Section: General Surgery

Original Research Article

A DIAGNOSTIC AND THERAPEUTIC STRATEGIES OF LIVER ABSCESSES IN A TERTIARY CARE HOSPITAL

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Received *: 04/12/2024*
Received in revised form *: 12/12/2024*
Accepted *: 02/01/2025*

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DOI: 10.70034/ijmedph.2024.4.252

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2024; 14 (4); 1383-1389

ABSTRACT

Background: Liver abscesses are an important cause of morbidity and mortality in tropical countries. Pyogenic liver abscess (PLA) is a serious, life-threatening condition with a high mortality rate that represents a diagnostic and therapeutic challenge. India, due to poor sanitary condition and a lower socioeconomic status, amoebiasis is endemic and amoebic liver abscess accounts for 3-9% of all cases of amoebiasis. Aims and objectives: to study a diagnostic and therapeutic strategies of liver abscesses.

Material and Methods: History and clinical examination was done and were then subjected to investigations available within the hospital such as Hb, Tc, ESR, RBS, Blood urea, Serum creatinine, liver function tests (SGOT, SGPT, Serum bilirubin, ALP, serum albumin, total proteins, A:G ratio PT). Ultrasonography of abdomen was done in all cases. Pus was sent for gram's stain and culture and sensitivity. Following diagnosis of liver abscess, patients were treated by conservatively, percutaneous needle aspiration. Follow-up was done as long as patient stayed in hospital and also during subsequent visits. Resolution meant ultrasonography showing complete collapse of cavity with no residual abscess.

Results: The study included 46 cases of Liver abscess between January 2018 and January 2019. Pyogenic organisms were most common cause of liver abscess. Solitary abscess in right lobe was common involvement. Most common treatment used for liver abscess was USG guided aspiration. Most common complication of liver abscess was pleural effusion.

Conclusion: Most of the liver abscesses required USG guided aspiration for their management. 100% resolution of abscess cavity can be obtained with USG guided aspiration of abscess cavity.

Keywords: diagnostic, therapeutic, strategies and liver abscesses

INTRODUCTION

Liver abscess can result from microbial contamination of the liver parenchyma that can happen directly through contiguity or through the bile ducts or vessels (arterial or portal). Most infections are bacterial, occasionally parasitic, and extremely infrequently fungal.[1]

Liver abscesses are an important cause of morbidity and mortality in tropical countries. Pyogenic liver abscess (PLA) is a serious, life- threatening condition with a high mortality rate that represents a diagnostic and therapeutic challenge.[2] Mortality remains high, and proper management continues to be a challenge. During the last decade a marked decrease in mortality has been noted in association with the introduction of new imaging techniques, such as computed tomography and ultrasonography, leading to a decrease in diagnostic delay and making percutaneous drainage possible.[3]

Liver abscesses are classified into two main groups, pyogenic and amoebic related to the etiological cause. In nearly every case involving pyrogenic liver abscesses, positive cultures are obtained. Most often isolated microbes are those found in the digestive tract, including Escherichia coli,

Klebsiella, Proteus, Staphylococcus, and Streptococcus. Rarely are anaerobic bacteria cultivated. Cultures of polymicrobial organisms are uncommon. The choice of the antibiotics should cover the most common microorganisms cultured from liver abscesses.[4] Amebic liver abscess is the most common extra-intestinal manifestation of the protozoan, Entamoeba histolytica. Most uncomplicated amebic liver abscesses can be treated successfully with conservative management, metronidazole, tinidazole, emetine, and dehydroemetine are active in invaded tissues; chloroquine is active only in the liver; tetracycline acts on the bowel wall; and diloxanide furoate, paromomycin, and iodoquinol are luminal agents only. The primary mode of treatment of amoebic liver abscess is medical; however, as many as 15% of amoebic abscesses may be refractory to medical therapy.[5] Also, secondary bacterial infection may complicate 20% of amoebic liver abscesses. In such patients and in patients with pyogenic liver abscesses, surgical drainage has been the traditional mode of treatment.[6] However operative drainage is associated with significant (10-47%) morbidity and mortality. In recent years imaging guided percutaneous drainage using catheters has been increasingly used to treat liver abscesses with reported success rates ranging from 70-100%. Few studies have shown therapeutic needle aspiration to be a simpler and less costly mode of treatment.[7] This study has tried to delineate diagnostic and therapeutic strategies of liver abscesses.

