Original article

Size of lesion is not a criterion for resection during management of giant liver haemangioma

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Background: The unknown natural history and risk of complications of large haemangiomas may pose therapeutic dilemmas. The authors describe their experience with the management of giant haemangiomas.

Methods: Patients with a giant haemangioma were identified by a survey of the hospital database. Forty-nine patients with a haemangioma of at least 4 cm in diameter presented between January 1990 and December 2000. Medical records were analysed retrospectively.

Results: Eleven patients had surgical treatment and 38 were managed conservatively. The median diameter of the tumours was 8·0 cm in surgically treated patients and 6·0 cm in the group managed by observation. Surgery-related morbidity occurred in three patients, and abdominal complaints persisted in three of ten patients with a symptomatic lesion. During a median follow-up of 52 months, 12 non-operated patients had mild abdominal complaints, considered to be unrelated to the lesion. In these patients symptoms either diminished or became minimal during follow-up. Complications did not occur.

Conclusion: Observation of giant haemangiomas can be performed safely. The authors advocate resection of cavernous liver haemangiomas only in patients with persistent severe symptoms.

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Introduction

Cavernous haemangioma is the most common benign tumour of the liver, with an estimated prevalence of 5–7 per cent[1]. The incidental finding of liver haemangioma has increased considerably as many patients undergo modern imaging techniques[2,3]. Although most of these lesions remain asymptomatic, they may be responsible for pain due to capsular stretch, partial infarction or pressure on surrounding tissues. More rarely, haemangiomas may rupture, or be associated with a consumptive coagulopathy (Kasabach–Merritt syndrome) or abscess formation[4–7]. Strategies for the management of liver haemangioma have ranged from selective observation to a variety of radiological and surgical interventions[8–12]. While there is general agreement that small asymptomatic lesions should be managed conservatively, the unknown natural history and the possibility of complications of larger, or giant, haemangiomas (4 cm or more) makes treatment selection difficult[3,9].

The management of large haemangiomas has become increasingly conservative with time. Because serious complications may occur during conservative management of liver haemangiomas, a retrospective review was undertaken to identify the magnitude of these risks.

Patients and methods

A survey of the hospital database was performed to identify all consecutive patients with a diagnosis of giant haemangioma (at least 4 cm in diameter) who presented at University Hospital Rotterdam-Dijkzigt between January 1990 and December 2000. Forty-nine patients were identified. The diameter of the tumour was 10 cm or more in eight patients. Liver haemangiomas were solitary in

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Table 1 Tumour characteristics

	Surgery (n = 11)	Observation (n = 38)
Location		
Right	4	22
Left	5	6
Bilateral	2	10
No. of tumours		
One	9	22
Two	2	8
Three or more	0	8
Diameter (cm)		
Mean	9·5	6·5
Median	8·0	6·0
Range	4·0–20·0	4·0–25·0

31 of the 49 patients. Bilateral giant haemangiomas were found in 12 patients (*Table 1*).

There were 33 women (67 per cent) and 16 men, with a mean age of 55 (range 32–89) years. Eleven (22 per cent) of the 49 patients underwent operation and 38 (78 per cent) were managed by observation. The medical records of all patients were reviewed to document clinical presentation, diagnostic strategies, treatment, complications and follow-up.

Diagnostic investigation included ultrasonography, triphasic spiral computed tomography (CT) and magnetic resonance imaging (MRI). The current MRI protocol for haemangiomas includes T2-weighted images with short and long echo times, multiphasic dynamic contrast-enhanced T1-weighted images, and delayed fat-saturated dynamic contrast-enhanced T1-weighted images. In the first part of this retrospective study, ultrasonographically guided needle cytology or biopsy was performed when there was still doubt regarding the diagnosis after the use of imaging modalities and a conservative approach was being considered. The histological diagnosis of cavernous liver haemangioma was retained if the biopsy specimen demonstrated endothelium-lined spaces containing either fibrin thrombi or aggregates of red blood cells separated from one another by connective tissue septa. More recently, fine-needle aspiration cytology or biopsy has been performed only when MRI is not conclusive.

A variety of surgical procedures were employed (*Table 2*), designed to minimize the unnecessary loss of normal liver tissue. When feasible, enucleation was preferred. In patients with multiple haemangiomas, resection was performed for the tumour that was presumed to be causing symptoms, considering size and localization.

Follow-up after either surgical or conservative treatment consisted of physical examination and ultrasonographic visualization of the liver.

