Upsala J Med Sci 93: 289–296, 1988

Infected Echinococcal Cyst. A Common Cause of Pyogenic Hepatic Abscess

Dionisios Karavias,[1] Costas Panagopoulos, Costas Vagianos, Costas Vagenas, Spiros Rathosis and John Androulakis

Department of Surgery, University Hospital, Patras, Greece

[1]Visiting scientist at the Department of Surgery, University Hospital, Uppsala, in 1986.

ABSTRACT

Twenty-one cases of hepatic abscesses treated during a period of four years (from 1981 to 1985) at the University of Patras, Greece, are presented. This material includes 10 cases with abscesses caused by suppurated echinococcal cysts, corresponding to 21 % of the total number of 47 cases of echinococcal cysts of the liver treated at our department during the same period. A preoperative diagnosis of the suppurated echinococcal cysts by conventional laboratory methods was not reliable.

Because of the high frequency of echinococcal disease in our region and the risk of contamination of the peritoneal cavity from echinococcal parasites if the cyst is punctured, the new therapeutic techniques of treating hepatic abscesses by percutaneous drainage have not been applied. The exclusive method of treatment used was surgical drainage which had a satisfactory outcome and a mortality rate as low as 9 %.

INTRODUCTION

Pyogenic hepatic abscesses are nowadays uncommon, due to a more aggressive surgical approach to intra-abdominal infections in combination with adequate antibiotic therapy. Despite advances in antibiotic therapy and the use of modern diagnostic techniques the disease is still a serious condition. The mortality of hepatic abscesses without treatment approaches 100 % (3). Percutaneous drainage, first introduced in 1953 by Mac Fadzean et al. (19), has further contributed to reducing the mortality, which still, however, remains high, ranging from 12 % to 26 % (3,5,7,9,10,12,13,25,27,28).

The main reason of hepatic abscess in our region, is the suppuration of an echinococcal cyst. In 1969, about 600 cases of hydatidosis were reported in Greece, that is 6 patients in a population of 100,000 (14). In 1983, 980 cases

of hydatidosis were reported, corresponding to almost 10 patients in a population of 100,000, an increase despite efforts made by health authorities to improve the general standards of hygiene in our country. Due to the facility with which the population migrates in our days, this problem goes far beyond restricted geographical areas.

This study presents a material of 21 cases with liver abscesses. The cases differ from those of previous series both in their pathogenesis and treatment.

Table 1. Causes of pyogenic hepatic abscesses

Cause	No. of pts	Percentage of pts
Infected echinococcal cyst	10	48
Biliary [1]	3	15
Cryptogenic	4	19
Portal [2]	2	9
Trauma	2	9
TOTAL	21	100

1) The preceding biliary disease was cholecystitis (n=2) and choledocholithiasis with cholangitis (n=1)

2) The aetiology of the portal infection was diverticulitis (n=1) and appendicitis (n=2)

PATIENTS AND RESULTS

The records of patients with the diagnosis of hepatic abscess during a period of four years (from 1981 to 1985) were analysed at the Department of Surgery at the University of Patras. This study is concerned only with patients whose diagnosis was confirmed surgically. The surgical procedures were indicated by the clinical picture (fever, chill, weight loss) and the diagnostic tests (ultrasonography, computerized tomography, technetium-99 scan). The pathogenesis, symptoms, clinical signs, laboratory findings, diagnostic methods, bacteriology, treatment, outcome and complications were analysed.

Table 2. Treatment and outcome of pyogenic hepatic abscesses

Abscess morphology	Treatment	Outcome		
		Hosp. days	Survived	Died
Single abscess (16)	Surgical drainage + broad-spectrum antibiotic treatment	25	16 (100%)	0
Multiple abscesses (5)	Surgical drainage + broad-spectrum antibiotic treatment	26	3 (60%)	2 (40%)

Age and sex: The clinical material consisted of 12 males and 9 females. The mean age of the patients with single abscesses was 58 years (range 25 to 78 years), for those with multiple abscesses 68 years (range 24 to 84 years). The mean age of both groups (single and multiple abscesses) was 62 years (range 24 to 84 years).

Pathogenesis: The pathogenesis of the abscesses can be seen in Table 1. The infected cases constituted 21 % of the total number (n=47) of patients with echinococcal cysts of the liver taken care of during the four-year period.

Clinical features and signs: Almost all patients had fever. Otherwise, abdominal pain, weight loss and chills were the main symptoms. Clinically, hepatomegaly with tenderness in the right upper abdominal quadrant was the most helpful sign in suggesting a liver abscess and was present in somewhat more than half of the cases. Jaundice was present in 8 patients and pulmonary abnormalities, detected by X-ray, were found in 9 patients.

