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ORIGINAL ARTICLE

SURGICAL TREATMENT OF HEPATIC HAEMANGIOMAS: A 15-YEAR EXPERIENCE

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Background: Hepatic haemangiomas are congenital vascular malformations. They are the most common benign tumours of the liver and are often asymptomatic. Spontaneous or traumatic rupture, intratumoral bleeding, consumption coagulopathy and rapid growth are the mandatory surgical indications. We present our experience over the last 15 years with the surgical management of 15 liver haemangiomas to clarify the safety and effectiveness of this treatment.

Methods: There were 15 patients with hepatic haemangiomas who were surgically treated from 1990 to 2004. Indications for the operation were spontaneous or traumatic rupture, consumption coagulopathy, rapid growth, abdominal pain and uncertain diagnosis. Four of these lesions were located on the left lobe, nine on the right lobe; one lesion was located on the left and the right lobes and one on segments VII and VIII. Methods for diagnosis included ultrasonography, computed tomography scan, magnetic resonance imaging and selective hepatic arteriography or combinations of more than one technique.

Results: The procedures included five right-extended lobectomies, five right lobectomies, one left-extended lobectomy, two left lobectomies and two segmental resections. There was no death. The postoperative morbidity was minimal and was mainly correlated to two subdiaphragmatic collections, one intra-abdominal collection and one wound infection. The postoperative hospital stay was 12.7 days (range, 10–19 days). During the follow-up period, there was no recurrence.

Conclusion: The resection of the hepatic haemangioma is safe. The indications for resection, however, should be carefully analysed before embarking on such a major operation.

Key words: hepatic haemangioma, hepatic resection, indication, surgical management, rupture.

Abbreviations: CT, computed tomography; MRI, magnetic resonance imaging; RBC, red blood cells; ^{99m}Tc, technetium-99*m*; U/S, ultrasonography.

INTRODUCTION

Haemangiomas are the most common benign tumours of the liver[1,2] with a frequency of 0.4–7.3% at autopsy.[3] These lesions consist of large vascular spaces lined by a single layer of endothelial cells. They are most commonly found in women, with a female : male ratio of up to 5:1, emphasizing the importance of excess of female sex hormones in these tumours.[4,5]

The natural history of hepatic haemangioma is not yet well defined, thus leading to several management options. Moser *et al.* reported a large family of Italian origin in which three female patients in three successive generations had large symptomatic hepatic haemangiomas.[6] Several pharmacological agents have been postulated to promote tumour growth. Steroid therapy, oestrogen therapy and pregnancy can increase the size of a haemangioma that is already present. Haemangiomas also have been reported in pregnant women following ovarian stimulation therapy with clomiphene citrate and human chorionic gonadotrophin.[7]

Because most of these tumours are asymptomatic, the diagnosis is usually made by ultrasonography (U/S), computed tomography (CT) scan or during laparotomy for other intra-abdominal disease.[8] Spontaneous or traumatic rupture, intratumoral bleeding, consumption coagulopathy (Kasabach–Merritt syndrome) and rapid growth are mandatory surgical indications. Persistent abdominal pain, obstructive jaundice, portal hypertension, size greater than 5 cm, superficial localization because of increased risk of trauma and an uncertain diagnosis are relative surgical indications.[9–11] Haemangiomas greater than 4 cm in size are defined as 'giant' haemangiomas.[12]

In this retrospective study, we describe our experience in diagnosis and surgical management of 15 hepatic haemangiomas.

PATIENTS AND METHODS

From 1990 to 2004, 15 patients with hepatic haemangioma were treated by hepatic resection. They were six men (40%) and nine

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women (60%). Their ages ranged from 28 to 62 years with a median age of 43 years.

Moderate to severe pain, discomfort, feeling of fullness, bloating and sensation of an abdominal mass were the most commonly reported symptoms. Initial complaints were right-upper abdominal or lower chest pain in six patients and a palpable mass in four patients. Five patients had clinically evident hepatomegaly.

