Percutaneous Transhepatic Drainage of Pyogenic Liver Abscess under Ultrasonography Guidance

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Summary: Nineteen patients with liver abscess were treated in our department over a period of 14 years. The cause of the liver abscess was biliary disease in 13 of the 19 or 68%, and 8 of these 13 patients had undergone surgical procedures. The 13 patients with liver abscess received both percutaneous transhepatic abscess drainage (PTAD) under ultrasonography (US) guidance and antibiotics. The remaining 6 were treated with antibiotics alone. Among the 13 cases treated with PTAD, 11 (84%) were cured in an average of 22 hospital days. One case (8%) with liver abscess caused by tuberculosis was unchanged and 1 (8%) died of hepatic failure due to liver cirrhosis. There were no complications related to PTAD, but the mortality rate among patients receiving antibiotics only was 33%. PTAD is the most advisable treatment for liver abscess and should be followed by appropriate supplemental management of the original conditions. Moreover, amputation of the distal bile duct is an indispensable part of bile diversion procedures because it prevents reflex cholangitis which may cause future liver abscesses.

Introduction

In 1938, Ochsner reported the varied pathogenesis and clinical course of pyogenic abscess and emphasized the high mortality rate without surgical treatment. Subsequent papers concerning liver abscess have described changes in average age, clinical course and bacteriologic factors, and recommended better diagnostic methods and treatments. However, in spite of the development of modern diagnostic tools, such as ultrasonography and computed tomography (CT) and the improvement of treatment methods, the prognosis of pyogenic liver abscess is still far from satisfactory. In this paper we report the successful treatment of liver abscess by percutaneous transhepatic abscess drainage (PTAD) under US guidance.

Patients and Methods

Between June 1977 and December 1990, 19 patients with liver abscess were treated at the Second Department of Surgery, Nagasaki University School of Medicine. We reviewed the clinical records of all these patients, analyzed the clinical features of liver abscess and the important factors affecting the prognosis, and discuss here the most ideal treatment methods.

Result

Ten males and 9 females with liver abscess were treated at the Second Department of Surgery, Nagasaki University School of Medicine. The age of the patients ranged from 32 to 78 years with a mean of 52. All 19 patients were found to have various types of abscess in the liver by US, CT and endoscopic retrograde cholangiography (ERC). The original diseases causing the liver abscess are summarized in Table 1. The most common cause of the liver abscess was biliary tract infection, 6 (32%) benign and 7 (36%) malignant arising from obstruction of the bile duct. Two cases (11%) were caused by diverticulitis of the colon infected via the portal vein system. One (5%) was caused by liver tuberculosis and the remaining 3 (16%) had no original infection.

<table>
<thead>
<tr>
<th>Table 1. Underlying disease</th>
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</thead>
<tbody>
<tr>
<td>Underlying disease</td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>Biliary disease</td>
</tr>
<tr>
<td>Benign</td>
</tr>
<tr>
<td>Malignant</td>
</tr>
<tr>
<td>Colonic disease</td>
</tr>
<tr>
<td>Diverticulitis</td>
</tr>
<tr>
<td>Tuberculosis</td>
</tr>
<tr>
<td>Cryptogenic</td>
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</tbody>
</table>

Ten of the 13 patients whose liver abscesses were caused by biliary tract infection had undergone surgical treatment before. As shown in Table 2, the surgical procedures consisted of 6 choledocho-jejunoostomies, 1 choledocho-duodenostomy, 1 papilloplasty and 2 hepatic resections. Repeated reflux cholangitis after operation was thought to be the cause of the liver abscess in 8 of the 13 patients. Three of the 8 patients had undergone choledocho-
jejunostomy by side-to-side anastomosis without resection of the common bile duct. One patient who had undergone hepatic resection for hepatocellular carcinoma with liver cirrhosis had a bile fistulae between the hepatectomized stump and the skin. Another who had undergone hepatic resection for carcinoid tumor had marked jaundice due to recurrence. The other 3 patients, that is, 2 suffering from malignant disease and 1 from intrahepatic lithiasis, had no history of biliary tract surgery.

