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## Excisional Treatment of Cavernous Hemangioma of the Liver

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**Fifteen patients had hepatic hemangiomas removed with liver resections that ranged in extent from local excision to right trisegmentectomy. There was no mortality and little morbidity. The propriety and feasibility of extirpative treatment of such liver tumors has been emphasized by this experience.**

**A**LTHOUGH HEMANGIOMAS ARE the most common benign tumors of the liver,<sup>1,4</sup> the role of surgical excision in their treatment has not been well defined. We report here 15 patients who had resections of hepatic hemangiomas. The cases illustrate the value and safety of such surgical treatment in carefully screened patients.

### Case Material

The 15 patients ranged in age from 40 to 65 years old (Table 1). Eight patients were female and seven were male. In 9 patients, the diagnosis of cavernous hemangioma was strongly suspected from x-ray studies or definitely diagnosed from prior biopsy specimens. In the other six patients, the decision to proceed was reached during operations on hepatic masses that were suspected to be malignant before operation.

The principal symptoms are listed in Table 1. Four patients were asymptomatic with liver masses that had been detected at physical examination or by radionuclide scanning in the course of general medical evaluation. Three patients had abdominal masses which were self-diagnosed. Three patients had pain. Six patients

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had gastrointestinal distress, apparently caused by pressure from large tumors. Three patients with intra-abdominal hemorrhage (one spontaneous, 2 after biopsy) were referred to us for definitive resection.

All of the patients were examined by one or more of the radiologic techniques of radionuclide scanning, ultrasonography, computerized axial tomography or arteriography (Table 2). The diagnosis of hemangioma was most commonly suspected after arteriography, a procedure which we often have omitted in recent years because of its significant inconvenience and morbidity.

Liver functions preoperatively were normal or nearly normal in all patients, as were hematologic measures, including platelet counts.

### Operative Procedures

The hemangiomas were localized and resection was possible in each patient. Blood loss in each patient is given in Table 1. Ten patients had hepatic lobectomy or segmentectomy (Table 1), using techniques described elsewhere.<sup>13,14</sup>

The other five patients had local excision. In the latter cases, the tumors tended to be superficial and with a base which was either narrow enough or accessible enough to permit cross clamping with one or more standard vascular clamps. After local excision of the vascular tumor, the clamped base was oversewn with two layers of 2-0 continuous catgut suture.

### Result

All 15 patients are alive and have normal liver function after follow-ups of two months to seven months (Table 1). There were no postoperative hemorrhages

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TABLE 1. Fifteen Cases of Cavernous Hemangioma of the Liver

Case No.	Age/Sex	Size in cm and Location of Tumor	Principal Symptoms	Procedures	Blood Loss (ml)
1	43 F	8 × 5 plus small lesions in rt. lobe	Mass felt at time of hysterectomy	Local excision in rt. lobe	1000
2	62 F	2.5 × 2 in rt. lobe	Nausea and vomiting	Local excision in rt. lobe	300
3	61 F	15 × 6 in rt. lobe	RUQ and epigastric pain, spontaneous hemorrhage	Rt. hepatic lobectomy	1500
4	51 M	22.5 × 14 in lt. lateral segment	Epigastric distress, nausea and vomiting	Lt. lateral segmentectomy	1100
5	45 F	14 × 12 in rt. lobe	Mass felt by patient	Local excision in rt. lobe	700
6	44 M	16 × 15 in rt. lobe	Abdominal fullness, stippling calcification on x-ray	Rt. hepatic lobectomy	3000
7	58 F	4.3 × 2.9 in rt. lobe	RUQ pain, gastrointestinal bleeding*	Local excision in rt. lobe	200
8	61 M	15 × 11.5 plus multiple small lesions in rt. lobe	Asymptomatic mass felt by physician	Rt. hepatic lobectomy	1900
9	65 M	17 × 9 in rt. lobe	Asymptomatic mass found by scan	Rt. hepatic lobectomy	3000
10	41 M	13 × 7.5 in rt. lobe	Mass felt by patient	Rt. hepatic lobectomy	2500
11	53 F	4 × 2 in median segment lt. lobe; smaller lesions in rt. lobe	RUQ pain, radiating to rt. shoulder	Rt. trisegmentectomy	3000
12	57 M	10 × 9.5 in lt. lateral segment	Asymptomatic mass found by scan	Lt. lateral segmentectomy	200
13	40 F	16 × 10 in rt. lobe	Weakness, massive hemorrhage from open biopsy	Rt. hepatic lobectomy	1850
14	45 M	17 × 20 plus smaller lesions in lt. lobe	Mass, weight loss and anorexia	Lt. hepatic lobectomy	3000
15	44 F	16 × 13 in lt. lateral segment	Mass, epigastric fullness; massive hemorrhage after closed needle biopsy	Local excision in lt. lobe	2000

\* Small bowel lymphosarcoma also found and resected. The lymphoma had caused the bleeding. Patient well 19 months.

nor any intra-abdominal abscesses. Two patients developed wound hernias which were repaired later.