Routine haematological tests and liver function tests were within normal limits in all patients except one who had consumption coagulopathy (Kasabach–Merritt syndrome) and five who had moderate anaemia with a haematocrit ranging from 17 to 23.5% and high-transaminase level (aspirate aminotransferase ranged from 1870 to 2458; alanine aminotransferase ranged from 4 938 to 1265). Tumour markets, such as α-fetoprotein and carcinoembryonic antigen were normal in all patients.

The diagnostic algorithm in our department had been to focus on U/S to assess initial tumour characteristics, followed by dynamic CT scan to identify anatomical relationships. We 5 restricted the use of magnetic resonance imaging (MRI) to adjunctive use to either confirm the diagnosis or when a more accurate delineation of the correlation of the tumour to the hepatic venous structures was desired.

All the patients of this study underwent anatomical resection. 6 The definitions used for liver resection are consistent with the IHBPA anatomical nomenclature for liver resections.[13]

RESULTS

Indications for the operation were rapid growth in four patients 7 (26.6%) within the next 6–14 months, abdominal pain in one (6.7%) and uncertain diagnosis in four (26.6%). One patient (6.7%) had Kasabach–Merritt syndrome. In three patients (20%), the haemangioma was ruptured spontaneously; these patients presented with acute abdominal pain and intra-abdominal haemorrhage. In two patients (13.5%), the haemangioma ruptured because of trauma. In these patients emergency laparotomy was carried out because of haemoperitoneum (Table 1).

In 14 patients, diagnosis and respectability were confirmed by U/S, CT scan, MRI, selective hepatic arteriography or combinations of more than one technique. U/S was carried out in 13 patients and was diagnostic in 7. CT scan (Fig. 1) was helpful in diagnosis in 9 patients out of 13. An MRI scan (Fig. 2) was

Table 1. Location and indications for surgery 14

	Patients (*n*)	Location
Coagulopathy	1	1
Bleeding	5	3
Uncertain diagnosis	4	4
Abdominal pain	1	1
Rapid growth	4	6

