

Traumatic rupture of nodular focal fatty infiltration of the liver: case report



Ann. Ital. Chir., LXXIV, 2, 2003

C. Marmorale¹, M. Romiti¹, I. Bearzi²,
A. Giovagnoni³, E. Landi¹

¹Department of Digestive Diseases and General Surgery,
University Hospital of Ancona

²Department of Pathology, University Hospital of Ancona

³Department of Radiology, University Hospital of Ancona

Abstract

Hepatic fatty infiltration generally appears in a widespread form but it can occasionally involve the liver in an irregular way. As regards focal forms, nodular focal fatty infiltration (NFFI) has great importance regarding problems of differential diagnosis with benign and malignant focal pathology of the liver. Except for this aspect, NFFI has little clinical importance as it is mainly asymptomatic.

We report a case of an acute bleeding of a big nodule of FFI which required an urgent hepatectomy.

Key words: Liver, focal fatty infiltration, surgery.

Introduction

Within the widespread pathology of the liver, steatosis represents a well defined nosological entity. It is the non-specific response of the organ to a large range of pathological conditions: obesity, malnutrition, total parenteral feeding, cortisone therapy, congestive cardiac failure, diabetes, alcoholism, severe hepatitis, glycogen storage disease, Wilson's disease, hyperlipidaemia, chronic diseases (tuberculosis, ulcerative colitis, Crohn's disease), jejunal-ileum by-pass, hepatic-toxic medicines, pregnancy, cystic fibrosis, chemotherapy (1-4).

Since about twenty years (5, 6) the possibility that liver steatosis could have a non-uniform distribution in the whole organ has been recognised. These forms, more frequently seen because of the increased use of echography and CT, are associated with the same pathological conditions listed above but no predisposing factor could be also recognised (1).

Among them, two forms in particular, the subtotal fatty infiltration with focal sparing and the nodular focal fatty infiltration (NFFI), are extremely interesting because they must be distinguished from focal benign and, above all, malignant pathology of the liver (1, 7-8).

We report a case that, as far as we know, has no precedents in literature: the intratumoral bleeding of a FFI

Riassunto

ROTTURA TRAUMATICA DI UN NODULO DI STEATOSI FOCALE EPATICA: CASO CLINICO

La steatosi epatica si presenta generalmente in forma diffusa ma può occasionalmente interessare il fegato in modo irregolare. Delle forme non diffuse la steatosi focale nodulare riveste particolare interesse per i problemi di diagnosi differenziale che crea nei confronti della patologia epatica focale benigna e maligna. Fatto salvo questo aspetto, tuttavia, la steatosi focale nodulare ha scarso peso clinico, essendo nella maggior parte dei casi asintomatica. Riportiamo il caso di un sanguinamento acuto di un grosso nodulo di steatosi focale che ha reso necessario un intervento chirurgico urgente di epatectomia.

Parole chiave: Fegato, steatosi focale, chirurgia.

nodule which required an urgent surgical operation and which was histologically checked.

Case report

A 49 year-old patient, female. Five years before, because of dyspeptic symptoms, she was subjected to an echo-

Pervenuto in Redazione il 27 Luglio 2002

Aggiornato l'11 Ottobre 2002

graphy and then to an abdominal MRI that demonstrated the presence of multiple focal lesions of the liver interpreted as angiomyolipomas (Fig. 1).

Since then the patient has been subjected to regular echographic follow-up (last check up two months before) which confirmed the quiescence of the situation.

The day before our observation, following a rapid hyperflexion of the trunk against the back of the seat of the car, the patient complained of a sudden epigastric ache. An abdominal echography confirmed the presence of multiple hyperechoic hepatic nodules, the biggest of which, in the dorsal segment, showed, if compared to the last check-up, dimensions clearly increased and an echo-structure inhomogeneous for the presence of anechoic areas referable to hemorrhagic focus (Fig. 2).

Admitted to our Institute, the patient was subjected to abdominal MRI and arteriography.

The first test confirmed the echographic datum of volumetrical increase of the hepatic nodule of the dorsal segment related to intratumoral bleeding; the inferior vena cava appeared displaced and partially compressed by the lesion (Fig. 3). The superselective arteriography of the left hepatic artery showed a leakage of the contrast medium near the suspected lesion. On the basis of the clinical and instrumental data urgent surgical operation was performed.

Laparotomy confirmed the presence in the liver of multiple yellow-ochre nodules with tense-elastic consistency. The biggest, situated at the dorsal area, about 12 cm in size, presented a fissure of the capsule which emitted a small quantity of blood; similar lesions were found on the II, III, IV and VIII segment. Consequently left hepatectomy extended to the dorsal segment with cholecystectomy was performed (Fig. 4).