Laboratory findings: Anaemia was found in 9 patients. The white blood cell count was elevated in 14 patients and the serum bilirubin in 12 patients. Low albumin level seemed to be a predicting factor of the course of the disease, as both patients who died had the lowest values (20 and 22 g/l). The serum alkaline phosphatase was increased in 12 and transferases in most of the patients. Intradermal Casoni test for diagnosis of hydatid disease was performed in 12 of the patients suffering from hepatic abscess. In 7 of these 12 patients the cause of the hepatic abscess was finally proved to be suppurated echinococcus cyst. In only 2 out of these was, however, the Casoni test positive. The other five patients with echinococcal hepatic abscesses had negative tests.

Diagnosis: The diagnosis was initially suspected from the clinical picture and confirmed with ultrasonography and computerized tomography (CT). Sixteen patients underwent ultrasonography which was diagnostic in 14 (88 %). In 13 patients CT was used and in 12 (92 %) of them the diagnosis of liver abscess was verified. Technetium-scanning was done in 5 patients and was diagnostic in all of them. X-rays of the thorax and abdominal cavity were done routinely in all patients and there were indirect signs of abscesses from some abnormalities in 13 cases (62 %).

Bacteriology: Aerobic cultures were performed in all patients. In 6 of them the cultures of the abscesses were negative (29 %). The blood cultures were negative in 16 patients (76 %). Anaerobic cultures from the abscesses were performed in 7 cases and were negative in 5 (71 %). The bacteria most commonly found were E.coli, Klebsiella, Pseudomonas aeruginosa, Staphylococcus aureus and Citrobacter.

Treatment: All the 21 patients were operated on after diagnosis. The aim was to drain the abscesses and to search for an aetiologic abdominal pathology. In 2 of the 3 patients with biliary abscesses the drainage was combined with cholecystectomy and in the third case with exploration of the common bile duct and an entero-biliary anastomosis. In the 2 patients with posttraumatic abscesses the drainage procedure was associated with the removal of necrotic liver tissue. Patients with cryptogenic abscesses underwent only drainage.

In all patients with infected echinococcal cysts the germinal and laminated layers were removed (cystectomy), and in some cases also a radical pericystectomy was carried out. A sump drain was usually left in the abscess cavity for 6 days. From the preoperative period all the patients received parenterally a broad-spectrum antibiotic treatment consisting of an aminoglycoside or a cephalosporin, in some cases combined with clindamycin or ampicillin. In 8 patients the treatment was corrected after the culture results and antibiotic sensitivities were known.

Two deaths occurred. One patient died from pulmonary complication and the other from septicemia and multiple organ failure. Both patients had multiple abscesses in the liver and positive blood cultures. None of the patients with infected echinococcal cysts died.

The mean period of hospitalization of the patients with a single abscess was 25 days, for those with multiple abscesses 26 days. The treatment and outcome are summarized in Table 2.

Complications: Nine patients developed severe and 8 mild complications (Table 3). The 2 patients who died belonged to the former group.

Table 3. Complications in surgically drained pyogenic hepatic abscesses

	No. of pts	percentage of pts
Pulmonary failure	2	9
Stress ulcer	1	5
Multiple organ failure*	1	5
Renal failure*	1	5
Atelectasis	2	9
Pleural effusion	1	5
Biliary fistula	1	5
Other	8	38

* Patient died.

DISCUSSION

The incidence of pyogenic hepatic abscesses has remained rather constant in this century. The sex distribution has varied in most reports (3,15,28). Historically, the condition has mainly affected young and middle-aged adults but this study is in accord with recent reports of a peak incidence in the seventh decade.

The frequency of infections arising from the portal venous system has decreased from about 50 % to 20 % (20) during the last 50 years. This is probably due to a more aggressive surgical approach to intra-abdominal infections in combination with adequate antibiotic therapy. In this study hepatic abscesses due to bacterial seeding via the portal circulation were only seen in 9 %.

Diseases in the extrahepatic bile ducts are in many series the main causes of hepatic abscesses. The high mortality often seen in this group of hepatic abscesses is almost always related to the multiplicity of the abscesses (17,20). In our series the frequency of biliary abscesses was 14 % and one of the two deaths was caused by multiple abscesses due to obstruction of the extrahepatic biliary tract.