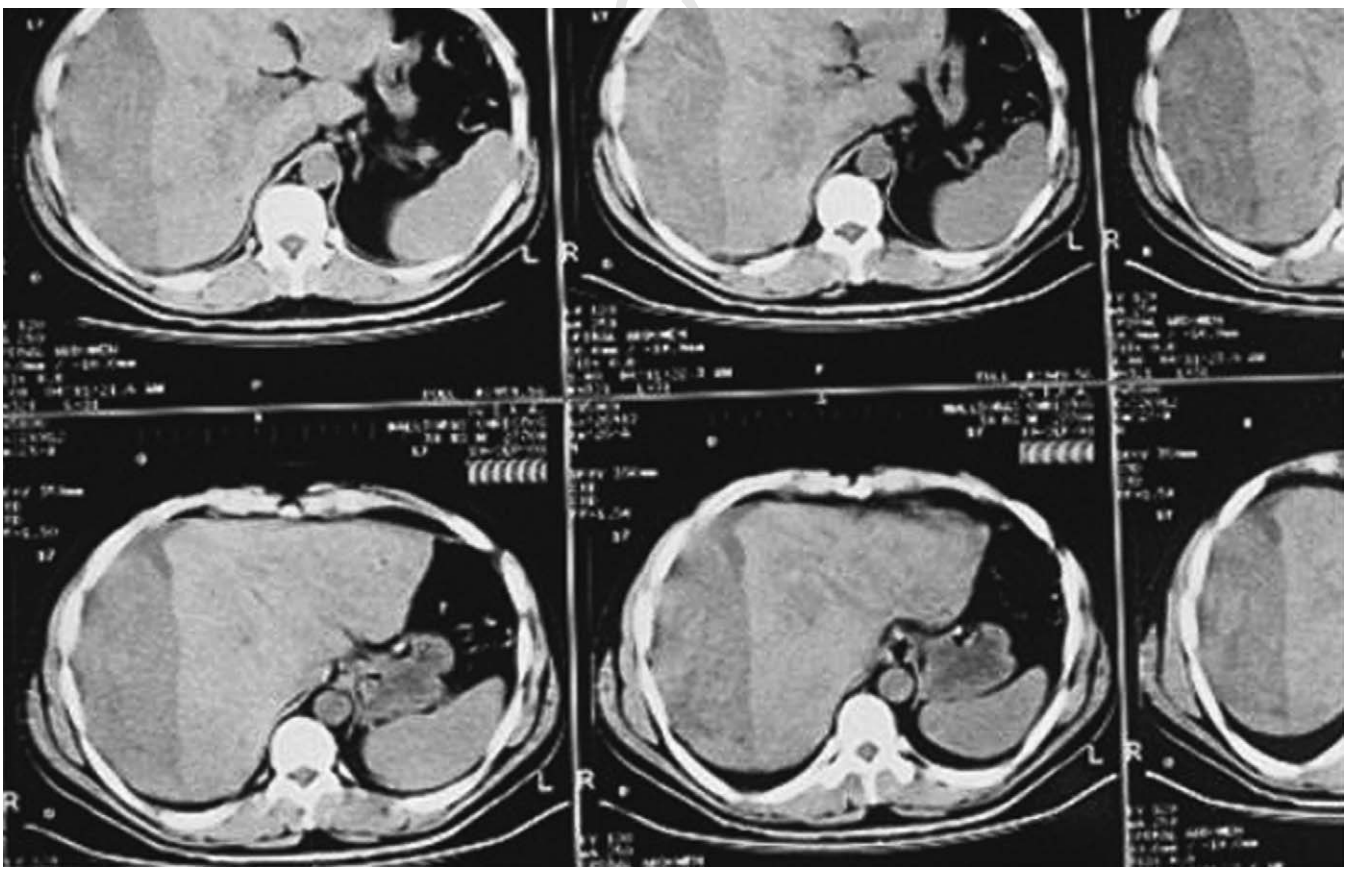

Fig. 1. Patient with a cavernous haemangioma of the liver. Computed tomography scan after admission showing a giant haemangioma on the 13 right lobe of the liver.

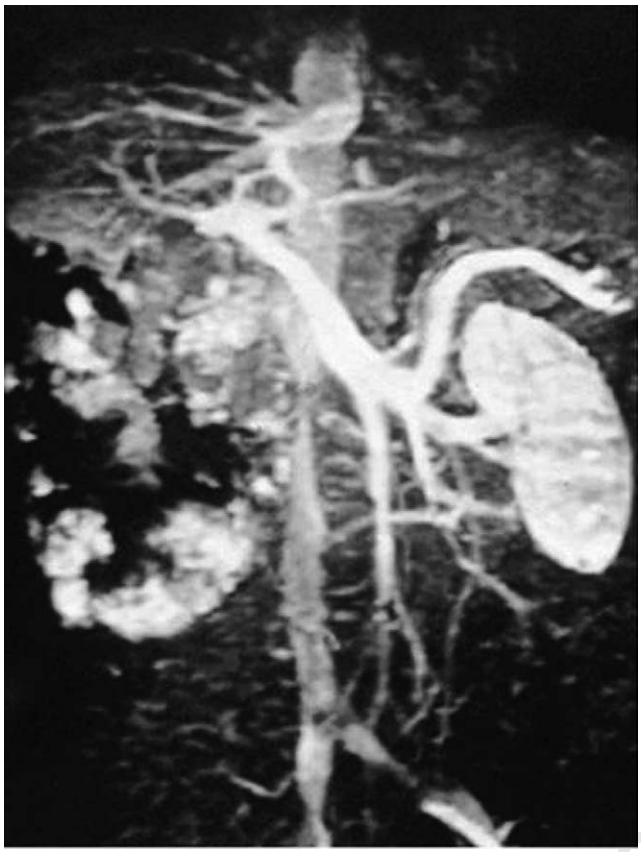

Fig. 2. Magnetic resonance imaging shows a ruptured cavernous haemangioma of the liver on the right lobe.

obtained in 12 patients and was diagnostic in 11. Selective hepatic arteriography (Fig. 3) was carried out in nine patients and was helpful in diagnosis in eight patients. The diagnostic sensitivities of the imaging procedures were U/S 63.8%, CT scanning 69.2%, selective hepatic angiography 89% and MRI 91.6%. The haemangiomas were located on the left lobe of the liver in four patients (26.6%) and on the right lobe in nine patients (60%). In one patient (6.7%), the haemangioma was located on the left and the right lobe and in one patient (6.7%), the haemangioma was located on segments VII and VIII. The locations of the ruptured liver haemangiomas were on the right lobe (four cases) and on the left lobe (one case). The sizes of the lesions varied from 5.6 to 26 cm in diameter.