Fig. 1: MR T1-weighted image shows the presence of multiple focal hyperintense lesions of the liver, solid, with well defined margins, the biggest of which (6 cm in diameter) is localized in the dorsal segment and causes a partial compression of the inferior vena cava. The lesions were interpreted as angiomyolipomas.

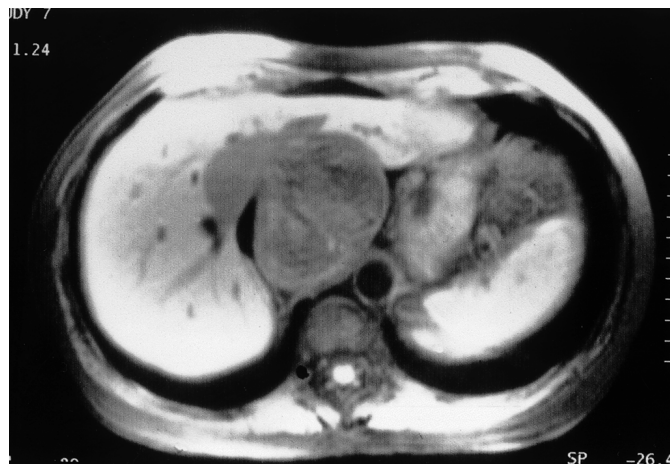


Fig. 3: T1 GE fat sat MR image: the nodule of the dorsal segment appears increased in size compared to the previous exams, with inhomogeneous central area.



Fig. 2: Ultrasonography of the liver demonstrates an irregular, hypo-anechoic area, related to intratumoral bleeding, in the big nodule of the dorsal segment.

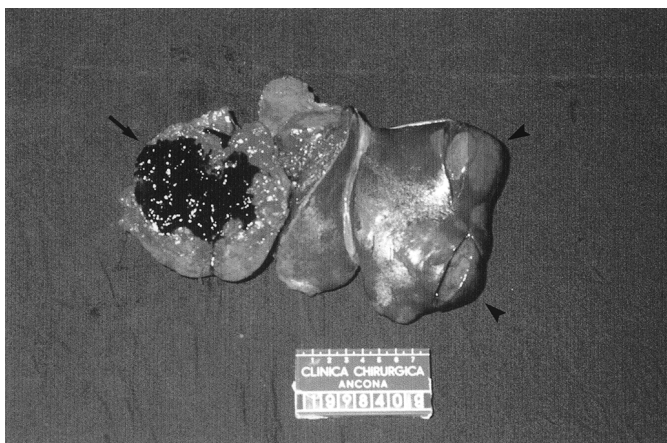


Fig. 4: Surgical specimen: the left hepatic lobe with the big hemorrhagic nodule of the dorsal segment (arrow) and multiple FFI nodules in the surrounding parenchyma (arrow-heads).

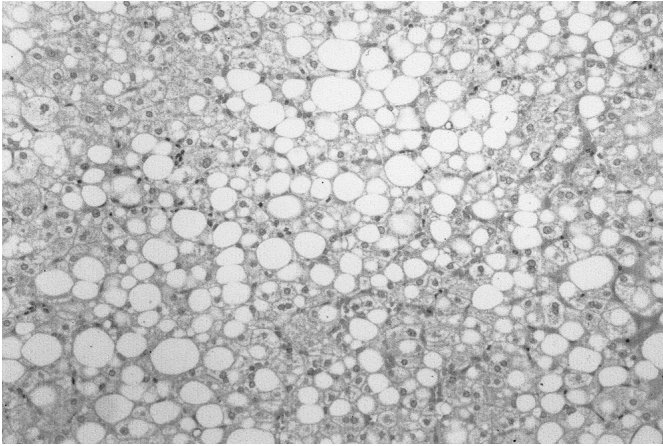


Fig. 5: The histopathology examination demonstrates the presence of hepatocytes seat of macrovesicular steatosis (Hematoxylin-Eosin, 60x).

Histopathology showed a voluminous yellow-ochre nodule, whose diameter was 8 cm, with a wide hemorrhagic area inside. In the remaining hepatic parenchyma there were many yellow-ochre nodules, partly with poorly defined margins, partly with well limited margins, of varying dimensions, between 4 mm to 4 cm in diameter. Microscopically, the hepatic nodules described consisted of hepatocytes with macrovesicular steatosis (Fig. 5). In the nodules, rare portal spaces were recognizable with vascular venous and arterial structures with thickened walls. The nodules were not delimited by capsule. Those with bigger dimensions had well defined margins and compressed the encompassing hepatic parenchyma; conversely the smallest had very irregular margins. The morphologic framework indicated multifocal nodular liver steatosis.

