Treatment Strategy for Patients With Cystic Lesions Mimicking a Liver Tumor

A Recent 10-Year Surgical Experience in Japan

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Objective: To clarify some of the difficulties in determining the appropriate surgical indications for cystic lesions mimicking a neoplasm in the liver.

Design: A retrospective review of hepatic resections for cystic lesions mimicking a neoplasm in the liver between August 1, 1986, and July 31, 1996.

Setting: A university hospital with a long history of hepatic resection for cystic lesions mimicking a neoplasm in the liver.

Patients: Ten patients with such cystic lesions in the liver, who underwent a hepatectomy during a recent 10-year period, were included in this study.

Main Outcome Measures: Detailed clinicopathologic data were analyzed, and comparisons were made between the preoperative and postoperative diagnoses.

Results: The postoperative diagnoses consisted of cysts, including cysts complicated by an infection or hemorrhage in 7 patients, localized cystic dilation of the bile duct due to hepatolithiasis in 1, cystadenoma in 1, and mucin-producing cholangiocarcinoma in 1. In only one case was postoperative diagnosis identical to the preoperative diagnosis. In one case, an intraoperative pathological examination showed the tumor to be a mucin-producing cholangiocarcinoma instead of a cystadenocarcinoma. A tumor-marker analysis of the fluid in the cystic lesions also did not contribute to a definite diagnosis. Furthermore, cytological examination of the fluid could not completely exclude malignancy. Neither mortality nor morbidity occurred in any of the patients, and their mean length of hospitalization after hepatectomy was only 13.7 days.

Conclusions: The accurate diagnosis of cystic lesions mimicking a tumor remains problematic; however, the results of hepatectomy for such cases are normally satisfactory. Such cystic lesions of the liver should be indicated for hepatectomy whenever the possibility of a cancerous neoplasm cannot be completely ruled out.

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There has been tremendous progress in refinement of the diagnostic modalities for hepatic tumors, including ultrasonography, computed tomography, magnetic resonance imaging, and angiography combined with digital subtraction angiography. However, obtaining an accurate preoperative diagnosis of cystic lesions mimicking a neoplasm in the liver still remains problematic.

Until recently, a hepatic resection had been considered one of the most dangerous operative procedures in general surgery. Furthermore, for patients who have nonneoplastic, nonparasitic, or nonhydatid cysts, but not those who have a symptomatic polycystic liver, either fenestration or ethanol injection is considered one of the safest and most effective treatment modalities. Both surgeons and physicians have hesitated to some extent to select hepatic resection for treating cystic lesions, even when malignancy could not always be ruled out.

However, thanks to great improvements in operative technique, perioperative patient management, and patient selection criteria, hepatic resection has been established as one of the most effective treatment modalities even for patients with cirrhosis and hepatocellular carcinoma.

The aim of this study is to clarify the problems of surgical indications for cystic lesions, based on a recent 10-year experience of hepatic resection for cystic lesions mimicking a tumor. The treatment strategies for such special-entity disorders in the liver are also discussed.
The postoperative diagnoses consisted of cysts including the following: those complicated by an infection or hemorrhage,7; a localized cystic dilation of the bile duct due to hepatolithiasis, 1; cystadenoma, 1; and mucin-producing cholangiocarcinoma, 1. No definite diagnosis could be made preoperatively, and in only 1 case was the postoperative diagnosis identical to the preoperative diagnosis.

Three patients had abnormal laboratory findings including elevated γ-glutamyl transpeptidase (1 patient), alkaline phosphatase (2 patients), and carbohydrate antigen 19-9 (1 patient). However, both the carcinoembryonic antigen and α-fetoprotein were normal. The concentrations of such tumor markers as carbohydrate antigen and carcinoembryonic antigen in 3 patients, from whom cystic fluid was obtained, were analyzed. Table 2 gives the results of the cystic fluid analysis. The 3 patients in this study with elevated tumor-marker levels in the cystic fluid had cysts that were complicated by either an old infection or a hemorrhage, and the tumor marker analysis of their cystic fluid did not confirm a definite preoperative diagnosis. Cytological examination of the cystic fluid was performed in 3 patients (2 with complicated cysts and 1 with cystadenoma), and all 3 patients' results were negative. However, a negative cytological result could not completely rule out malignancy.

### RESULTS

The postoperative diagnoses consisted of cysts including the following: those complicated by an infection or hemorrhage,7; a localized cystic dilation of the bile duct due to hepatolithiasis, 1; cystadenoma, 1; and mucin-producing cholangiocarcinoma, 1. No definite diagnosis could be made preoperatively, and in only 1 case was the postoperative diagnosis identical to the preoperative diagnosis.

