

Percutaneous Needle Aspiration in the Treatment of Hepatic Abscess: Factors Influencing Patients' Outcome

R H G Lo,*^{MBBS, FRCR}, S C H Yu,**^{MBBS, FRCR}, P S Kan,**^{MBChB, FRCR}

Abstract

Sixty-four consecutive cases of hepatic abscess diagnosed over a 6-year period and all treated by ultrasound-guided percutaneous needle aspiration and systemic antibiotics were retrospectively reviewed to ascertain factors influencing the outcome in these patients. The 64 patients had in total 101 liver abscesses which averaged 4.7 cm in diameter. Two patients (3.1%) required surgery for associated biliary tract disease. Five patients (7.8%) died from septicaemia and/or serious condition or malignancy. The remaining 57 patients (89.1%) were successfully treated. 45 cases (70.3%) showed fully-resolved abscess/es after a mean period of 69.9 days after initial aspiration; 12 patients (18.8%) showed markedly-shrunk abscess cavity size over an average of 30.7 days and all were asymptomatic on discharge from hospital.

No correlation was demonstrated between number of abscesses and successful patient recovery. 42 of 46 patients (91.3%) with solitary hepatic abscess recovered, 6 of 8 patients (75.0%) with 2 abscesses and 9 of 10 patients (90.0%) with more than 2 abscesses were successfully treated. No correlation was detected between abscess size and number of aspirations required, majority of abscesses (73.3%) requiring no more than two aspirations irrespective of their sizes. Of the 57 patients cured, no significant correlation between abscess size and degree of abscess healing was evident. Our results demonstrate the effectiveness of percutaneous needle aspiration and it should be considered a first-line treatment in the management of liver abscess, irrespective of their number and sizes.

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Introduction

Liver abscess traditionally has been treated by open surgical drainage, mortality rates being as high as 80% to 100% if left untreated. However, with the advent of modern non-invasive imaging techniques, percutaneous techniques performed under imaging guidance have, over the recent years, become increasingly acceptable as a suitable alternative to open surgical drainage.

McFadzean et al² first reported percutaneous needle aspiration in the treatment of liver abscesses as early as 1953 when they treated 14 patients with solitary pyogenic liver abscess successfully by closed needle aspiration and antibiotics. Despite this, continuous percutaneous catheter drainage has become generally accepted as standard treatment³⁻⁸ with needle aspiration being considered only as a means of diagnosing, or confirming the diagnosis of hepatic abscess. However, problems and complications may be encountered with catheter drainage such as haemorrhage, sepsis and catheter dislodgement.⁹ Moreover, several recent studies¹⁰⁻¹⁷

have also confirmed the effectiveness of percutaneous needle aspiration in the treatment of liver abscess. In addition, needle aspiration is not only simpler and cheaper, but also more acceptable to the patient than catheter placement.

We therefore conducted a retrospective review of 64 consecutive cases of liver abscess diagnosed at the Prince of Wales Hospital, Shatin, Hong Kong, over a period of six years and all treated by intermittent repeated percutaneous needle aspiration and systemic antibiotics to ascertain the factors, if any, that may influence the outcome of these patients.

Materials and Methods

Sixty-four consecutive cases of hepatic abscess diagnosed at the Prince of Wales Hospital, Shatin, Hong Kong, over a period of six years (from 1989 onwards) were retrospectively studied. The patients' medical records, radiological reports, procedure notes and, in some cases, radiographs were reviewed and these con-

* Senior Registrar

Department of Diagnostic Radiology
Singapore General Hospital

** Senior Medical Officer

Department of Diagnostic Radiology and Organ Imaging
Chinese University of Hong Kong
Prince of Wales Hospital, Shatin, NT, Hong Kong

Address for Reprints: Dr R H G Lo, Department of Diagnostic Radiology, Singapore General Hospital, 1 Hospital Drive, Singapore 169608.

stitute the basis for this study.

The cohort of patients included 40 male and 24 female patients with ages ranging from 18 to 81 years and a mean age of 56.3 years. Forty-six patients (71.9%) had a solitary abscess, 8 (12.5%) had 2 abscesses, and the remaining 10 patients (15.6%) had more than 2 abscesses. Seventy-one abscesses were located in the right hepatic lobe, and 30 in the left lobe, giving a total of 101 abscesses. The lesions ranged in size from 1.0 to 13.0 cm in diameter, with a mean size of 4.7 cm. Sixty-two abscesses (61.4%) were smaller than 5 cm in size, 34 (33.7%) were between 5 and 10 cm, and only 5 (4.9%) were larger than 10 cm in diameter.