Aims and Objectives

To study a diagnostic and therapeutic strategies of liver abscesses.

MATERIALS AND METHODS

The present study was a prospective observational study conducted from January 2018 to January 2019.The study was done on patients admitted to KIMS, Hubballi. Ethics committee approval had been taken from Karnataka Institute of Medical Sciences Hubballi Ethics Committee (212; 2018-19), held on 22nd January 2018. 46 patients were admitted, diagnosed and treated as cases of liver abscess.

Inclusion Criteria

1. Liver abscess in age group above 12 years.
2. Liver abscess with or without complication in KIMS, Hubballi.

Exclusion Criteria

1. Liver abscess associated with malignancy.
2. Liver abscess associated with immunodeficiency.

Diagnostic criteria for Liver Abscess: As a practical matter, diagnosis of hepatic amoebic abscess is based on sonographic findings, clinical data and laboratory data.

i. Five sonographic features that occur in amoebic liver abscesses.[8]
   1. Absence of significant wall echoes
   2. Round or oval shape, this sonographic feature is more prevalent
   3. Lower echogenicity than normal liver with fine, homogeneous low-level internal echoes at high gains, this sonographic feature is more prevalent
   4. Contiguity with the liver capsule, and
   5. Distal sonic enhancement (through-transmission).

ii. Clinical data suggestive of amoebic liver abscess include right upper quadrant abdominal pain, mild to moderate grade fever, poor general health and hepatomegaly, which is often tender.

iii. Patients show clinical improvement with anti-amoebic drugs (metronidazole) after initiation of therapy.

Diagnostic criteria for Pyogenic Liver Abscess include:

Sonographic features suggestive of pyogenic liver abscesses are.[9]

1. It is less likely to be round or oval.
2. Abscess wall can vary from well- defined to irregular and thick.
3. Less commonly found in contiguity with the diaphragm
4. Multiple abscess more common

II) Isolation of bacteria by culture and sensitivity of pus or blood samples from patients of liver abscess.

III) Patients show clinical improvement to anti-amoebic drugs (metronidazole) after initiation of therapy.

A history was taken from each of these patients and all of them were subjected to a through clinical examination. These patients were then subjected to investigations available within the hospital such as Hb, Tc, ESR, RBS, Blood urea, Serum creatinine, liver function tests (SGOT, SGPT, Serum bilirubin, ALP, serum albumin, total proteins, A:G ratio PT). Ultrasonography of abdomen was done in all cases. Chest X-ray was done in all cases. Pus was sent for gram's stain and culture and sensitivity.

Following diagnosis of liver abscess, patients were treated by conservatively or percutaneous needle aspiration. Percutaneous needle aspiration was done with an l8G spinal needle using ultrasonography. Intravenous antibiotics were started and metronidazole at a dose of 500mg in divided doses. If pus revealed growth of organisms than appropriate antibiotics were given in full course. Follow-up was done as long as patient stayed in hospital and also during subsequent visits. Relapses were noted and repeat aspirations were performed when necessary. Resolution meant ultrasonography showing complete collapse of cavity with no residual abscess.

Sample Size

According to earlier research, the probability of septicaemia was 0.5 (5%). Since Type I error of 0.05 (5%) and probability (power) of 0.80 are

required to reject the null hypothesis, a minimum of 22 subjects are needed.[10]

$$n = \frac{2PQ\left(z_{1-\frac{\alpha}{2}} + z_{1-\beta}\right)^2}{(p)^2}$$

$z_{1-\alpha/2}$ - table values for alpha error of 0.05 (5%) is 1.96

$z_{1-\beta}$ - table values for power of 0.80 (80%) is 0.84

P - (Pooled proportion) $\frac{P_1+P_2}{2} = \frac{0.5+0.37}{2} = 0.435$

Q = 1-P = 1-0.26 = 0.565

Considering the above statistical calculation, we calculated sample size required in this study was 44.

