Hepatic Resection for Cavernous Hemangiomas of the Liver

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ABSTRACT

In this report, we evaluate the indications of, and present our recent strategy for, cavernous hemangioma of the liver. Seven patients with cavernous hemangiomas of the liver, who underwent hepatic resection were enrolled in this study. The lesions were located in the right lobe in 3 patients, the left lobe in 2, and in both the right and left lobes in 2. The longest diameter of the lesions ranged from 1.4 to 14.5 cm (mean, 8.2 cm). The indications for hepatic resection were symptomatic lesions in 3 patients, lesions suspected to be hepatocellular carcinoma in 2, and symptomatic and growing lesions during follow-up in 2. Right lobectomy was performed in 2 patients, left lobectomy with caudate lobectomy in 1 patient, and minor hepatic resection in the other 4 patients. One of the patients who underwent minor hepatic resection had recently received laparoscopy-assisted hepatic resection and one of the three patients who received transfusion during surgery was given an autotransfusion. There were no mortality, and morbidity was minimal. In conclusion, hepatic resection, including laparoscopy-assisted procedures, was considered a safe treatment. Hepatic resection for cavernous hemangioma should be performed only in patients with moderate to severe symptoms, complicated lesions or both, because most benign lesions have a good natural course. Furthermore, in the future, less invasive surgical procedures should be used whenever possible to treat these benign liver tumors.

Key words: Cavernous hemangioma, Hepatic resection, Less invasive surgery

Cavernous hemangiomas of the liver are the most common benign tumor of mesenchymal origin. An autopsy series has revealed that the incidence is about 2% of all autopsies. Owing to recent advances in diagnostic techniques, many cavernous hemangiomas are detected incidentally in patients who are either asymptomatic or have symptoms unrelated to tumors in the liver. Cavernous hemangiomas of more than 4 cm in diameter are defined as giant hemangiomas, and symptoms such as abdominal pain and fullness occur at incidence of about 50%. However, serious complications, including rupture, are rare. Moreover, no report has described malignant transformation of cavernous hemangiomas. It is generally accepted that these vascular lesions grow by ectasia rather than by hypertrophy, hyperplasia or neoplasia. Surgical indications for cavernous hemangiomas, especially symptomatic lesions, are controversial. Here we present our experience of 7 patients with cavernous hemangiomas of the liver who underwent hepatic resection. We also evaluate surgical indications and present our recent strategy for the management of these benign lesions of the liver.

PATIENTS AND METHOD

From January 1986 through December 1997, 7 patients with cavernous hemangiomas underwent hepatic resection at the Department of Surgery II, Hiroshima University Hospital, Hiroshima, Japan. There was one man and six women; ages ranged from 46 to 55 years, with a mean age of 51.6 years. No patient was pregnant and all denied ever having used oral contraceptives or steroids. All patients except one had symptoms that suggested the presence of a liver tumor and prompted their visit to our hospital.

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Various symptoms were reported such as abdominal fullness, upper abdominal discomfort, right or left upper quadrant pain, epigastralgia, and back pain. None of these symptoms were serious, and no other lesion which could potentially cause such symptoms was detected by an intensive work-up. Case 5, who had been admitted to another hospital for liver cirrhosis caused by hepatitis C virus, was symptom-free and found to have a liver mass on routine abdominal ultrasonography (US). No patient had spontaneous rupture of their lesions. Before operation, US, computed tomography (CT), and angiography were performed in all patients. On admission, one patient (case 1) had severe anemia, with a hemoglobin value of 8.0 g/dl. One patient (case 5) had liver cirrhosis with moderate thrombocytopenia (platelet count $4.2 \times 10^4 / \text{mm}^3$) caused by hypersplenism. The other patients had no hematologic abnormalities. The indications for hepatic resection in the 7 patients were symptomatic lesions in 4 patients, lesions suspected to involve hepatocellular carcinoma in 2, and symptomatic and growing lesions during follow-up in 2. Lesions were located in the right lobe in 3 patients, in the left lobe in 2, and in both right and left lobes in 2. Four patients had a single lesion, and three had multiple ones. The longest diameter of the lesions ranged from 1.4 to 14.5 cm, with an average of 8.2 cm (Fig. 1).