Causative organisms were isolated from blood cultures (positive in 7 patients) or aspirated pus (positive in 25 patients), or both (positive blood cultures and aspirated material in 12 patients), or from indirect haemagglutination titre for amoeba (positive in 2 cases only, of which one also had positive blood and aspirated material cultures). In the remaining 19 patients, no causative organism was identified.

All 64 patients were treated by ultrasound-guided percutaneous needle aspiration and systemic antibiotics. For ultrasound guidance, an Aloka SSD-650 (Aloka Co. Ltd., Tokyo, Japan) equipped with 3.5 and 5.0 MHz transducers was used.

Percutaneous approaches to the hepatic abscesses were performed either through the anterior abdominal wall with the patient lying supine, or via an intercostal approach with the patient lying in an oblique position with his left side down. The abscesses were then aspirated with 18-gauge needles, varying in length between 10 and 20 cm, depending upon the location and depth of the lesion. The abscesses were aspirated as completely as possible on each occasion. None of the patients had drainage catheters inserted. Aspirated material was sent immediately for microbiological studies. Patients were started on systemic broad-spectrum antibiotic therapy usually within 24 hours of hospitalisation and frequently even before the abscesses were initially aspirated. The most frequent antibiotic combination used included cephalosporins, ampicillin, metronidazole and aminoglycosides. When the results from culture and sensitivity tests were made available, the choice of antibiotics was then accordingly altered if necessary.

Results

Of the 64 patients, 57 cases (89.1%) showed successful treatment on follow-up ultrasound scans. Ultrasonograms on these 57 patients revealed complete absence and resolution of the abscess cavity in 45 cases (70.3%) after a mean of 69.9 days after the initial aspiration; in the remaining 12 patients (18.8%), follow-up ultrasonograms were incomplete but significantly reduced and shrunken abscess cavity was demonstrated

in the final scan after a mean of 30.7 days after the first aspiration, and all the patients were asymptomatic on discharge from hospital. The average hospitalisation period for these successfully treated cases was 13.4 days with a range of 0 to 55 days. Figure 1a shows an example of a heterogeneously echoic abscess in the right hepatic lobe which, after 3 aspirations over a period of two months, showed complete resolution and replacement by normal liver parenchyma as demonstrated in Figure 1b.

Two patients (3.1%) underwent subsequent surgical treatment for their abscesses due to associated biliary tract disease. One had recurrent pyogenic cholangitis complicated by the development of liver abscess and a biliary stricture in the left hepatic lobe, and subsequently had a left lateral segmentectomy. The second patient had associated cholecystitis due to the presence of gallstones and underwent cholecystectomy and debridement of the liver abscess.

There were five deaths (7.8%) from septicaemia, either from their liver abscess or from complications of their

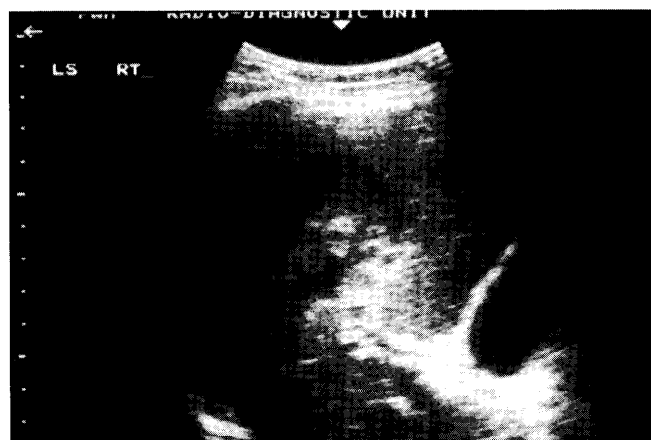


Fig. 1a. Ultrasound scan showing presence of a heterogeneously echoic abscess in the right hepatic lobe

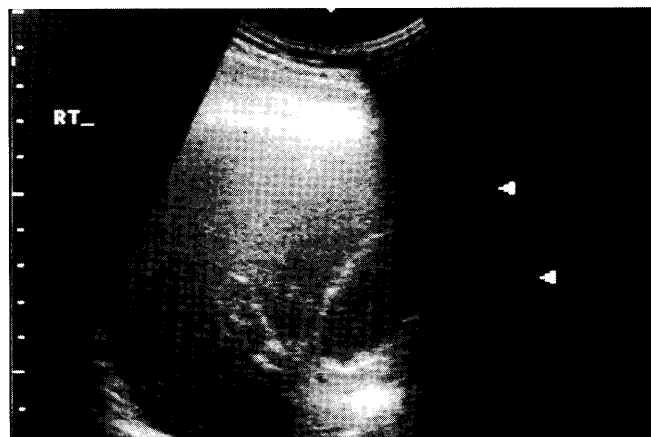


Fig. 1b. Follow-up ultrasound scan taken in approximately the same plane two months later and after three aspirations; there is complete resolution of the abscess and replacement by normal liver parenchyma.