The locations and types of liver abscess are listed in Table 3. Of the 19 patients with liver abscess, 12 (68%) had solitary lesions, of which 9 were located in the right lobe. Among the remaining 7 patients with multiple liver abscess, 3 had lesions in both lobes. Thus, the most common site of the liver abscess was the right lobe. There were 8 solitary lesions in the right lobe, all of which were secondary complications of biliary tract disease. In 3 patients with multiple small abscesses complicated by acute obstructive suppurative cholangitis, percutaneous transhepatic cholangiography (PTC) revealed the characteristic “plum blossom” appearance of the abscesses.

Table 3. Classification, location and type

<table>
<thead>
<tr>
<th>Underlying disease</th>
<th>Cases</th>
<th>r-lobe (%)</th>
<th>I-lobe (%)</th>
<th>both lobes (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biliary</td>
<td>13</td>
<td>8 (62)</td>
<td>2 (15)</td>
<td>2 (15) 1 (5)</td>
</tr>
<tr>
<td>Diverticulitis</td>
<td>2</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Cryptogenic</td>
<td>3</td>
<td>2</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td>9 (47)</td>
<td>4 (21)</td>
<td>3 (16) 3 (16)</td>
</tr>
</tbody>
</table>

The bacteriologic findings of each liver abscess are summarized in Tables 4 and 5. Fifteen of 19 patients had positive cultures of the abscess. Pure rod was isolated in 4 patients (27%) and pure cocci in 1 (7%), and mixed infection was demonstrated in 10 cases (66%). Among the 10 cases with mixed infection, 2 kinds of bacterium were found in 5 (33%), 3 kinds in 3 (20%) and 4 or more kinds in 2 (13%). Mixed infection of rod and cocci were detected in 4 (27%) and aerobic and anaerobic in 3 (20%). Klebsiella, Eschria coli, Enterobacter and Streptococcus were the most commonly isolated organisms, followed by Enterococci and Bacteroides fragilis. Bacteria producing β-lactamase were found in 3 patients and tuberculosis was found in 1 patient. The patients whose abscesses were infected with Bacteroides fragilis suffered the most severe clinical symptoms.

All the patients with liver abscess underwent systematic administration of broad-spectrum antibiotics from the beginning of admission. Thirteen of 19 patients were treated by PTAD under US guidance, and the antibiotics were changed after identification of the bacterium. Six (31%), however, were managed by antibiotics only. PTAD was performed safely and successfully without any complication. Three different drainage procedures were applied according to the locations of the abscesses. The abscess near the dome of the liver was punctured and drained easily by the anterior approach avoiding the pleura. The lesion in the left lobe of the liver were also approached via the anterior wall. On the other hand, the lesions in the inferior lobe were drained via the lateral wall. Double catheters were inserted into the abscess cavity in 3 patients whose liver abscesses were septated or multiloculated. Lavage of
the abscess using physiological saline with antibiotics via
the catheter was conducted several times every day until
the contents of the cavity were completely eliminated.

Of the 13 patients treated by PTAD, 11 showed a favor-
able medical course, 1 was unchanged and 1 died of liver
failure. Two patients whose liver abscess originated from
diverticulitis and became granulomatous after PTAD re-
ceived lateral segmentectomy of the liver and right hemi-
colecetomy. Neither has suffered any recurrent abscess in
the liver. The patient who died of liver failure had bile
fistulae after liver resection and suffered from reflux cho-
langitis. The patient with tuberculous liver abscess who did
not respond to PTAD had bronchobiliary and gastro-biliary
fistulae, but antituberculous chemotherapy succeeded in
reducing the size of the liver abscess and in closing the
fistulae. However, the patient soon developed a liver ab-
scess again and has been suffering from rupture of the
esophageal varices due to portal hypertension. Among the
6 patients treated with antibiotics alone, 4 cases with
comparatively small liver abscesses were cured but 2 died
as a result of underlying malignancy followed by multiple
organ failure and sepsis (Table 6 and 7).