MRI follow-up on 5, 8 and 33 months after surgery, didn't show any changes of previous described lesions or appearance of new nodules.

Discussion

Nodular focal fatty infiltration of the liver is one of the rarest form of non-diffuse steatosis (1).

The pathogenetic mechanism that subtends the nodular distribution of steatosis is still not clear. Some authors believe that it is determined by fibrous septa caused by alcoholic illness of the liver (4) (but this theory does not explain the forms which arise in healthy livers); others believe that the cause must be sought in local hypoxia (5, 9), perhaps linked to aberrant venous drainage to the hepatic parenchyma of bordering structures such as the stomach, pancreas or gall-bladder (10-13). The nodules can be single or multiple; in some cases they are so numerous to give a "flowery field" aspect to the liver (1). The dimensions can vary from few millimetres to several centimetres (the case of a nodule of

7x14 cm is reported (14)). Morphologically, they can have a non-spherical form, with poorly defined and irregular margins (2-3, 15). Otherwise they can appear as well defined nodules, spherical and oval, of difficult interpretation. In both cases differential diagnosis must exclude hemangiomas, lipomas, angioliipomas, angiomyoliipomas, angiomyeloliipomas, angiomyomyeloliipomas, regenerative hyperplasia in cirrhotic liver, abscesses, hepatocarcinomas and, in particular, metastases (1-3, 15-17). The ultrasound represents the first diagnostic technique: the FFI nodule appears as an hyperechoic area, with margins sometimes definite, sometimes irregular, without mass effect (i.e. they do not displace or penetrate the bordering structures nor alter the hepatic outline) (1-2, 15-18). This last datum must not be considered to have great diagnostic value. Some authors in fact describe FFI associated to the radiologically evidence of mass effect (1-3, 19-21).

The CT aspect is that of an hypodense nodule (1-3, 15, 22) which can show a marked central enhancement towards the surrounding tissue (3). The selective arteriography of the hepatic artery can identify no vascular alterations (2-3) but it can show a hypovascularization of the suspected area as a metastasis (1, 4, 9).

MRI is more precise than CT scan: due to its potentiality of tissue characterization it can determine in a relatively certain way the presence of hepatic lesions with lipidic contents (23-25).

The scintigraphy could represent an important instrument of differential diagnosis. The use of Tc 99, intercepted by Kupfer cells, shows a uniform distribution of the tracer, without focal defects (1, 3, 8, 26-27). On the other hand, the use of Xe 133, intercepted by the fat, allows the differentiation of the nodular FFI area from the surrounding healthy parenchyma (1, 27). This methodology however is not routinely used.

If the diagnostic doubt persists it is possible to have recourse to the fine-needle biopsy, a simple and always diagnostic way, which is not inadvisable even if the suspected lesion could be an angioma (28).

As last resort laparoscopy or explorative laparotomy, with the possibility of effecting multiple biopsies or removing the tumour, would be sufficient for a definite diagnosis (2, 4).

As for the clinical aspects of the illness, from the revision of the cases reported in literature, it would seem that its appearance can be linked either to a predisposing factor (for example the appearance of diabetes mellitus) or to the beginning of a symptomatology characterized by dyspeptic symptoms or undefined, chronic pains, situated at the right hypochondrium and/or at the epigastrium. The diagnosis is often occasional, during instrumental tests made for other reasons.

NFFI does not need surgical treatment; eventually it needs a medical therapy aimed at the correction of the predisposing factor.

In the few cases reported in literature surgery was used,

to have a certain diagnosis. In most cases only multiple biopsies were made (4, 9, 29-30). In other cases suspected NFFI was confirmed at the surgical operation but the type of surgery realized is not mentioned (3). Finally, two Japanese studies report six cases of surgical excision of FFI nodules (2, 10). But also in this case the type of exeresis was not specified (nodulectomy? segmentectomy?).

The evolution of FFI nodules can be extremely changeable. In fact they can remain quiescent as documented also in our case (1, 3). They can also become smaller or completely disappear, in general after some months of medical treatment of the associated pathological condition (3, 9, 20-21, 31-33). Finally, there is the possibility of their progression towards a fibrosis or regenerative pattern (3) or of their growth (14).

The case we reported is certainly very particular and we think that it gives some new information about the nature of this pathology.