serious underlying conditions or malignancies. One patient had carcinoma of the gallbladder; one was a drug addict with chronic myeloid leukaemia and also carcinoma of the oesophagus; one died from chronic renal failure; the fourth patient had intrahepatic cholelithiasis complicated by recurrent pyogenic cholangitis, hepatic and subphrenic abscesses and was considered unfit to undergo general anaesthesia/surgery, and the last patient had cholangiocarcinoma.

Out of the total of 64 patients, 31 (48.4%) were aspirated only once, 17 patients (26.6%) twice within a mean period of 8.1 days, 9 patients (14.1%) 3 times within a mean period of 16.0 days, 4 patients (6.3%) required 4 aspirations within a mean period of 19.5 days, 2 patients (3.1%) required 5 aspirations within a mean period of 40 days, and 1 patient (1.6%) was aspirated 7 times within 42 days. The indications for repeat aspirations included persistence of clinical symptoms, leukocytosis, and significant residual abscess collection on follow-up ultrasound scan. The mean number of aspirations per patient was 1.95.

Only 1 patient (1.6%) in our series of 64 patients had a complication from the needle aspiration procedure. This occurred in a patient with markedly deranged clotting times which unfortunately were not available prior to aspiration of his large hepatic abscess. The procedure was complicated by haemoperitoneum and subsequent laparotomy revealed liver laceration from the needle aspiration. The patient recovered and was discharged 20 days after the initial aspiration; follow-up ultrasound scans were performed and revealed complete absence of the abscess cavity 59 days after the initial aspiration procedure.

Discussion

Currently, the options available for the management of liver abscess include surgical drainage, continuous percutaneous catheter drainage, percutaneous needle aspiration combined with antibiotics, or antibiotics alone. Open surgical drainage has been the traditional method of treatment,¹ but problems may often be encountered due to difficulty or failure in locating the abscess at surgery, depth of abscess location within the liver, and draining only one abscess when multiple abscesses are present and not recognised. However, modern non-invasive imaging techniques such as computed tomography and ultrasound which have become widely available, together with the increasing expertise of interventional radiologists in successfully treating a wide variety of abscesses using aspiration / drainage catheter insertion, have therefore resulted in utilising percutaneous techniques in the treatment of liver abscesses.^{3-9,18-24}

Percutaneous needle aspiration in the management of liver abscess is not a new concept. It was first reported as early as 1953 by McFadzean et al² from Hong Kong, but

has not been widely adopted as the preferential treatment for liver abscesses, and has generally been regarded only as a procedure for diagnosing, or confirming the diagnosis of hepatic abscess, whereas continuous percutaneous catheter drainage has come to be considered as standard treatment.^{5-9,18-24} In fact, there has been some controversy over managing liver abscess by means of simple needle aspiration and antibiotic therapy only and without a drainage procedure; some reports have concluded that this is inadequate²⁵ or inferior²⁶ to percutaneous catheter drainage for the management of liver abscess. On the other hand, some investigators have advocated the use of antibiotics alone after percutaneous needle aspiration has confirmed or established the diagnosis, and occasionally, even aspiration has not been considered necessary.²⁷⁻²⁹

Our retrospective analysis of 64 consecutive cases treated by needle aspiration, however, has clearly demonstrated that the majority of hepatic abscesses can be successfully treated with percutaneous needle aspiration and parenteral antibiotics. Fifty-seven in our series of 64 patients (89.1%) so treated were cured. Table I shows the degree of abscess healing in relation to its size in these 57 patients. It can be deduced from the figures in the table that in these patients, the size of the abscesses did not correlate with the extent of healing, as can be seen with the 4 abscesses measuring over 10 cm in size which healed completely and the 20 abscesses less than 5 cm in size that showed only partial resolution. However, follow-up ultrasonograms of the partially resolved abscesses were incomplete; nevertheless, it is worth noting that even large abscesses measuring over 10 cm in diameter can still be treated successfully by percutaneous needle aspiration with complete resolution of the abscess.