Statistical Analysis

The data were entered after defining the variables in SPSS (version 21) from case record form. Descriptive statistics were used to summarise baseline data. Continuous data such as age, hemoglobin, total leukocyte count, serum sodium, serum creatinine, random blood sugar, C- reactive protein were analysed using student t-test and categorical data such as sex distribution, sites involvement, risk factors, severity, and death were analysed using Chi-square test. Mann Whitney U test was used to analyse ordinal data. Multiple binary logistic regressions were used to determine factors that influenced mortality.

A p-value of less than 0.05 was considered significant.

RESULTS

The study included 46 cases of Liver abscess between January 2018 and January 2019. Following admission, every case was monitored during surgical management and all pertinent information was documented. Post-operative follow-up was done. This was summarized into a master chart. The comparable tabulations permit certain statistical inferences to be made and are presented below.

Heamoglobin less than 10gm% was noted in 14 patients (30.44%). Leucocytosis (>12,000c/cmm) was noted in 12 patients (26.09%). None of the patients were diabetic. The table 1 showed that, abnormal laboratory investigations are not an influencing factor in the presence of Liver abscess, with a p-value of 0.15 (statistically not significant) and a chi-square of 8.109. [Table 1]

In this study total of 46 cases, 12 cases had the bilirubin >2mgm / dl (26%). Alkaline phosphatase was found to be raised in 32 (69.6%) of cases. Hypoalbunemia (< 3 gm/dl) was observed in 30 (65.2%) cases. Increased Prothrombin time > 20sec was seen in 2 (4.3%) of cases. Increased SGOT and SGPT was seen in 18 patients (39%) and 16 patients (34.8%) of the cases in this study. This comparison liver function test (LFT) levels with the presence of liver abscess showed a p-value of 0.451, which was statistically insignificant, which meant that liver function test levels do not correlate with presence of liver abscess. [Table 2]

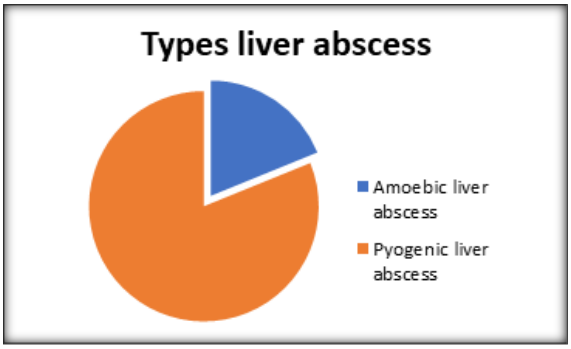

Figure 1: Type of abscess

In this study, Among 46 patients, pyogenic organisms were most common cause of liver abscess (57%), as compared to amoebic liver abscess (43%), with a P value of 0.066. Statistically no significant difference was observed.

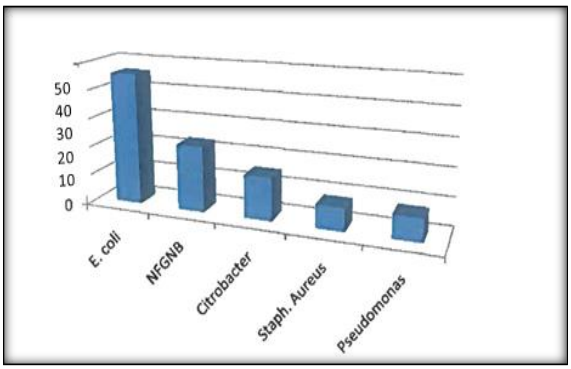

Figure 2: Organisms isolated from Pyogenic Liver Abscess

In this study on culture, E.coli was most common organism isolated in pyogenic liver abscess, in 12 cases (46%), followed by NFGNB in 23%, Citrobacter in 15%, Staph.aureus and Pseudomonas accounting for 8% respectively. In one patient with pyogenic liver abscess, blood culture yielded Klebsiella pneumoniae. This comparison showed that, liver abscess was seen more in patients with isolated organism E-coli, with a p-value of 0.000573, which is statistically significant (chi-square test=80.9).