We carried out five right extended lobectomies, five right lobectomies, one left extended lobectomy, two left lobectomies and two segmental resections (Fig. 4).

Anatomical resection was carried out using standard resection techniques. We preferred complete mobilization of the liver. The portal vein and hepatic artery were divided before bile duct division. In six patients, after the inflow vessels were divided, we preferred to control the hepatic veins at their level of entry into the inferior vena cava before hepatic parenchyma division. This reduced blood loss considerably. Clamping of the hepatoduodenal ligament by Pringle manoeuvre was carried out during transection of the liver in nine patients.[15] The Pringle manoeuvre was carried out for 15 min during liver parenchymal dissection, followed by 5 min of unclamping. After the hepatic parenchyma was removed, manual compression of the cut surface was used to facilitate haemostasis. Residual bleeding sites were controlled with simple sutures, electrocautery or argon-beam coagulation. We did not use large transhepatic compression sutures to avoid ischaemic injury to the remaining segments. Packed red blood cells (RBC) were given to nine patients (1.34 ± 2.64) and two patients received only autologous blood (1.32 ± 2.97).

There was no postoperative mortality. The postoperative morbidity was minimal and was correlated mainly to two subdiaphragmatic collections, one intra-abdominal collection requiring percutaneous drainage and one wound infection. The postoperative hospital stay was 12.7 days (range, 10–19 days). Symptoms and haematological disorders were relieved in all patients during a follow up of 38 months (range from 6 to 48 months). During the follow-up period, there were no recurrences.

DISCUSSION

The incidence of liver haemangiomas is 0.4 to 7.3% in the general population.[16,17] For most persons, these tumours remain asymptomatic and are discovered incidentally during a surgical procedure or imaging studies for unrelated problems. When symptomatic, abdominal pain, early satiety and distension are most common.[1] Rarely, platelet sequestration with thrombocytopenia

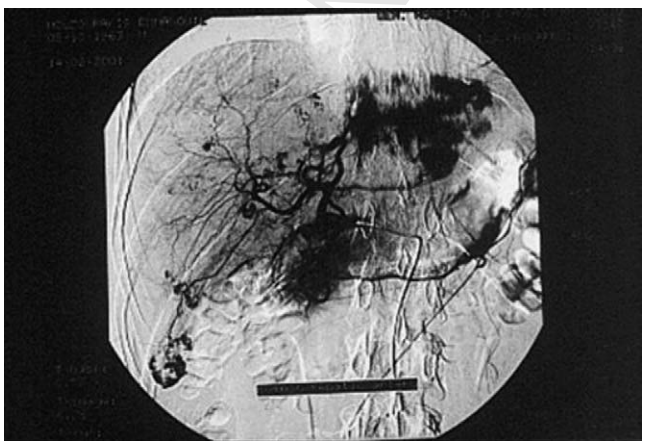

Fig. 3. Selective hepatic arteriography shows multiple vascular lakes to hang the fruits on the branches in early arterial phase.