Table 2 Surgical procedures undertaken in 11 patients

	n	Diameter (cm)
Right hemihepatectomy	2	7·0, 12·0 (9·5)
Right extended hemihepatectomy	1	20·0
Left hemihepatectomy	2	9·0, 12·0 (10·5)
Segmental resection	3	4·0, 7·0, 9·0 (6·7)
Enucleation	3	5·0, 6·0, 7·0 (6·0)

Values in parentheses are mean

Table 3 Clinical presentation of 49 patients with a giant haemangioma

	Surgery (n = 11)	Observation (n = 38)	Total (n = 49)
Abdominal complaints	10	12	22 (45)
Incidental finding	1	22	23 (47)
Suspected metastasis	—	3	3 (6)
Raised γ-glutamyl transferase level	—	1	1 (1)

Values in parentheses are percentages

Results

In 27 (55 per cent) of the 49 patients, haemangioma was an incidental finding during abdominal imaging for unrelated pathology or during follow-up or staging of an extrahepatic malignancy (*Table 3*). Symptoms potentially related to haemangioma included upper abdominal pain, fullness and dyspepsia.

Liver function test results were abnormal in 25 patients (51 per cent) but did not contribute to the diagnosis. No patient had thrombocytopenia or anaemia.

Ultrasonography was performed in all 49 patients and demonstrated haemangioma in 30. Twenty-three patients had CT, which was conclusive in 21 patients. In some of the patients with a typical lesion, MRI was performed additionally to increase the level of confidence and experience with this imaging technique. In eight of nine patients MRI established the diagnosis unequivocally. When fine-needle cytology or biopsy was employed, haemangioma was detected in five of ten and in nine of 11 patients respectively.

Surgical treatment

In ten patients an operation was performed where abdominal symptoms were considered to be related to haemangioma (infarction, capsular stretch or pressure on surrounding tissues). One patient underwent operation for an asymptomatic giant haemangioma (diameter 12 cm)

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with persistent growth (5 cm during radiological follow-up of 36 months). The mean greatest diameter of all resected tumours was 9·5 (median 8·0, range 4·0–20·0) cm (*Table 1*).

Postoperative complications occurred in three patients. One patient developed secondary bleeding that necessitated relaparotomy; one had a pleural effusion and another had a subhepatic abscess, both of which required drainage. During postoperative follow-up of 24·5 (range 13–110) months, abdominal symptoms persisted in three patients. Two of these symptomatic patients had bilateral haemangiomas at the time of operation. They have been managed conservatively by radiological follow-up of the contralateral lesions, which have been left *in situ* (6 and 7 cm). There was no surgery-related mortality.

Conservative management

Thirty-eight patients were managed conservatively. Twelve non-operated patients had mild abdominal pain or discomfort, considered to be unrelated to the lesion *(Table 3)*. The mean greatest diameter of the tumour in these symptomatic patients (6·1 (median 6·0, range 4·0–11·0) cm) was not significantly different from that in the symptomatic patients who underwent surgery (mean 9·7 cm, median 8·5 cm) ($P = 0·36$).

During a mean follow-up of 59 (median 52, range 12–122) months, symptoms had either diminished or become minimal in all 12 patients with abdominal complaints. None of the patients who were asymptomatic at the time of first referral developed abdominal pain. In 32 patients the tumour was followed by means of ultrasonography. An increased diameter was observed in only one patient with an asymptomatic haemangioma. Coagulation disorders, other complications or tumour-related death have not occurred.

Discussion

In patients with benign liver tumours, surgery may relieve complaints in a large proportion of those with symptoms. In a substantial proportion of patients (15–30 per cent), however, symptoms persist after resection probably as a consequence of another undiagnosed problem, such as irritable bowel syndrome, peptic ulcer or reflux disease[8,13]. It is essential to decide whether the mass is indeed the cause of the patient's complaints, as simple observation of a benign liver lesion might be the best clinical approach without the risks of surgery and the potential for symptom resolution. In patients with a haemangioma, it may be even more difficult to correlate symptoms with size and location. Indications for operation have traditionally been the presence of symptoms, the development of complications, and the need to establish a definite diagnosis when radiological and histological studies were inconclusive. Liver haemangiomas have also been resected because of a perceived risk of spontaneous or traumatic rupture, and the possibility of the Kasabach–Merritt syndrome, a consumption coagulopathy with low platelet counts and hypofibrinogenaemia[6,9,14,15]. The potential for complications of a liver haemangioma is minimal[4,16] and does not justify, *per se*, resection of all haemangiomas. The risk of significant and sometimes uncontrollable intraoperative bleeding of hypervascular lesions, in addition to the common risks of any liver resection[17–19], should be carefully balanced against the benefit that might be expected from surgery. The reported mortality rate associated with elective liver resection of such tumours ranges from 0 to 4 per cent[8,13,20,21]. The latter figure must be considered unacceptable, taking into account the benign nature and high prevalence of the tumour.