Chest X-ray showed no radiological abnormality in 22 patients (48%) of all liver abscess. 10 cases (50%) of amoebic liver abscess, chest X-ray showed no radiological abnormality. 12 cases (46%) from pyogenic liver abscess, chest X-ray showed no radiological abnormality. 10 cases (50%) due to amoebic liver abscess showed obliteration of right costo-phrenic angle. 8 cases (31%) from pyogenic etiology showed obliteration of right costophrenic angle. Bilateral pleural effusion was seen in 6 cases (23%) of Pyogenic liver abscess. X-ray findings

showed a p-value of 0.057, which was statistically not significant. [Table 4]

Ultrasound examination was done in all cases. It showed evidence of abscess in liver in all the cases. Liver abscess most commonly involved right lobe in 40 patients (87%), followed by left lobe in 4 patients (9%) and both lobes in 2 patients (4%). Amoebic and pyogenic liver abscess most commonly involved right lobe in 18 patients (90%) and 22 patients (85%) respectively. Both lobe involvements was not seen with amoebic but 2 patients (8%) with pyogenic liver abscess had both lobe involvement. A p-value of 0.0871, statistically not significant difference was observed. [Table 5]

38 patients (83%) showed solitary abscess, 2patients (4%) showed two abscess and 6 patients (13%) showed multiple abscess. 16 patients (80%) and 22 patients (85%) of amoebic and pyogenic liver abscess showed solitary abscess. Two abscesses were seen in a patient of amoebic liver abscess. Multiple abscesses were more commonly seen in pyogenic (15%) then amoebic (l0%). This comparison evaluated that, number of lesions with the liver abscess showed a p-value of 0.371, which was statistically insignificant. [Table 6]

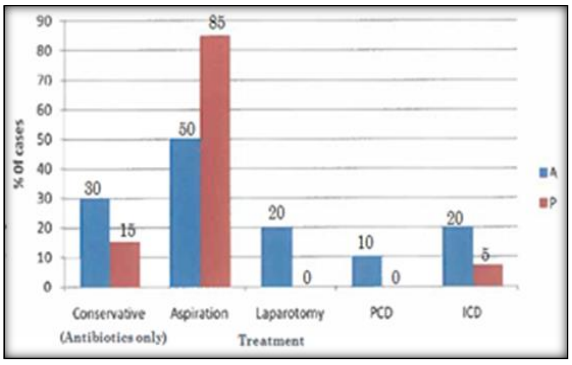

Figure 3: Analysis of treatment

Most common treatment used in this study for liver abscess was USG guided aspiration in 16 patients (70%) of liver abscess followed by conservative treatment in 10 patients (21%), Right ICD (inter coastal drainage) insertion in 6 patients (13%) and PCD (percutaneous catheter drainage) in 2 patients (4%). Most common treatment used in Amoebic and Pyogenic liver abscess was aspiration in 10 patients (50%) and 22 patients (85%) respectively. Statistically significant are the Chi-square statistics (70%) and (21%) with P < 0.0039 and < 0.0016 respectively.

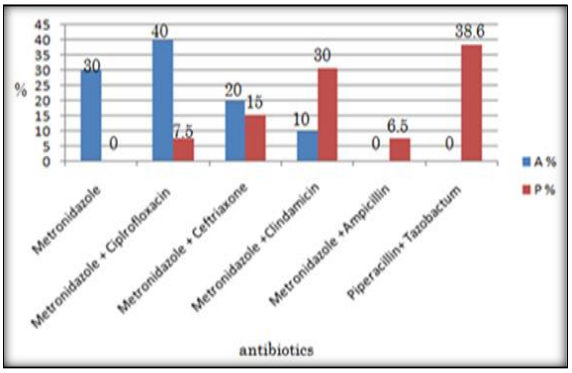

Figure 4: Usage of antiobiotics

Most common antibiotic used in this study for Amoebic liver abscess was Metronidazole combined with ciprofloxacin in 18 patients (40%). Most common antibiotic used in Pyogenic liver abscess was Piperacillin combined with Tazobactum 16 patients (38.6%).