### PATIENTS AND METHODS

#### PATIENTS

Ten out of 613 patients with cystic lesions mimicking a tumor who underwent a hepatic resection at Kyushu University Hospital during the 10-year period between August 1, 1986, and July 31, 1996, were retrospectively studied. Their ages ranged from 42 to 75 years (mean age, 56.6 years). Six patients (60%) were men and 4 (40%) were women. The operative procedures were as follows: right trisegmentectomy, 1; right lobectomy, 2; segmentectomy, 2; bisubsegmentectomy, 2; and subsegmentectomy or other minor procedure, 3 (Table 1).

#### DETERMINATION OF SURGICAL INDICATION

The diagnoses were made using ultrasonography, dynamic computed tomography, magnetic resonance imaging, and angiography. Magnetic resonance imaging, however, has only been routinely available since 1990. All customary laboratory examinations including serological tests for parasites were also performed. In addition, cytological and bacteriological evaluations were performed if needed. Our treatment strategy was as follows: (1) an asymptomatic benign cyst was merely followed up, (2) a symptomatic simple cyst was indicated for ethanol injection,3 or (3) either suspected malignant or definitely malignant cystic lesions were indicated for a hepatectomy.

In principle, the final decisions were made by our surgeons. However, during the process of determining the final indications, a preoperative conference was held among our surgeons and radiologists expert in liver tumors on each patient's liver cyst. All 10 patients evaluated in this study finally underwent a hepatectomy either because malignancy could not be ruled out (9 patients) or a malignant transformation was strongly suspected (1 patient). Informed consent for surgical treatment was obtained from each patient. Typical preoperative images, in which malignancy could not be ruled out, are shown in the Figure.

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**Table 1. Preoperative and Postoperative Diagnoses, With Operative Variables, for Hepatic Cystic Lesions Mimicking Liver Tumor in 10 Patients**

<table>
<thead>
<tr>
<th>Patient No.</th>
<th>Preoperative Diagnosis</th>
<th>Postoperative Diagnosis</th>
<th>Procedure</th>
<th>Operation Time, min</th>
<th>Blood Loss, mL</th>
<th>Hospital Stay After Operation, d*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cystadenoma</td>
<td>Complicated cyst</td>
<td>Subsegmentectomy</td>
<td>225</td>
<td>1000</td>
<td>13</td>
</tr>
<tr>
<td>2</td>
<td>Hepatoma with necrosis</td>
<td>Cyst</td>
<td>Partial resection</td>
<td>210</td>
<td>270</td>
<td>13</td>
</tr>
<tr>
<td>3</td>
<td>Cystadenoma</td>
<td>Cyst</td>
<td>Partial resection</td>
<td>350</td>
<td>1100</td>
<td>17</td>
</tr>
<tr>
<td>4</td>
<td>Atypical hemangioma†</td>
<td>Localized cyst dilatation of bile duct due to hepatolithiasis</td>
<td>Right lobectomy</td>
<td>225</td>
<td>850</td>
<td>16</td>
</tr>
<tr>
<td>5</td>
<td>Metastatic tumor</td>
<td>Cyst</td>
<td>Left lateral segmentectomy</td>
<td>166</td>
<td>350</td>
<td>11</td>
</tr>
<tr>
<td>6</td>
<td>Cystadenocarcinoma</td>
<td>Cystadenoma</td>
<td>Right trisegmentectomy</td>
<td>295</td>
<td>800</td>
<td>13</td>
</tr>
<tr>
<td>7</td>
<td>Cystadenocarcinoma</td>
<td>Complicated cyst</td>
<td>Right lobectomy</td>
<td>290</td>
<td>1800</td>
<td>14</td>
</tr>
<tr>
<td>8</td>
<td>Cystadenoma</td>
<td>Cyst</td>
<td>Posterior segmentectomy</td>
<td>310</td>
<td>1300</td>
<td>14</td>
</tr>
<tr>
<td>9</td>
<td>Cystadenoma</td>
<td>Cystadenoma (suspected)‡</td>
<td>Bisubsegmentectomy</td>
<td>247</td>
<td>1200</td>
<td>13</td>
</tr>
<tr>
<td>10</td>
<td>Cystadenocarcinoma</td>
<td>Cholangiocarcinoma</td>
<td>Bisubsegmentectomy with extended lymph node dissection</td>
<td>353</td>
<td>2000</td>
<td>13</td>
</tr>
</tbody>
</table>

*No postoperative complications occurred in any of the patients.
†The final diagnosis of this tumor was not obtained before operation. Furthermore malignancy such as cholangiocarcinoma could not be ruled out before operation.
‡The tumor encapsulated by fibrous tissue was completely composed of necrotic tissue with cystic space, calcification, choleserin clefts, and hemorrhage. The cystic wall was partially lined by a cuboidal epithelium.
The single patient with cholangiocarcinoma underwent an extensive lymph node dissection and a hepatectomy, since an intraoperative pathological examination revealed mucin-producing cholangiocarcinoma instead of a cystadenocarcinoma. This patient’s case exemplifies how an intraoperative pathological examination is valuable in accurately diagnosing and determining the treatment strategy.