After they were cut, the tumors ranged in size from 2.5 to 20 cm in diameter (Table 1). By measuring them after evacuation of their blood contents, their size was systematically underestimated. The tumors were soft and red, and often had firm gray-white streaks or areas. Four tumors were multifocal. Microscopically the tumors were cavernous hemangiomas and were composed of vessels of varying size. Rarely, capillary patterns were in the same tumor. Organizing thrombi, some recent and some old, were common and focally obliterated vessels in parts of one tumor. The thickness of the vessels in several tumors was attributed to organization of thrombi. The adjacent liver was normal except for mild lymphocytic infiltration of sinusoids adjacent to the tumor. One liver (Case 1) showed severe fatty change. This patient had diabetes mellitus.

TABLE 2. Radiologic Studies in 15 Patients

	Number of Studies Performed	Number of Positive for Mass	Number of Hemangioma Strongly Suspected
Radionuclide scan	14	13	0
Ultrasonography	9	8	1
Computed tomography	8	8	0
Arteriography	7	7	4

All symptoms were relieved. Amelioration of pain was particularly noteworthy. One patient (Case 11) was denied operation for many months because of the suspicion that her complaints were an excuse for non-employment plus drug abuse. After right trisegmentectomy she was immediately relieved of pain and did not ask for postoperative analgesics.

### Discussion

The hemangiomas of this series were all of the cavernous variety, there being no examples of capillary hemangiomas. Cavernous hemangiomas are found in about 2% of autopsy livers,<sup>8</sup> but the great majority of these lesions are small and without medical or surgical significance. Adam, Huvos, and Fortner classified hemangiomas as "giant" if their diameter exceeded 4 cm.<sup>1</sup> The larger hemangiomas can be responsible for diverse complications including pain and hemorrhage.<sup>1,4,8,11,16</sup>

Until recently, the surgical literature about cavernous hemangiomas consisted mainly of periodic scholarly reviews<sup>3,5,10,15</sup> for which the stimulus frequently was an unusual operative experience with one or two cases. The only significant series described in detail was that of Adam, Huvos, and Fortner.<sup>1</sup> They observed 22 patients with hepatic cavernous hemangiomas exceeding 4 cm in diameter. In ten of these patients they attempted to remove the tumors with six local excisions, three

right lobectomies, and one left lobectomy. Two of the three patients submitted to right lobectomy died, but these deaths were attributable to ongoing hemorrhages that led to the attempts at emergency resection. The other eight patients who had elective operations survived.

The true frequency with which hemangiomas are removed probably is not accurately reflected by the foregoing literature or lack thereof. In Smith's series of 78 hepatic resections, ten (13%) were for hemangiomas.<sup>12</sup> Longmire et al. recorded eight hemangiomas among 75 partial hepatectomies.<sup>6</sup> The 15 cases herein reported were culled from 87 liver resections at the University of Colorado.

The inability to establish an unequivocal preoperative diagnosis may be one reason to carry out hepatic resection. To establish a diagnosis, resection may be the safest procedure. Needle biopsies of hemangiomas have been responsible for fatal hemorrhages and should not be done for suspicion of this diagnosis.<sup>1,8,11</sup> In recent years, the radiologic diagnosis of hemangiomas has improved. Radionuclide scanning, ultrasonography, and computerized axial tomography can be helpful. The most distinctive findings are with arteriography whereby there is early arterial and persistent late venous puddling of the contrast material.<sup>2,7,9</sup> In spite of the relative specificity of such findings, we have used hepatic arteriography less and less frequently. First, even arteriography cannot assure the diagnosis with certainty; two of our other patients thought to have hemangiomas actually had malignancies. Second, because a symptomatic hemangioma is a valid reason for partial hepatic resection, the establishment of this diagnosis at the time of operation instead of before should not alter therapy.

The validity of the foregoing aggressive attitude about surgery depends on the safety with which the excision of hemangiomas can be offered. In our experience, there was no mortality and little morbidity, and the experience of others has been the same.<sup>1,6,12</sup> The surgical principles involved were simple and above all involved the avoidance of uncontrolled hemorrhage. Local (wedge) excision was the procedure of choice but this was performed only if the pedicle of the tumor could be clamped and oversewn. Failure to meet this condition could result in transection through vessels so large that lethal bleeding could result. When formal segmental or lobar resections were performed, the

major vessels entering or leaving the specimen were controlled before starting the parenchymal transection.

It must be emphasized that the compilations of this series and other large series<sup>1,6,12</sup> of surgical resections of hemangiomas have been in specialized liver centers. The appropriate decision for occasional liver surgeons in many of our patients might well have been to close the incision without biopsy and to refer the patient to a specialty center. There would seem to be little justification to attempt "palliation" with hepatic artery ligation or arterial embolization or radiotherapy in patients whose lesions are susceptible to excision. At our center, most asymptomatic hemangiomas are not removed if the diagnosis is secure. On the other hand, if the hemangiomas are symptomatic, they are excised unless the risks are deemed overwhelming from systemic disease or anatomic considerations.

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