Table 6. Treatment and outcome

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percutaneous drainage</td>
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</tr>
<tr>
<td>Cured</td>
<td>11 (84)</td>
</tr>
<tr>
<td>Died</td>
<td>1 (8)</td>
</tr>
<tr>
<td>No change</td>
<td>1 (8)</td>
</tr>
<tr>
<td>Antibiotics</td>
<td></td>
</tr>
<tr>
<td>Cured</td>
<td>4 (67)</td>
</tr>
<tr>
<td>Died</td>
<td>2 (33)</td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
</tr>
</tbody>
</table>

Table 7. Mortality

<table>
<thead>
<tr>
<th>No</th>
<th>Age</th>
<th>Sex</th>
<th>Underlying disease</th>
<th>Past-history</th>
<th>Complication</th>
<th>Treatment</th>
<th>cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>47</td>
<td>M</td>
<td>Bile fistulae after hepatic resection</td>
<td>Hepatic resection</td>
<td>Liver cirrhosis</td>
<td>PTAD</td>
<td>60 days death Liver failure</td>
</tr>
<tr>
<td>2</td>
<td>55</td>
<td>M</td>
<td>Bile duct carcinoma</td>
<td>Cholecodocho-jejunostomy</td>
<td>(-)</td>
<td>Antibiotics alone</td>
<td>12 days death Septic shock</td>
</tr>
<tr>
<td>3</td>
<td>78</td>
<td>F</td>
<td>Cystoadenocarcinoma</td>
<td>Jaundice</td>
<td>(-)</td>
<td>Antibiotics alone</td>
<td>20 days death Multiple organ failure</td>
</tr>
</tbody>
</table>

PTAD: Percutaneous transhepatic abscess drainage

Discussion

In 1938 Ochsner and De Bakey reviewed about 187 cases of
liver abscess and reported a mortality rate of 95% in
patients receiving no surgical treatment. They also empha-
sized the importance of primary disease and the role of the
portal venous system which drains bacteria into the liver.
The high mortality among cases of liver abscess has long
been considered to be due to the difficulty of accurately
determining the location and distribution of the lesions.6,12
However, modern diagnostic image techniques such as US,
CT and magnetic resonance imaging (MRI), which can be
done repeatedly without any pain, have facilitated the
accurate and early diagnosis of liver tumor.13,14

Among the routes of infection in liver abscesses, the
poral vein was stressed by many authors prior to the
1960s.16,18) Acute appendicitis was previously the most
common cause of liver abscesses, but the incidence of liver
abscesses secondary to acute appendicitis has decreased as
a results of the use of effective antibiotics after surgery.19,20
On the other hand, however, the liver abscess occurring as a
secondary complication of obstruction of the bile duct has
increased.21,22) In our series, 13 cases (68%) of liver abscess
were caused by biliary disease and 8 (62%) of the 13 had
undergone some surgical procedure before. Considering
the fact that repetition of cholangitis can lead to liver
abscesses, amputation of the distal bile duct is indis-
penensible in the prevention of reflux cholangitis.24,27)

The ideal treatment for liver abscesses is surgical drain-
age. However, the usual procedures such as exploratory
laparotomy and open drainage are associated with a high
rate of complications and mortality. In 1954, McFadzen
advocated the revolutionary idea of the percutaneous
needle drainage of liver abscesses, but the procedure did
not come into common use until reliable imaging tech-
niques became available.28) Surgeons implementing CT-
guided percutaneous drainage of liver abscesses reported a
high success rate, few complications and shorter hospital
stay than surgery, but it is still difficult to demonstrate liver
abscess during this PTAD procedure.29,30) On the other
hand, PTAD under US guidance simultaneously allows the
accurate detection and puncture of the liver abscess.30,31) In
our series, the mortality rate of patients treated with PTAD
was 8% and there were no complications.

In conclusion, PTAD is the most advisable treatment for
liver abscess and should be followed by appropriate
supplemental management of the original conditions.
Moreover, amputation of the distal bile duct is an indis-
penensible part of bile diversion procedures because it pre-
vents reflux cholangitis which may cause future liver
abscesses.
References