Liver metastases of solitary fibrous tumors: a pictorial review

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Learning objectives

To illustrate the various aspects of the hepatic metastases of solitary fibrous tumors (SFTs)

To review the spectrum of hypervascular liver lesions

To describe the pathologic features of SFTs
Background

Solitary fibrous tumors (SFTs), previously termed hemangiopericytomas and now considered a phenotype of a larger category of fibroblastic tumors [1], are extremely rare tumors with most often either a pleural, meningeal or soft tissue origin, that can actually be encountered in any location [2,3]. Their biological behavior is unpredictable and when clinically aggressive, they tend to metastasize to the lung, liver and bones.

They contain a variable mixture of spindle cells and fibroblasts, present often ectatic blood vessels and pathological diagnosis is based on positive staining for CD 34, vimentin, Bcl-2 and negative reactivity for S-100 [3,4,5].

The spectrum of differentials should include malignant hepatic tumors such as multifocal hepatocellular carcinoma or other hypervascular liver metastases (of neuroendocrine, renal, thyroid tumours, melanoma and sarcomas)[6]. It might also include benign lesions such as multiple hepatic adenomas or multiple focal nodular hyperplasia.
We analyzed a series of 7 patients (5 female and 2 male, with ages ranging from 25 to 59 and a mean of 49.8 years) with liver metastases from either musculoskeletal, retroperitoneal or meningeal SFTs. CT scans were obtained in all cases, whereas MRI exams were available for only 3 subjects. An arterial phase had been performed for 4 of them. Several features such as size, number, shape, margins, density or signal, enhancement pattern, the presence of a capsule, degree of necrosis and hepatic involvement, association with adenopathy and simultaneous distant localisations were all considered in the attempt to identify specific aspects of this rare entity in comparison with other hypervascular liver lesions.

Firstly, they appear variable in size, ranging from about 1 to 19 cm in our series, but generally seem to attain large dimensions, with 5 cases presenting at least one lesion over 7 cm, while their numbers tend to be high, exceeding 20 in 3 of our cases. (Fig. 1 on page 6 and Fig. 2 on page 6)

In all patients a nodular, generally well-limited, heterogenous pattern was encountered and an important degree of necrosis was noted at large volumes. (Fig. 3 on page 7)

The imaging characteristics are resumed in Table 1 on page 8. The hepatic metastases of solitary fibrous tumors were hypodense on unenhanced CT and mainly T2 hyperintense, T1 hypo or isointense in our series. The T2 hypointensity encountered in one of our cases hereby illustrated is probably related to the existence of an important fibrous component. After contrast medium injection, they share the strong arterial enhancement previously reported for primary SFT localizations [3,4], which persists on subsequent vascular phases (Fig. 4 on page 9 and Fig. 5 on page 10).

Both hepatic lobes were involved and extrahepatic distant metastases in a variety of locations including the lungs, axial skeleton, pancreas, soft tissues, were present or had already been treated in all except one patient at the moment of diagnosis. Nonetheless, this case also developed distant renal and bone recurrence later on. (Fig. 6 on page 10 and Fig. 7 on page 11)

Interestingly, accompanying adenopathies, vascular invasion, hepatic contour irregularities or ascites were absent in all cases.

The most probable differential diagnosis is represented by other hypervascular metastases. Liver involvement occurs very often when dealing with a neuroendocrine point of departure, in which case it seems to bear the highest resemblance to secondary lesions from SFTs. (Fig. 8 on page 12 and Fig. 9 on page 12). Among the other mimicks, thyroid primaries may generate strikingly similar metastases as well (Fig. 10 on page 12). However, in our study the distinction between SFT and other hypervascular
metastases was made possible by the existence of a known, histologically proven primary SFT and a usually long evolution until the development of hepatic metastases.

The second entity to be considered in the differential is multifocal HCC (Fig. 11 on page 13), although this would generally imply the existence of a chronic liver disease with morphologic liver changes and modifications in tumor marker levels.