The incidence of cryptogenic abscesses has remained relatively stable. In recent series a fairly consistent 20 % incidence was reported (1,13,14,24). In our study the frequency approached 19 %. Some investigators believe that cryptogenic abscesses are secondary to infections within the region of the portal drainage (18) whereas others are of the opinion that they derive from hepatogenic spread via the hepatic artery (22). In our study we used the terminology "cryptogenic abscesses" for those abcesses where no primary infectious site was discovered during the laparotomy. One of the two deaths in this series was due to cryptogenic abscess, emphasizing the serious nature of this disease.

In our material hepatic abscesses were most often caused by infected echinococcal cysts (48 %). Reviewing the literature we have found only one study reporting this association. In that study 3 infected echinococcal cysts were the underlying condition in 14 patients with hepatic abscesses (18). The suppuration of an echinococcal cyst of the liver is a complication that mostly occurs after small ruptures into the biliary tract (17). Thus, it has been reported by Androulakis that a hydatid cyst of the liver might rupture and suppure in 6-19 % (2).

Thus, this benign disease should be considered a source of hepatic abscess in countries where Echinococcus resides. It should not, however, be disregarded also in other countries either due to the migration of people into and from infected areas. A considerable variation of symptoms and signs was found in this series. Fever, chills, weight loss, hepatomegaly, pain in the right upper quadrant and pulmonary signs are indications sufficient enough to suspect hepatic abscess but not specific enough to differentiate the echinococcal and non-echinococcal hepatic abscess. The same holds true of laboratory examinations. White cell count is not always elevated, even in the presence of severe septicemia (7,20). Serum liver enzymes and serum albumin can be pathological in many hepatic diseases. The increase of serum bilirubin and alkaline phosphatase may express extrahepatic obstruction without extension of the infection into the liver. Many modern diagnostic methods with great accuracy are used today. Technetium-scanning, CT and ultrasonography accomplish the correct diagnosis in 90 % of the cases. X-rays of abdomen and chest may also provide a number of useful information. Calcification of the walls of a hepatic abscess seen at plain x-ray examination of the abdomen supports the diagnosis of an infected echinococcal cyst. Many immunological tests have been used in the diagnosis of a hydatid disease (16). While immunological tests can be diagnostic in echinococcal disease, their role in the diagnosis of infected echinococcal cysts is equivocal, as long as suppuration of the cyst can revert them to negative. In our series intradermal Casoni test was used and was positive in only 2 out of the 7 cases of infected echinococcal cysts. It is fair to assume that the use of other immunological tests or combinations of them may be more specific in the preoperative diagnosis of infected echinococcal cysts.

For many decades the only treatment applied to liver abscesses was surgical drainage. The mortality was initially high (70 %) (20), but is today reduced to less than 20 % (18). In our series the mortality rate was only 9 %. Conservative treatment with antibiotics alone has poor results (17,21) and cannot be recommended (10,14). With the help of high resolution imaging technology such as CT and ultrasonography, percutaneous drainage of the pyogenic hepatic abscesses has been suggested as the treatment of choice with mortalities ranging from 1.5 to 15 % (4,6,8,9,15,17). However, percutaneous drainage should not be

applied in situations where a laparotomy is urgent, the viscosity of the pus is high or when the abscesses are multiple or multilocular (18). Additionally, percutaneous needle puncture or aspiration of a hepatic hydatid cyst has always been contraindicated because of the potential complications of anaphylactic shock and spread of hydatid daughter cysts to the peritoneum (11,15,23,26). In our study, surgical drainage was exclusively used, as the most common cause of pyogenic hepatic abscesses in our region is infected echinococcal cysts. Mc Corkell, et al. believe that an early laparotomy should be considered in any patient with a hepatic abscess (18).

Infected echinococcal cysts of the liver present the same symptoms and yield the same findings in laboratory tests, CT and ultrasonography as abscesses of other kinds. Immunologic tests cannot be reliable in excluding echinococcal hepatic disease when suppuration of the cyst exists. Consequently, in countries where echinococcal disease resides the physician should always entertain strong suspicions about the diagnosis of infected echinococcal cyst of the liver, whenever he or she encounters a liver abscess. We believe that in those areas, evacuation of the abscess cavity by percutaneous drainage is contraindicated because of the risk of anaphylactic shock and contamination of the abdominal cavity, and surgical drainage should always be the treatment of choice.