### RESULTS

Right lobectomy was performed in 2 patients, left lobectomy with caudate lobectomy in 1 patient, and minor hepatic resection in the other 4 patients. Case 6, whose largest lesion was located in the left lateral segment, underwent hepatic resection under laparoscopic guidance. Intraoperative blood loss ranged from 220 to 2000 ml, with an average of 910 ml. Although four patients required no transfusion, the other three patients did receive transfusion, ranging from 600 to 1600 ml, with an average of 910 ml. However, in case 7, the patient lost 900 ml of blood during the operation and received autotransfusion of 800 ml of whole blood, which was obtained and preserved before the operation. There were no operative or hospital deaths although in one patient, case 6, left pneumothorax accidentally developed during the operation. The other six patients had no intraoperative or postoperative complications (Fig. 1).

### Case Reports

A 52-year-old woman, case 6, had suffered from

<table>
<thead>
<tr>
<th>Case</th>
<th>Age</th>
<th>Sex</th>
<th>Symptom</th>
<th>Indication</th>
<th>Location, Resected region</th>
<th>Maximum size (cm)</th>
<th>Blood loss (Replaced)</th>
<th>Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>46</td>
<td>F</td>
<td>Discomfort in the upper abdomen</td>
<td>Symptomatic</td>
<td>[Diagram]</td>
<td>14.5</td>
<td>2000 ml (1600)</td>
<td>(-)</td>
</tr>
<tr>
<td>2</td>
<td>55</td>
<td>F</td>
<td>R.U.Q. pain</td>
<td>Symptomatic</td>
<td>[Diagram]</td>
<td>7.0</td>
<td>220 ml (0)</td>
<td>(-)</td>
</tr>
<tr>
<td>3</td>
<td>54</td>
<td>F</td>
<td>Epigastralgia</td>
<td>Suspect of HCC</td>
<td>[Diagram]</td>
<td>5.5</td>
<td>1100 ml (600)</td>
<td>(-)</td>
</tr>
<tr>
<td>4</td>
<td>55</td>
<td>F</td>
<td>Back pain</td>
<td>Symptomatic Observing enlargement</td>
<td>[Diagram]</td>
<td>11.0</td>
<td>700 ml (0)</td>
<td>(-)</td>
</tr>
<tr>
<td>5</td>
<td>50</td>
<td>M</td>
<td>(-)</td>
<td>Suspect of HCC</td>
<td>[Diagram]</td>
<td>1.4</td>
<td>1100 ml (0)</td>
<td>(-)</td>
</tr>
<tr>
<td>6</td>
<td>52</td>
<td>F</td>
<td>L.U.Q. pain Abdominal fullness</td>
<td>Symptomatic</td>
<td>[Diagram]</td>
<td>8.0</td>
<td>350 ml (0) Pneumothorax</td>
<td>(-)</td>
</tr>
<tr>
<td>7</td>
<td>49</td>
<td>F</td>
<td>Abdominal fullness</td>
<td>Symptomatic Observing enlargement</td>
<td>[Diagram]</td>
<td>10.0</td>
<td>900 ml (800)</td>
<td>(-)</td>
</tr>
</tbody>
</table>