In this study 16 patients (35%) required 49 - 64 days treatment for complete resolution of liver abscess cavity. The maximum duration of follow-up required for complete resolution of Amoebic and Pyogenic liver abscess cavity was 49 - 64 days in 8 patients (40%) and 33 - 48 days and 49 — 64 days in 8 patients (31%) each respectively, with a mean (SD) of 7.65 (7.37) days and a median of 5 (4-7) days. [Table 7]

In this study, incidence of complication in liver abscess was 69.6%. Right sided pleural effusion (38%) was most common complication associated with liver abscess. Right sided pleural effusion (38%) was most common complication associated with liver abscess. Most common complication of liver abscess was Pleural effusion in 24 patients (52.2%). Most common complication in amoebic liver abscess was pleural effusion in 10 patients (50%) followed by rupture into peritoneum (20%) and secondary bacterial infection in 2 patients (10%). [Table 8]

In this study Mortality rate associated with liver abscess was 4.35%. There was no mortality associated with amoebic liver abscess. [Table 9]

Table 1: Abnormal laboratory investigations

Investiations	No. of patients	%
Anemia (Hb< 10 gm%)	14	30.44
Leucocytosis (>12,000c/cmm)	12	26.09
Diabetic (RBS > 200c/mgm/dl)	0	0

Table 2: Analysis of Liver function test (LFT)

(Tests) Serum Bilirubin	No. of patients	%
< 1	16	34.78
1.1-2	18	39.13
2.1-4	10	21.74
4.1-6	2	4.35
ALP(Alkalinephosphatase)(>115 IU/L)	32	69.6

Hypoalbunimia (<3gm/dl)	30	65.2
Increased PT time (+20 sec)	2	4.3
Increased SGOT (> 60 IU/I)	18	39
Increased SGPT (>60 IU/L)	16	34.8

Table 3: Types of abscess

Type of abscess	No. of patients	%
Amoebic liver abscess	20	43
Pyogenic liver abscess	26	57

Table 4: Chest X-ray

Chest X-ray	No. of Patients	Type of Abscess				
		%	A	%	P	%
No radiological abnormality	22	48	10	50	12	46
Right pleural effusion	18	39	10	50	8	31
Bilateral pleural effusion	6	13	0	0	6	23

Table 5: Ultrasound Examination

Lobe	No. of patients	%	Types of abscess with lobe involved			
			A	%	P	%
Right Lobe	40	87	18	90	22	85
Left Lobe	4	9	2	10	2	8
Both Lobe	2	4	0	0	2	8

Lobe involvement

Table 6: Number of lesions

No. of lesions	No. of patients	%	Type of abscess			
			A	%	P	%
1	38	83	16	80	22	85
2	2	4	2	10	0	0
Multiple	6	13	2	10	4	15

Table 7: Duration of Follow-up

Duration (days)	No. of patients	%	Type of abscess			
			A	%	P	%
0-16	4	9	2	10	2	8
17-32	10	22	4	20	6	23
33-48	12	26	4	20	8	31
49-64	16	35	8	40	8	31
65-80	4	9	2	10	2	8

Table 8: Complications

Complications	No. of Patients	%
Septicemia	2	8
Right Pleural effusion only	10	3
Rupture in to peritoneum and Right Pleural Effusion	2	8
Rupture in to Right Pleural space	2	8
Rupture in to peritoneum and Right pleural space	2	8
Bilateral pleural effusion	6	2
Rupture in to Right Pleural space and Secondary bacterial infection of liver abscess	2	8

Table 9: Mortality

Total patient with liver abscess	46	%
Surviving	44	95.65
Death due to liver abscess	2	4.35

DISCUSSION

Analysis of laboratory investigation

In this study, anaemia was noted in 14 patients (30.44%). Leucocytosis (>12,000c/cmm) was noted in 12 patients (26%). In study done by Hyo Min Yoo et al, anemia was seen in 23% and leucoytosis in 83% of cases.[11]

Analysis of liver function tests

In this study 12 cases had the bilirubin >2mgm / d1 (26%). According to Jha AK et a1, incidence of bilirubin > 2mg in liver abscesses was 22%. In this study, alkaline phosphatase was found to be raised in 32 (69.6%) of cases. Hypoalbunemia (< 3 gm/d1) was observed in 30 (65.2%) cases. Increased SGOT and SGPT was seen in 18 patients (39%) and 16 patients (34.8%) of the cases in this study.[12] In

study done by Edwin J et al, alkaline phosphatase was found to be raised in 83% of cases. Hypoalbunemia (< 3 gm/dl) was observed in 55% cases. Increased SGOT and SGPT was seen in 21% and 20% of the cases.[13]