Firstly, this case demonstrates that NFFI, in general associated to symptoms of little entity or completely asymptomatic, even if exceptionally, can appear in a so dramatic and potentially lethal way to need urgent surgery. Then it is interesting to note that, even if it wasn't a spontaneous rupture but traumatic, hepatic fracture has interested only the big nodule of FFI situated at the dorsal area, leaving perfectly integral the surrounding healthy parenchyma. This observation and the particular mechanism of the trauma (not a strong contusion but a rapid hyperflexion of the trunk against the stuffed back of the seat of the car) could suggest that FFI nodules of big dimensions represent areas of greater structural pliability, with a higher risk of rupture if compared to a perfectly healthy liver.

The left hepatectomy extended to the dorsal segment has finally given the anatomopathologists the possibility to analyse a big portion of parenchyma. Several small nodules, with variable dimensions, were found within the apparently healthy parenchyma: it seems that these nodules remained still and did not change as documented by the radiological tests made during the previous five years and the three years after the sharp event.

Beside, it was interesting to note the absence of FFI nodules in the regenerated hepatic parenchyma.

Bibliografia

- 1) Giorgio A., Brancica G., Aloisio T., Tarantino L., Pierrri P., Pellicano M., Buscarini L., Livraghi T.: *Multifocal fatty infiltration of the liver mimicking metastatic disease*. *Gastrointest Radiol*, 4:169-172, 1991.
- 2) Yoshikawa J., Matsui O., Takashima T., Sugiura H., Katayama K., Nishida Y., Tsuji M.: *Focal fatty change of the liver adjacent to the falciform ligament: CT and sonographic findings in five surgically confirmed cases*. *AJR*, 149:491-494, 1987.
- 3) Yates C.K., Streight R.A.: *Focal fatty infiltration of the liver simulating metastatic disease*. *Radiology*, 159:83-84, 1986.

- 4) Wang S.S., Chiang J.H., Tsai Y.T., Lee S.D., Lin H.C., Chou Y.H., Lee F.Y., Wang J.S., Lo K.J.: *Focal hepatic fatty infiltration as a cause of pseudotumors: ultrasonographic patterns and clinical differentiation*. *J Clin Ultrasound*, 18:401-409, 1990.
- 5) Brawner M.K., Austin G.E., Lewin K.J.: *Focal fatty change of the liver: a hitherto poorly recognized entity*. *Gastroenterology*, 78:247-252, 1980.
- 6) Scott W.W., Sanders R.C., Siegelman S.S.: *Irregular fatty infiltration of the liver: diagnostic dilemmas*. *AJR*, 135:67-71, 1980.
- 7) Chong V.F.H., Fan Y.F.: *Ultrasonographic hepatic pseudolesions: normal parenchyma mimicking mass lesions in fatty liver*. *Clin Radiol*, 49:326-329, 1994.
- 8) Alessi V., Bianco S., Marotta R., Traina G.: *"Area indenne" pseudotumorale nella steatosi epatica subtotale. Aspetti ecografici e tomografici*. *Radiol Med*, 76:280-283, 1998.
- 9) Clain J.E., Stephens D.H., Charboneau J.W.: *Ultrasonography and computed tomography in focal fatty liver. Report of two cases with special emphasis on changing appearances over time*. *Gastroenterology*, 87:948-952, 1984.
- 10) Kawamori Y., Matsui O., Takahashi S., Kadoya M., Takashima T., Miyayama S.: *Focal hepatic fatty infiltration in the posterior edge of the medial segment associated with aberrant gastric venous drainage: CT, US and MR findings*. *J Comput Assist Tomogr*, 20:356-359, 1996.
- 11) Kobayashi S., Matsui O., Kadoya M., Yoshikawa J., Gabata T., Kawamori Y., Sanada J., Terayama N.: *CT arteriographic confirmation of focal hepatic fatty infiltration adjacent to the falciform ligament associated with drainage of inferior vein of Sappey: a case report*. *Radiat Med*, 19:51-54, 2001.
- 12) Fukukura Y., Fujiyoshi F., Inoue H., Sasaki M., Hokotate H., Baba Y., Nakajo M.: *Focal fatty infiltration in the posterior aspect of hepatic segment IV: relationship to pancreaticoduodenal venous drainage*. *Am J Gastroenterol*, 95:3590-3595, 2000.
- 13) Nakayama Y., Yoshimitsu K., Masuda K.: *Pseudolesion in segment IV of the liver with focal fatty deposition caused by the parabiliary venous drainage*. *Comput Med Imaging Graph*, 24:259-263, 2000.
- 14) Gariballa S.E., Woods D.J., Davidson A.R.: *Case report: focal fatty liver infiltration causing mass effect*. *Clin Radiol*, 52:630-632, 1997.
- 15) Baker M.E., Silverman P.M.: *Nodular focal fatty infiltration of the liver: CT appearance*. *AJR*, 145:79-80, 1985.
- 16) Strotzer M., Paetzel C., Feuerbach S.: *Multiple hepatic angioliipomas: a case report and review of literature*. *Eur Radiol*, 9:259-261, 1999.
- 17) Di Martino G.: *The emergency surgical treatment of hemoperitoneum due to the spontaneous rupture of a hepatocarcinoma in a cirrhotic liver*. *Ann Ital Chir*, 64(1):83-85, 1993.
- 18) Middleton W.D.: *Focal hepatic fatty infiltration adjacent to falciform ligament*. *AJR*, 152:1326-1327, 1989.
- 19) Verhille R., Marchal G., Baert A.L., Fevery J.: *Focal fatty infiltration of the liver associated with important mass effect*. *J Belge Radiol*, 77:10-12, 1994.
- 20) Flueckiger F., Steiner H., Leitinger G., Hoedl S., Deu E.: *Nodular focal fatty infiltration of the liver in acquired porphyria cutanea tarda*. *Gastrointest Radiol*, 16:237-239, 1991.