REFERENCES

1. Altemeier, W.A.: Schowengerdt, C.G. & Whiteley, D.H.: Abscesses of the liver: surgical considerations. Arch Surg 101:258-266, 1970.
2. Androulakis, G.A.: Surgical management of complicated hydatid cysts of the liver. Eur Surg Res 18:145-150, 1986.
3. Balasegaram, M.: Management of hepatic abscess. Curr Probl Surg 18:282-340, 1981.
4. Barbour, G.L & Juniper, K. Jr.: A clinical comparison of amebic and pyogenic abscess of the liver in sixty-six patients. Am J Med 53:323-334, 1972.
5. Belli, L., del Favero, E., Marni, A. & Romani, F.: Resection versus pericystectomy in the treatment of hydatidosis of the liver. Am J Surg 145:239-242, 1983.
6. Berger, L.A. & Osborne, D.R.: Treatment of pyogenic liver abscesses by percutaneous needle aspiration. Lancet 1:132-134, 1982.
7. Bertel, C.K., van Heerden, J.A. & Sheedy, P.F. II.: Treatment of pyogenic hepatic abscesses. Surgical vs percutaneous drainage. Arch Surg 121:554-558, 1986.
8. Butler, T.J. & McCarthy, C.F.: Pyogenic liver abscesses. Gut 10:389-399, 1969.
9. Dietrick, R.B.: Experience with liver abscess. Am J Surg 147:288-291, 1984.
10. Gerzof S.G., Johnson, W.C., Robbins, A.H. et al.: Intrahepatic pyogenic abscesses: treatment by percutaneous drainage. Am J Surg 149:487-494, 1985.
11. Hankins, J., Werner, D. & Kobout, E.: Surgical treatment of ruptured and unruptured hydatic cysts of the lung. Ann Surg 167:336-341, 1968.

12. Herbert, D.A., Rothman, J., Simmons, F., Fogel, D.A., Wilson, S. & Ruskin, J.: Pyogenic liver abscesses: successful non-surgical therapy. Lancet 1(8264):134-136, 1982.
13. Kandel, G. & Marcon, N.E.: Pyogenic liver abscess: new concepts of an old disease. Am J Gastroenterol 79:65-71, 1984.
14. Kourias, B.: Hydatid disease of the liver and other viscera; in Maingot, R.: Abdominal operations (Appleton-Century-Crofts, New York 1974).
15. Lazarchick, J., De Souza e Silva, N.A., Nichols, D.R. & Washington, N.A. II. Pyogenic liver abscess. Mayo Clin Proc 48:349-355, 1973.
16. Little, J.M. & Deane, S.A.: Hydatid Disease in Liver Surgery, ed. by Stig Bengmark & L.H. Blumgart, chap. 10. Churchill Livingstone, Edinburgh, 1986.
17. Maher, J.A., Reynolds, T.B. & Yellin, A.E.: Successful medical treatment of pyogenic liver abscess. Gastroenterology 77:618-622, 1979.
18. McCorkell, S.J. & Niles, N.L.: Pyogenic liver abscesses: another look at medical management. Lancet, 6:803-806, 1985.
19. Mac Fadzean, A.J.S., Chang, K.P. & Wong, C.C.: Solitary pyogenic abscess of the liver treated by closed aspiration and antibiotics. A report of 14 consecutive cases with recovery. Br J Surg, 41:141-152, 1953.
20. Miedema, B.W. & Dineen, P.: The diagnosis and treatment of pyogenic liver abscesses. Ann Surg, 200:328-335, 1984.
21. Neoptolemos, J.P., Macpherson, D.S., Holm, J., Fossard, D.P.: Pyogenic liver abscess: a study of forty-four cases in two centres. Acta Chir Scand 148:415-421, 1982.
22. Ogden, W.W., Hunter, P.R. & Rives, J.B.: Liver abscess. Postgrad Med 30:11-19, 1961.
23. Pissiotis, C.A., Wander, J.V. & Condon, R.E.: Surgical treatment of hydatid disease: prevention of complications and recurrences. Arch Surg 104:454-459, 1972.
24. Pitt, H.A. & Zuidema, G.D.: Factors influencing mortality in the treatment of pyogenic hepatic abscess. Surg Gynecol Obstet, 140:228-234, 1975.
25. Rubin, R.H, Swartz, M.N. & Malt, R.: Hepatic abscess changes in clinical, bacteriologic and therapeutic aspects. Am J Med 57:601-610, 1974.
26. Saidi, F.: Hydatid cysts of the liver: In: Surgery of Hydatid Disease, chap. 3, 0-7216-7900-5. Saunders, Philadelphia, 1976.
27. Sheinfeld, A.M., Steiner, A.E., Rivkin, L.B. et al.: Transcutaneous drainage of abscesses of the liver guided by computed tomography scan. Surg Gynecol Obstet 155:662-666, 1982.
28. Sherman, J.D., Robbins, S.: Changing trends in the casuistics of hepatic abscess. Am J Med 28:943-950, 1960.

Address for correspondence:
Dr. D. Karavias
Department of Surgery
University Hospital
Patras, Greece