



General Surgery

PREDICTORS FOR RUPTURE OF LIVER ABSCESS – A PROSPECTIVE STUDY OF 70 CASES

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ABSTRACT

Introduction : Liver abscess is a morbid disease when complicated. The most frequent and serious complication is rupture. It may further cause peritonitis and cause morbidity. Hence, our aim is to identify the predictive risk factors of rupture of liver abscess at a tertiary Centre. **Material and methods :** This is a prospective observational and analytical study within a study period of December 2021 to December 2022 with a total study population of 70 patients. Patients of all ages are included in the study. **Results :** A total of 70 cases are taken in the study out of which 37 cases (54.2%) are pyogenic abscess and 28 cases (40%) are amoebic abscess. We had 18 cases (26%) of rupture. The mean age of patients was 30 +/- 15 years. The sex ratio of M:F is 3:7. The mean time at presentation was 18 +/- 5 days. Most of the abscess were located in right lobe of liver about three fourths as in 75%, the left lobe abscess were less frequent as in 10% and bilobar abscess were found in 15%. The mean diameter of abscesses was 8 +/- 7 cms (range- 3.3 -15 cms). The abscesses were solitary in 85% patients while sub-capsular were identified in 15% cases. Gas in the abscess identified in 6% of cases. The most probable risk factors determined to be the predictors of rupture of liver abscess on multivariate analysis are as follows: the pyogenic abscess ($P < 0.001$); abscess diameter ($P = 0.004$); left lobe localized abscess ($P < 0.001$) and sub-capsular location ($P = 0.017$). **Conclusion:** According to this study, the predictive risk factors of rupture of liver abscess are: the pyogenic origin, abscess diameter, left lobe abscesses and sub-capsular location of the abscess. By these risk factors it's easy to avoid the complications of liver abscesses as rupture and for providing early and appropriate management modalities.

KEYWORDS :**INTRODUCTION :**

Liver abscess can be defined as a suppurated collection in the hepatic parenchyma that may be of bacterial, parasitic or fungal. The most common complication is the rupture which is estimated to be 2.7 to 17%. It's a morbid disease in absence of treatment or delayed diagnosis. Rupture into peritoneal cavity is a common and morbid complication requiring emergency surgery. Sometimes, rupture into pleural cavity or pericardium may lead to increased mortality risk. The liver abscess most commonly may be due to pyogenic origin or amoebic origin on culture and sensitivity testing of the abscess fluid. Radiological findings are major deciding essentials in planning the management of liver abscess. Also, minimally invasive techniques as conservative percutaneous drainage of abscess or pig tail insertion with antibiotic therapy became the most frequent management option in safe abscesses found based on predictive risk factors. Our aim is to determine these predictive risk factors of liver abscess at a tertiary centre.

MATERIALS AND METHODS :

This is a prospective observational and analytical study done within a study period of December 2021 to December 2022 on a total of 70 patients with liver abscess.

Study is done at NRI General Hospital, Mangalagiri in the department of General Surgery.

The patients who had liver abscess on radiological, clinical biological findings (on bacteriology, amoebic serological, ultrasonography or CT scan) are included in this study.

The variables observed to determine the risk factors are –

- Epidemiology aspects - frequency, age, sex
- Clinical signs and symptoms – abdominal pain, fever, jaundice, hepatomegaly
- Comorbidities – diabetes, alcoholism, cirrhosis of liver (liver disease), malnourishment
- Laboratory findings- anemia, leukocytosis, hepatic cytolysis, hyperbilirubinemia.
- Ethology – bacterial or amoebic or fungal
- Imaging findings- diameter of abscess, presence of gas, location, lobularity, number

- Treatment modality- surgical, conservative or percutaneous drainage
- Outcomes- favorable, recurrence, death.

RESULTS :

In this study, 70 patients were studied over a period of 12 months. The mean age was 30 years +/- 15. The sex ratio of M:F was 3:7. The mean time of first presentation or consultation was 18 +/- 5 days. The incidence of amoebic abscess was 40% in 28 cases and of pyogenic was 54.2% as in 37 cases. The location of abscess in right lobe was in 75% and in left lobe in 10% where as the rest was 15%. The range of diameter of abscesses identified was 3.3 to 15 cms with a mean of 8 +/- 7 cms. The abscesses which are subcapsularly located were 15% where as solitary abscesses were in 85% of cases. Gas in abscess was found in 6% of total liver abscesses. The most common organism was *Staphylococcus aureus* in 15% of cases.

Liver abscess ruptured in 18 cases i.e., 26% of all cases. Different radiological investigations were done to confirm all the variables of liver abscesses as ultrasonography is done in all the cases as in 100% and further details were obtained through CT scan as in 40% i.e., in 28 cases. Chest radiography were done in 36.2% cases and plain abdominal radiography were done in 40% cases.