Fig. 1. Clinical characteristics of patients undergoing hepatic resection for cavernous hemangioma of the liver. M, male; F, female; R.U.Q., right upper quadrant; L.U.Q., left upper quadrant; HCC, hepatocellular carcinoma.
left upper quadrant pain and abdominal fullness for 1 year. Because these symptoms persisted and general fatigueness subsequently developed, she visited a local hospital and was given a diagnosis of multiple cavernous hemangiomas in July, 1996. She was referred to our department for surgical treatment. On admission, US (Fig. 2a), abdominal CT (Fig. 2b), and angiography revealed cavernous hemangiomas of the liver measuring 8.5cm in diameter and located in the left lateral segment. There was extrahepatic growth, and small hemangiomas were present in the other segments. Laparoscopic partial resection of the left lateral segment of the liver was performed via small skin incisions. The operative time and intraoperative blood loss were 6 hours and 25 minutes and 350ml, respectively. Because left pneumothorax occurred accidentally during the operation, a thoracic drain was placed into the left thoracic cavity. The thoracic drain was removed on the third postoperative day without any complications. She had an uneventful postoperative course and was discharged 22 days after the operation.

A 49-year-old woman, case 7, had abdominal fullness in July 1997 and visited a general practitioner. Ten years earlier, multiple hemangiomas, each measuring 3 or 4cm in diameter, were discovered incidentally in the right lobe of the liver at another hospital. No lesions were detected in the left or caudate lobes of the liver. Since the patient’s condition was asymptomatic, she received no medical treatment. In this time, US revealed large masses in the left lobe and caudate lobe of the liver, and she was referred to our hospital and admitted for further examination on July 28, 1997. On admission, US (Fig. 3a) and abdominal CT (Fig. 3b) disclosed that multiple cavernous hemangiomas in the right, left, and caudate lobes of the liver were discovered incidentally in the right lobe of the liver at another hospital. No lesions were detected in the left or caudate lobes of the liver. Since the patient’s condition was asymptomatic, she received no medical treatment. In this time, US revealed large masses in the left lobe and caudate lobe of the liver, and she was referred to our hospital and admitted for further examination on July 28, 1997. On admission, US (Fig. 3a) and abdominal CT (Fig. 3b) disclosed that multiple cavernous hemangiomas in the right, left, and caudate lobes of the liver were particularly prominent, with diameters of 10cm and 8cm, respectively. The diagnosis was symptomatic giant cavernous hemangiomas of the liver. Left lobectomy with caudate lobectomy was performed on November 18, 1997. Because intraoperative blood loss of one degree was predicted, 800ml of her own blood was collected and was
stored before the operation. Actual blood loss was
900ml, and autotransfusion of 800ml was carried
out successfully. She had an uneventful postopera-
tive course and was discharged 15 days after the
operation.

**DISCUSSION**

Which cavernous hemangiomas should be
excised? The answer to this question depends on
the relative weight of the risk of operation versus
the natural history of untreated lesions. With
respect to the risks of hepatic resection, recent
advances in operation instruments, techniques,
and perioperative management now permit hepatic
resection to be performed safely, even in
patients with concurrent liver disease such as cir-
rhosis. Furthermore, because most patients with
cavernous hemangiomas have no associated liver
disease, the risk of hepatic resection for these
lesions are minimal. However, with regard to the
natural history of untreated lesions, several fol-
low-up studies have reported spontaneous rupture
of untreated lesions, a very serious complica-
tion. On the basis of Japanese reports of sponta-
neous rupture of cavernous hemangiomas and
their own experience, Aiura et al suggested that
such lesions of more than 4cm in diameter and
located on the liver surface or showing extrahepa-
tic growth have a high risk of spontaneous rupture
if the patient is receiving steroid therapy for a
coeexisting disorder.