- 21) Tang-Barton P., Vas W., Weissman J., Salimi Z., Patel R., Morris L.: *Focal fatty liver lesions in alcoholic liver disease: a broadened spectrum of CT appearances*. *Gastrointest Radiol*, 10:133-137, 1985.
- 22) Alpern M.B., Lawson T.L., Foley W.D., Perlman S.J., Reif L.J., Arevalos E., Rimm A.A.: *Focal hepatic masses and fatty infiltration detected by enhanced dynamic CT*. *Radiology*, 158:45-49, 1986.
- 23) Wenker J.C., Baker M.K., Ellis J.H., Glant M.D.: *Focal fatty infiltration of the liver: demonstration by magnetic resonance imaging*. *AJR*, 143:573-574, 1984.
- 24) Mitchell D.G.: *Focal manifestations of diffuse liver disease at MR imaging*. *Radiology*, 185:1-11, 1992.
- 25) Hirohashi S., Ueda K., Uchida H., Ono W., Takahama J., Takewa M., Kitano S., Ohishi H.: *Nondiffuse fatty change of the liver: discerning pseudotumor on MR images enhanced with ferumoxides - initial observations*. *Radiology*, 217:415-420, 2000.
- 26) Kissin C.M., Bellamy E.A., Cosgrove D.O., Slack N., Husband J.E.: *Focal sparing in fatty infiltration of the liver*. *Br J Radiol*, 59:25-28, 1986.
- 27) El-Hassan A.Y., Ibrahim E.M., Al-Mulhim F.A., Nabhan A.A., Chammas M.Y.: *Fatty infiltration of the liver: analysis of prevalence and clinical features and influence on patient management*. *The BJ of Radiology*, 65:774-778, 1992.
- 28) Solbiati L., Livraghi T., De Pra L., Ierace T., Maschiardi N., Revetto C.: *Fine-needle biopsy of the hepatic hemangioma with sonographic guidance*. *AJR*, 144:471-474, 1985.
- 29) Paulson E.K., Baker M.E., Spritzer C.E., Leder R.A., Gulliver D.J., Meyers W.C.: *Focal fatty infiltration: a cause of nontumorous defects in the left hepatic lobe during CT arterial portography*. *J Comput Assist Tomogr*, 17:590-595, 1993.
- 30) Lwakatere F., Yamashita Y., Nakajama M., Takahashi M.: *SPIO-enhanced MR imaging of focal fatty liver lesions*. *Abdom Imaging*, 26:157-160, 2001.
- 31) Rich H.G.: *Resolution of focal fatty infiltration of the liver*. *South Med J*, 89:1024-1027, 1996.
- 32) Rampal P., Desmorat H., Bruneton J.N., Saint-Paul M.C., Rampal A., Mouiel J., Serres J.J.: *Irregular hepatic steatosis. Clinical and imaging study of 6 cases*. *Gastroenterol Clin Biol*, 10:43-48, 1986.

Autore corrispondente:

Dott. C. MARMORALE
University Hospital of Ancona
Department of Digestive Disease and General Surgery
c/c Ospedale di Torrette
Via Conca
60100 ANCONA