Types of liver abscess

In this study pyogenic organisms were most common cause of liver abscess (57%), as compared to amoebic liver abscess (43%). According to Lee HL et al, pyogenic liver abscess accounted for 69.6% as compared to amoebic liver abscess 30.4% of cases.[14]

PUS culture Analysis

In this study pyogenic organisms were most common cause of liver abscess (57%), as compared to amoebic liver abscess (43%). In this study E.coli was most common organism isolated in pyogenic liver abscess, in 14 cases (54%), followed by NFGNB in 23%, Citrobacter in 15%, Staph.aureus, Pseudomonas, P.vulgaris And Klebsiella accounting for 8% of cases each. According to Geo F B et al, pyogenic liver abscess accounted for 69.6% as compared to amoebic liver abscess 30.4% of cases.[15] E.coli was most frequently found organism (30%). Other common organisms were Klebsiella (13%), Proteus (9%), Staphylococcus coagulase positive (8%) and alpha streptococcus (6%). According to Jia D et al the most common organism identified was Klebsiella spp. (19.1%), followed by Escherichia coli (12.8%).[16]

Lobe involvement

According to Ewa K et al, multiplicity is common in pyogenic liver abscess. Lobe involvement was common in pyogenic liver abscess.[17]

Treatment

In this study, common antibiotics prescribed were metronidazole, metronidazole + ciplrofloxacin, metronidazole + ceftriaxone, metronidazole + clindamicin, metronidazole + ampicillin and piperacillin+ tazobactum. According to Lubbert C et al, the antibiotic therapy should consist of a combination of an aminoglycoside with either metronidazole or clindamycin, or a beta lactam antibiotic with anaerobic coverage.[18]

Most common treatment used in this study for liver abscess was USG guided aspiration in 32 patients (70%) of liver abscess. According to M P Sharma et al, most common treatment used for treatment of liver abscess was USG guided aspiration of abscess cavity (87%).[19]

Complications

In this study, incidence of complication in liver abscess was 69.6%. Most common complication of liver abscess was Pleural effusion in 24 patients (52.2%). Incidence of complication in amoebic and pyogenic liver abscess was 80% and 61.5% respectively. Most common complication in amoebic and pyogenic liver abscess was pleural effusion in 10 patients (50%) and 14 patients (53.8%) respectively. According to Roland A et al, incidence of complication was 59%. The common complications were pulmonary (56%) and peritonitis (7%). Total incidence of complications in amoebic and pyogenic liver abscess was 44% and 66% respectively. Pulmonary and peritoneal complication in amoebic liver abscess was 44% and 4 %. Pulmonary and peritoneal complication in pyogenic liver abscess was 57% and 5 % respectively.[20]

Mortality

In this study mortality was 4.35%. There was no mortality associated with amoebic liver abscess. Pyogenic liver abscess was associated with 7.7% of mortality. There was no recurrence. According to Viroj W et al, overall mortality rate was 11%. The mortality of pyogenic liver abscess (17%) was significantly higher than that of amoebic liver abscess (3%). The recurrence rate was 7% for all cases.[21]

Limitation(S): This was a single institutional study

CONCLUSION

Alkaline phosphatase is the most consistently elevated, abnormal liver function test in cases of liver abscesses. Liver abscess usually present as a solitary abscess most commonly in the right lobe of liver. Clinical features, USG of abdomen and Culture and sensitivity of abscess helps to differentiate between amoebic and pyogenic liver abscess. In tropical countries like India, due to recurrent amoebic infections, serology for amoebias is cannot be considered as diagnostic tool to differentiate it from pyogenic liver abscess. Most of the liver abscesses required USG guided aspiration for their management. 100% resolution of abscess cavity can be obtained with USG guided aspiration of abscess cavity.

Liver abscess is still a disease associated with morbidity and mortality. Pulmonary complications, septicemia, secondary bacterial infection and intra peritoneal rupture are the complications that can occur. Mortality rate in this study was 4.35%.

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