Hemangiomas are probably of congenital rather
than neoplastic origin, and there is no well-docu-
mented report of malignant transformation. Moreover, these vascular lesions grow by ectasia rather than by hypertrophy, hyperplasia, or neo-
plasia. Therefore, most specialists recommend
that "potential for rupture" is insufficient
grounds for surgery in patients with asympto-
matic lesions. On the other hand, absolute indica-
tions for surgical intervention include hemangiomas associated with conditions such as
rupture, Kasabach-Merritt syndrome, or congestive heart failure. Furthermore, there is
strong agreement that lesions that cause severe
symptoms or grow rapidly require surgery. The
presence of a "palpable mass" is also an indi-
cation for operation, if there is potential exposure to trauma. However, it is controversial whether
or not all asymptomatic lesions, especially those
with mild symptoms, are sufficiently indicated for
surgical intervention. Symptoms, when present,
are often nonspecific and include vague abdominal
pain, abdominal fullness, early satiety, nausea,
vomiting, or continued fever. With respect to the
cause of pain, rapid expansion of the lesion with or
without thrombosis produces stretching and
inflammation of Glisson's capsule, the only well
understood mechanism by which pain arises from
the liver. Nichols et al reported that although
15% of lesions of 4 to 10cm in diameter are asym-
ptomatic, 90% of those exceeding 10cm in diameter
are symptomatic. Foster et al proposed that
patients with chronic pain or disabling symptoms
due to a mass are candidates for resection.
Furthermore, many authors have reported that
when symptoms are present, surgical excision
plays an important therapeutic role, and is able to
relieve symptoms related to the presence of hemangioma in nearly all patients. Trastek et al studied the natural courses of cavernous hemangiomas of the liver (mean diameter, 8.8cm)
in 36 patients followed up for 1 to 15 years. There
was no death, rupture of lesions, or progression of
symptoms in asymptomatic patients, although 4
patients (11%) showed evidence of enlargement.

In our opinion, asymptomatic patients and asympto-
matic patients with non-specific, mild symptoms,
such as discomfort, fullness, and early satiety, do
not require hepatic resection. However, lesions
associated with a tendency to enlargement or with
progressive symptoms (or both) during follow-up
require surgical intervention. In addition, patients
with moderate to severe symptoms such as a palpa-
bable mass, persistent abdominal pain, and pro-
longed fever, should be operated on. Hepatic
resection is also absolutely indicated in patients
who have lesions associated with rupture, Kasabach-Merritt syndrome, or obstructive jaun-
dice (Fig. 4).

Two of the seven patients in this study under-
went hepatic resection for a suspected diagnosis of
hepatocellular carcinoma. In particular, case 5
had a small lesion which was difficult to differenti-
ate from a small hepatocellular carcinoma associ-
ated with liver cirrhosis caused by hepatitis C
virus infection. In the other five patients, all
symptoms resolved postoperatively, hepatic resec-
tion was indicated in these patients.

The results of our experience indicate that hepatic
resection in patients with giant cavernous hemangiomas is a safe procedure when performed
by specialized liver surgeons. Four minor hepatic
resections, two right lobectomies, and one left

![Fig. 4. Strategy for management of cavernous hemangioma.](image-url)
lobectomy with caudate lobectomy were carried out with no mortality and minimal morbidity. Recently, we have been attempting to minimize surgical invasion in patients with such benign liver tumors. A laparoscopy-assisted hepatic resection was performed with little blood loss in Case 6, in which lesions were located mainly in the left lateral segment. Less invasive procedures should also be used in the management of lesions with extrhepatic growth. When intraoperative blood loss of one degree is expected, preparations for autotransfusion should be made before the operation unless patients have severe anemia. In case 7, with lesions in the caudate lobe and lateral segment of the liver, autotransfusion during the operation could be avoided by collecting blood for autotransfusion before surgery.

In conclusion, hepatic resection for cavernous hemangiomas is indicated only in patients with moderate to severe symptoms and lesions associated with conditions such as rupture, Kasabach-Merritt syndrome, or obstructive jaundice, because most benign lesions have a good natural course. In our seven patients who underwent hepatic resection, there was no mortality and minimal morbidity. Hepatic resection, including laparoscopic procedures, is thus considered a safe treatment. In the future, less invasive procedures should be used whenever possible to manage cavernous hemangiomas of the liver.

Reference