhage

The largest haemorrhage measured 28 cm and the smallest 4.5 cm (mean: 11.7 cm; SD = 5.8 cm). They all appeared very heterogeneous on the CT-scan, with distinctly hyperdense portions and more hypodense zones.

In nine patients (75%), the haemorrhage was at least in part of liver segment VI or VII.

Characteristics of the intrahepatic lesions discovered

In seven patients, at least one lesion was visible at the acute phase (66.7%). The mean size of the nodules was 78.2 mm (SD = 85.5). The mean enhancement, after injection of contrast agent, of the visible nodules directly in contact with the haematoma [5] was 66% (59—74%) at the arterial time, attesting to the highly hypervascular nature (wash-in) of these lesions with a sharp tendency to early wash-out (Fig. 1).

Five patients (41.7%) underwent a liver MRI during the acute phase. This helped specify the characteristics of the nodules that seem to be iso or discretely hyper-T1 (no hypo-T1) and all were distinctly hypervascular.