Specific features of cavernous liver haemangioma may be apparent with a variety of imaging techniques such as ultrasonography, dynamic contrast-enhanced CT and MRI. With ultrasonography, a typical haemangioma is characterized as a sharply marginated, lobulated, predominantly hyperechoic lesion[22–24]. Haemangiomas may be complicated by bleeding, scar tissue or calcification[24]. Such lesions have a variable appearance at ultrasonography. In addition, the ultrasonographic appearance of uncomplicated haemangiomas may overlap with those of primary or secondary malignant liver tumours. In patients with an unclear diagnosis and in those with a known (colorectal) malignancy or cirrhosis, the authors recommend MRI because of its high specificity in the diagnosis of haemangioma. At MRI, haemangiomas are typically very bright on T2-weighted images (*Fig. 1*) and show peripheral nodular enhancement on dynamic contrast-enhanced T1-weighted images (*Fig. 2*). Occasionally, small haemangiomas may show a homogeneous intense enhancement during early phases of the dynamic study, although haemangiomas, unlike malignant lesions, retain contrast material and stay hyperintense on delayed contrast-enhanced imaging[22,24]. The overall accuracy of MRI for the detection and characterization of haemangiomas has been reported to be high, with a specificity of 90–100 per cent and a sensitivity of about 90 per cent[22–26], especially when T2-weighted images with short and long echo times are combined with multiphasic dynamic contrast-enhanced images, and delayed contrast-enhanced images. The results of MRI in the present study, although obtained in only a small number of patients with haemangioma, are in accordance with those reported previously[22,24]. The use of other invasive imaging methods, such as scintigraphy and technetium-99m-

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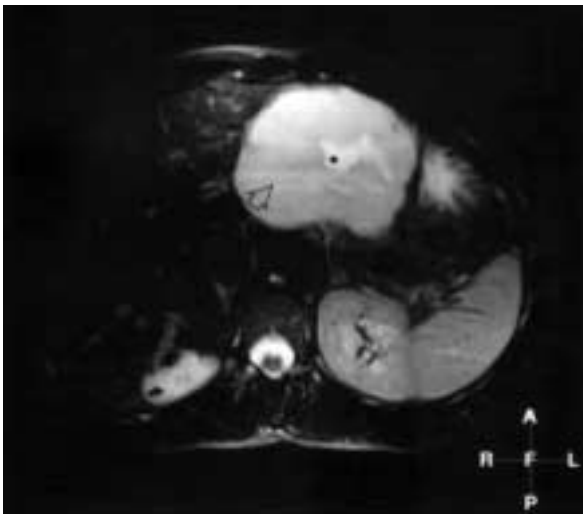

Fig. 1 T2-weighted magnetic resonance image with fat saturation showing a typical giant haemangioma (arrowhead) with a central scar (*) on the left side of the liver, and a small haemangioma in the right liver (black arrow). Both lesions are sharply marginated and very bright compared with surrounding liver

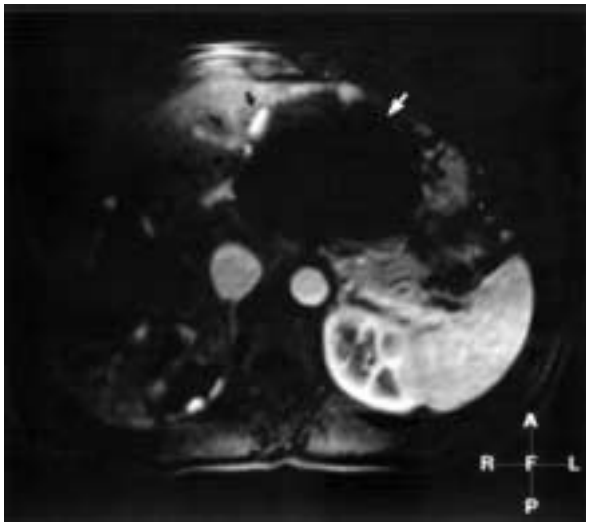

Fig. 2 T1-weighted image during the arterial phase of a dynamic study after intravenous injection of magnetic resonance imaging contrast medium (gadolinium–diethylenetriamine penta-acetate), showing typical peripheral nodular enhancement (black arrows) in both lesions (giant haemangioma indicated with white arrow). The presence of a combination of a bright lesion on a T2-weighted image and peripheral nodular enhancement is pathognomic for liver haemangioma

labelled red blood cell scanning, has also been reported for the diagnosis of benign liver lesions and especially haemangiomas[25,26].

The risk of needle-induced bleeding during ultrasonographically or CT-guided biopsy in benign hypervascular tumours is reported to be low (0·03–0·04 per cent)[27,28]. In the present series there were no complications following biopsy. A tissue diagnosis is recommended when the radiological diagnosis remains unclear and conservative treatment is being considered.

Conservative management of liver haemangioma is preferred because of the minimal risk of complications. As supported by the present observation, mild symptoms often resolve spontaneously during follow-up, and operation is not completely successful in terms of symptomatic relief. In addition, this series derives from a tertiary referral centre with a higher proportion of large tumours than is observed in the general population. The study clearly demonstrates that a confident diagnosis may be made using modern recent high-resolution radiological studies, and that conservative management can be undertaken safely. Based on the present experience, surgery for liver haemangioma is advocated only in patients with incapacitating symptoms. The size of the lesion is not a criterion for resection and some exceptional indications or complications which may necessitate liver surgery or even transplantation[12,13,29] confirm the importance of this general guideline for the treatment of liver haemangioma: observe the lesion, unless the patient has severe symptoms.

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