Finally, multiple adenomas (Fig. 12 on page 14) and multiple focal nodular hyperplasia (Fig. 13 on page 15) must also be considered as benign differential diagnoses [7,8], although the clinical history is different, these presenting most often as incidental findings. Multiple HNFs are generally homogeneous and typically present a central scar [7,8], while adenomas may be harder to distinguish, but usually SFT metastases are more heterogeneous and never contained fat or hemorrhagic foci in our study [7,8].
Fig. 1: Very numerous hypervascular hepatic and vertebral secondary lesions in a 59 year-old female patient, originating from a right shoulder soft tissue primary removed in 1998-T1-w arterial phase MRI after gadolinium injection, coronal view

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**Fig. 2:** Same patient as in Fig.1- T1-weighted MRI after injection of gadolinium-based contrast medium: portal phase. The lesions remain hypervascular.

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Fig. 3: 58 year-old female patient developing very large, necrotic hepatic metastases 12 years after the surgical removal of a parietal SFT: CT scan, portal phase post injection of iodinated contrast

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* On CT or MRI studies

**Table 1:** Imaging features of the studied patients

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Fig. 4: 44 year-old female patient presenting with multiple hypervascular liver metastases from a parietal meningeal SFT surgically removed 6 years previously: unenhanced, portal and delayed phases on abdominal CT. The patient subsequently benefitted from a liver transplant.

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Fig. 5: 25 year-old female with a resected SFT of the left foot: T1-w, T2-w, T1 fat suppressed MRI post intravenous gadolinium administration in the arterial, portal and delayed phases- the T2 hypointense aspect of the largest lesion may be due to its high collagen content

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Fig. 6: 59 year-old female displaying multiple SFT metastases involving the pleura, both iliopsoas muscles, the dorsal spine and pelvis- CT scan: portal phase

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Fig. 7: Spectrum of extrahepatic distant SFT metastases encountered in different patients included in our series: lungs, sternum, ribs and femoral neck were concerned

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**Fig. 8:** Neuroendocrine liver metastases from a colic primary- CT scan: portal and delayed phases displaying numerous well-limited, heterogenous, hyperenhancing lesions becoming hypodense in the delayed phase

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**Fig. 9:** Multiple solid metastases from a pancreatic neuroendocrine tumor: T2-w, T1-w and T1 fat supressed arterial, portal and delayed phases after injection of gadolinium-based contrast showing several well-limited, hyperenhancing lesions in the arterial phase, turning slightly hypointense on the following acquisitions

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Fig. 10: Multiple hypervascular liver metastases, of which some are large and necrotic, from a medullary carcinoma of the thyroid - CT scan: unenhanced, portal and delayed phases after injection of iodine-based contrast

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Fig. 11: Multifocal hepatocellular carcinoma in an elderly patient suffering from chronic hepatitis C- CT scan, arterial and portal phases post contrast injection: liver contour irregularities and large arterial hypervascular lesions, washing out subsequently

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Fig. 12: Multiple adenomas- T1 fat suppressed MRI post gadolinium injection: arterial, portal and delayed phases, where several arterial hyperenhancing nodules are visible, which persist slightly hyperintense on the following sequences.
Fig. 13: Multiple biopsy-proven focal nodular hyperplasia in a 49 year-old female patient: T1-w and T1 fat suppressed MRI sequences in the arterial, portal and delayed phases post gadolinium administration showing several homogenously arterial hyperenhancing lesions, which tend to become isointense on the next vascular phases

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Conclusions:

What is to be kept in mind is that liver metastases from SFTs are large, heterogeneous and hypervascular lesions, generally occurring several years (this interval ranged from 6 to 23 years in our series) after the discovery of the primary. However, these radiological findings are nonspecific and the diagnosis of such entities should be confirmed by pathological analysis.
References


2. Nicolas Penel, Eric Yaovi Amela, Gauthier Decanter, Yves-Marie Robin, and Perrine Marec-Berard, Solitary Fibrous Tumors and So-Called Hemangiopericytoma *Sarcoma* 2012;2012:690251

3. Andrew B. Rosenkrantz, Nicole Hindman, Jonathan Melamed, Imaging Appearance of Solitary Fibrous Tumor of the Abdominopelvic Cavity *J Comput Assist Tomogr* 2010;34:201-5


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