Operation time ranged from 166 to 353 minutes (mean time, 267 minutes) and estimated blood loss ranged from 270 to 2000 mL (mean blood loss, 1067 mL). No mortality or morbidity was observed, and the length of hospitalization after operation ranged from 13 days to 17 days (mean hospitalization, 13.7 days) (Table 1).

**Comment**

Definite preoperative differentiation between cystadenoma and cystadenocarcinoma is difficult using medical imaging,

regardless of the advances in radiographic imaging modalities. Moreover, cystadenoma can also be potentially malignant. For both biliary cystadenoma or cystadenocarcinoma, a complete excision offers the best chance for a cure. Surgical resection, therefore, should be indicated even for cystadenoma, which can usually be differentiated from cystadenocarcinoma. The presence of mural or septal nodules, a discrete soft tissue mass, and a possible thick and coarse calcification increase the likelihood that a suspected cystadenoma is really a cystadenocarcinoma. However, no characteristic imaging features have yet been identified that differentiate cystadenocarcinoma from cystadenoma. If a cystadenoma is suspected, then surgery must be performed immediately because biliary cystadenoma and cystadenocarcinoma cannot be reliably differentiated based on the findings in the macroscopic specimen alone.

Another problem that should be considered in the management of cystic lesions in the liver is that cysts complicated by hemorrhage or infection often tend to be misdiagnosed as either a cystadenoma or a cystadenocarcinoma. The differential diagnosis of cystic hepatic lesions includes a complicated cyst, abscess, hematomata, echi- nococcal cyst, mesenchymal hamartoma, undifferentiated embryonal sarcoma, and cystic metastasis. Simple hepatic cysts usually do not contain internal septations or thick irregular walls. Hepatic abscesses usually have
thick irregular walls and contain internal echoes,13,16 and intrahepatic hematomas may appear cystic; fortunately, however, the septations characteristic of cystadenomas are uncommon in either abscesses or hematoma.17 Echogenic cysts may also appear to be similar to cystadenomas, but their internal loculi are usually smaller and more uniform. Both the patient’s travel history and serological testing aid in the differential diagnosis of echinococcal cyst.18 Mesenchymal hamartomas of the liver are uncommon benign tumors that appear to be similar to cystadenomas, but they are most often seen in infants younger than 2 years old.19 Undifferentiated (embryonal) sarcomas usually occur in older children, adolescents, and young adults, and range from solid to cystic.20 Cystic metastases are rare but unfortunately also may appear to be quite similar to cystadenomas or cystadenocarcinomas.21 A cholangitic abscess, resembling either a cystadenoma or cystadenocarcinoma, has been described that contained dilated ducts and mobile echogenic material.22 Roever et al23 reported that percutaneous cyst aspiration was useful in some cases, as it usually differentiates the kinds of cysts. However, the analysis of tumor-marker concentrations in the cystic fluid did not help us to make an accurate diagnosis in the 3 cases in our study in which cystic fluid was obtained. Iemoto et al8 reported that an ultrason sound-guided biopsy could give an accurate diagnosis. Kanamori et al24 recommended that endoscopic aspiration cytological tests be performed for an accurate diagnosis. Percutaneous transhepatic cholangioscopy is another possible diagnostic modality.25 However, the possibility of peritoneal seeding of tumor cells through the needle track or endoscopic tract should be carefully considered.

In the proposed treatment strategy for such unique cystic lesions, all efforts should be focused on making an accurate diagnosis before the operation, using routine laboratory examinations including assays for tumor markers, as well as imaging modalities that include ultrasonography, computed tomography, magnetic resonance imaging, and angiography. A hepatic resection should be selected only if all else (ie, the rest of the liver and the patient’s general condition) is satisfactory, whenever the aforementioned noninvasive or minimally invasive interventional techniques cannot rule out malignancy or a potential malignant lesion such as cystadenoma. An intraoperative pathological examination is thus strongly recommended, since a different type of operative procedure, including an extensive lymph node dissection, is required for cholangiocarcinoma cases.

In conclusion, an accurate diagnosis of cystic lesions mimicking a tumor still remains problematic. The results of hepatectomy for such diseases, however, have been satisfactory. Hepatectomy should be indicated for cystic lesions mimicking a tumor of the liver whenever a potential malignancy cannot be completely ruled out.

**REFERENCES**