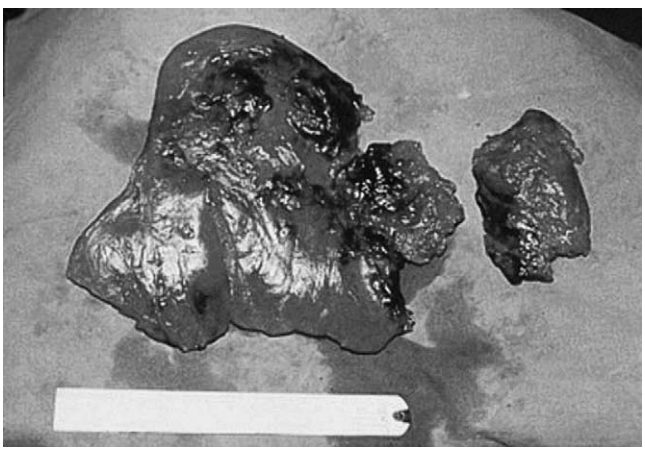

Fig. 4. Hepatic haemangioma after right lobectomy.

or spontaneous rupture with i.p. or intrahepatic haemorrhage can occur and can be life threatening.[2]

The aetiology of haemangiomas is not well defined, but several authors agree that this vascular tumour is a benign, congenital haematoma or tissue malformation that grows slowly from birth. In the adult, haemangioma occurs more frequency in the fourth, fifth and sixth decades of life with an average age of approximately 45 years, when symptoms present with a female : male ratio of up to 5:1.

The differential diagnosis of atypical haemangiomas of the liver includes a large variety of hepatic tumours. It is mainly represented by liver metastases, cystic islet cell tumours, liver adenomas, focal nodular hyperplasia, hepatocellular adenoma, hepatocellular carcinoma and intrahepatic cholangiocarcinoma.

As most patients with cavernous hepatic haemangiomas remain asymptomatic, the decision to remove these lesions surgically has been a point of controversy in previous reports.[11,18] Several studies suggest that only haemangiomas causing severe abdominal pain or those with an indeterminate diagnosis, haemorrhage, rapid growth and Kasabach–Merritt syndrome should be removed. In these patients, the benefit of palliating pain, excluding the diagnosis of a possible malignant tumour or controlling life-threatening haemorrhage, justifies the risk of surgery. In an asymptomatic patient with a secure diagnosis of a cavernous haemangioma, surgical resection cannot be justified.[8,11]

The strategic approach to diagnose these lesions varies among institutions, with U/S, CT scan, erythrocyte scanning, selective hepatic arteriography and MRI scanning used alone or in combination.[19–21] The precise diagnostic criteria for cavernous haemangiomas of the liver vary with each diagnostic procedure. For lesions found on U/S, small haemangiomas are described as hyperechoic homogeneous masses.[22] Large or massive haemangiomas have heterogeneous areas interspersed within the hyperechoic mass on U/S.[23] With contrast-enhanced CT scans, a peripheral nodular pattern of enhancement with a hypodense centre is often seen.[24] Scintigraphic studies using RBC tagged with technetium-99*m* (^{99m}Tc) show delayed filling from the periphery of the lesion, whereas a hyperintense signal is seen
8 during T_2-weighted MRI scanning.[22,25] There is evidence that evaluation of dynamically displayed ^{99m}Tc-RBC single-photon emission computed tomography studies is superior to conventional reading of static display and comparable to MRI in liver haemangioma > or = 1 cm, whereas for smaller lesions, modern MRI is sensitive.[10,26]

Core biopsy and fine-needle aspiration are reportedly safe but may be associated with pain or bleeding and we did not recommend them for diagnosis.[27,28] However, laparoscopic biopsy especially with the use of U/S is reported to be a safe procedure when the diagnosis of haemangioma must be ascertained.[29]

Once the decision to remove a symptomatic haemangioma has been made, an important surgical management issue relates to the technique of removal. Both anatomical resection and enucleation can be effective in removing the lesion. In this study, we carried out hepatic resection in all patients. Hepatic resection was found to be associated with no postoperative mortality; the postoperative morbidity was minimal. Given the potential for life-threatening intraoperative and postoperative complications, the surgical treatment of hepatic haemangiomas should be carried out by surgeons comfortable with liver resection techniques, which will ensure low rates of morbidity and mortality. Alternatively, transcatheter arterial embolization of hepatic cavernous haemangioma is a useful procedure in the therapy of symptomatic haemangiomas for high-risk patients.[30]

In summary, our experience indicates that resection of giant haemangioma of the liver is safe. The indication for resection, however, should be carefully analysed before embarking on such a major operation.

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