The number of aspirations required in relation to the size of the abscess is shown in Table II. From this table, it can be noted that the large majority of abscesses (73.3%), irrespective of their sizes, required only one or two aspirations. In fact, approximately half of the total number of abscesses required only a single aspiration, about a quarter were aspirated twice, and the remaining quarter required three or more aspirations. It is thus

TABLE I: ABSCCESS HEALING IN RELATION TO ABSCCESS SIZE IN 57 PATIENTS TREATED SUCCESSFULLY BY ULTRASOUND-GUIDED PERCUTANEOUS NEEDLE ASPIRATION AND ANTIBIOTIC THERAPY

Abscess healing	Size of abscesses (cm)		
	<5	5-10	>10
Absent abscess cavity (63)	33	26	4
Shrunk abscess cavity (27)	20	7	

Note: Numbers in parentheses represent number of abscesses

TABLE II: SIZE OF ABSCESES IN RELATION TO NUMBER OF ASPIRATIONS

Size of abscess	Number of aspirations						
	1	2	3	4	5	6	7
<5 cm (62)	34	12	10	5	-	-	1
5-10 cm (34)	13	12	4	2	1	-	2
>10 cm (5)	3	-	1	-	1	-	-

Note: Numbers in parentheses represent number of abscesses

TABLE III: OUTCOME OF PATIENTS IN RELATION TO NUMBER OF ABSCESES

Number of abscesses	Outcome of patients		
	Recovery	Surgery	Death
1 Abscess (46)	42	1	3
2 Abscesses (8)	6	0	2
>2 Abscesses (10)	9	1	0

Note: Numbers in parentheses represent number of patients

evident that abscess size bears no relation to the number of aspirations required.

Also, the number of abscesses present did not appear to influence the outcome of the patients in our series. Of the 46 patients with solitary liver abscess, 42 (91.3%) recovered. Six of the 8 patients (75.0%) with 2 abscesses were successfully treated, and 9 of the 10 patients (90.0%) with more than 2 abscesses recovered, as is summarised in Table III.

Review of the literature also reveals very favourable outcome in patients with hepatic abscess treated by percutaneous needle aspiration, most studies reporting success rates of over 70% (Table IV) with the exception of 2 studies, by McCorkell and Niles²⁵ and Robert et al.²⁶ Our results of 57 patients out of 64 (89.1%) successfully treated also appear comparable with the favourable reports in the literature. We therefore strongly believe that ultrasound-guided percutaneous needle aspiration is a simple, safe and effective procedure. It offers the advantages of avoiding general anaesthesia and operative procedure, few complications, minimal morbidity, better acceptance by patients, and no indwelling drainage catheter to look after with its associated complications such as risk of infection, obstruction or dislodgement of the catheter. In addition, it is useful not only for confirming the diagnosis of liver abscess, but also for identifying the causative organism/s and determining antibiotic sensitivity, and should preferably be carried out in all cases prior to starting the patients on antibiotic treatment. The reason for failing to isolate organism/s in either blood or pus culture in a significant number of patients in our series may be due to antibiotic therapy being initiated prior to aspiration. In terms of factors that may influence patient's outcome, we have

TABLE IV: LITERATURE REVIEW OF HEPATIC ABSCESES TREATED BY PERCUTANEOUS NEEDLE ASPIRATION (PNA)

	Number of cases treated by PNA	Success No.	Success %	Failure No.	Subsequent catheter drainage No.
1. McFadzean et al ² (1953)	14	14	100	0	0
2. Perera et al ¹⁰ (1980)	7	7	100	0	0
3. Berger et al ¹¹ (1982)	15	15	100	0	0
4. McCorkell et al ²⁵ (1985)	11	1	9.1	10	4
5. Attar et al ¹² (1986)	4	4	100	0	0
6. Juul et al ¹³ (1990)	11	8	72.7	3	0
7. Civardi et al ¹⁴ (1990)	8	8	100	0	0
8. Stain et al ¹⁵ (1991)	29	23	79.3	6	5
9. Robert et al ²⁶ (1992)	16	6	37.5	10	
10. Baek et al ¹⁶ (1993)	25	24	96	1	0
11. Giorgio et al ¹⁷ (1995)	115	113	98.3	2	0
12. Lo et al (1997)	64	57	89.1	7	0

not been able to demonstrate any significant correlation between size/number of abscesses present, and the degree of abscess healing or number of aspirations required or patient's outcome. Percutaneous needle aspiration should therefore be considered a first-line therapeutic procedure in the management of hepatic abscesses, irrespective of the number or size of abscesses present.

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