All the patients were treated with medical conservative therapy along with or without percutaneous drainage of abscess was done according to the diameter of abscess or liquefaction of abscess.

Empirical Antibiotic therapy with Metronidazole 800mg TID, Amoxycillin- Clavulanic acid 1.2mg BD, and secondarily it was treated according to culture sensitivity. Sometimes, Chloroquine was also administered at a dosage of 16mg/kg with dose tapering for every 3 days.

The different treatment modalities done were :

Table 1: different modalities of treatment in the study population

Treatment	Number	Percentage (%)
Medical therapy alone	32	45.7
Percutaneous drainage	18	36

Chest drainage + percutaneous drainage	2	2.8
Surgery	18	36
Total	70	100

The mortality was 1.4% as in 1 patient. The cause of mortality was due to inferior vena cava thrombosis leading to pulmonary embolism and severe sepsis.

Univariate analysis done comparing the patients who were divided into 2 groups as ruptured abscess and unruptured abscesses as follows:

Table 2: Predictive risk factors for rupture of liver abscess in study population

Parameters	Ruptured abscess(26%)	Unruptured abscess(74%)	P value
Age	22(61.1%)	27(26.4%)	<0.001
Pyogenic origin	15(41.7%)	30(58.3%)	<0.001
Clinical findings-			
Right hypochondrium pain	18(100%)	50(96.5%)	0.573
Fever	17(94.9%)	47(90.4%)	0.407
Jaundice	4(23.3%)	3(5.7%)	0.009
Hepatomegaly	6(33.3%)	50(96.5%)	<0.001
Comorbidities			
Diabetes	4(23.3%)	30(58.3%)	0.089
Alcoholism	4(23.3%)	10(19.6%)	0.698
CLD/Cirrhosis	1(5.5%)	3(5.7%)	0.942
Undernourished	10(56%)	13(25%)	<0.001
Laboratory findings			
Leukocytosis	17(94.9%)	43(82.7%)	0.076
Anemia	13(72.2%)	38(73.1%)	0.879
Hyperbilirubinemia	15(83.4%)	37(71.1%)	0.089
Hypoalbuminemia	5(27.8%)	8(15.4%)	0.111
Radiological findings			
Diameter (Mean +/- S.D)	9.1 +/- 1.6	7.6 +/- 2.8	0.004
Left lobar	4(23.3%)	2(3.9%)	0.006
Sub-capsular location	7(38.9%)	4(7.7%)	<0.001
Gas presence	5(27.8%)	0(0%)	<0.001

DISCUSSION :

Liver abscess is defined as a suppurative encapsulated collection in the hepatic parenchyma that may be bacterial, parasitic or fungal. Delayed diagnosis or consultation is associated with occurrence of complications. Ruptured liver abscess is the most common and morbid and mortal complication of this condition. In literature, several risk factors were mentioned which helps in the planning and treatment i.e., either medical treatment alone or percutaneous drainage or open intervention. But only some factors as origin of abscess are most studied in the literature. So, it's important to know the predictive factors for rupture for early diagnosis and early intervention to prevent further complications. The predictors which were mainly studied in this study are :

Diameter of the abscess:

Diameter is regarded as a risk factor for rupture in the vast majority of series in the literature. In the Dieng and Gupta series, drainage was only performed for abscesses more than 10 cm in diameter. As per the theory, the higher the diameter the more chances of the abscess to rupture. This alone is followed by some surgeons to choose between the medical management alone or to drain the abscess percutaneously. The threshold to rupture is different in different abscess which is also based on other predictors mainly as they are variable in amoebic and pyogenic originated abscesses. The mean diameter of abscesses in this study is 8.04cms, with 25.4% of abscess with more than 10cms.

In this study, the diameter of abscess was found to be the most important predictor but not only the predictor for rupture ($p=0.004$). The mean diameter according to our study for rupture was found out to be 9.1 +/- 1.6 cms where as in other literatures it is found to be greater than 6 cms by Jun et al study ($P=0.002$). Several other studies show that the diameter of abscess as a predictive measure for medical therapy failure.

Localisation of abscess:

In our study, the presence of an abscess in the left lobe was regarded as another predictive risk factor for rupture. In the literature, this had been described as the volume of the left lobe is the factor making the abscess to expose more for rupture. Although the right lobe abscesses are higher in number and to rupture but the incidence of rupture to prevalence of abscess in left lobe is higher showing it to be a predominant predictive risk factor. In our study, among the 6 cases, 4 left lobar abscesses ruptured proving it to be a notable risk factor.

Another predominant factor in localisation is sub capsular abscess location i.e., among the 11 cases, 7 abscesses in sub capsular location ruptured and lead to peritonitis needing open surgery making it another predominant predictive risk factor.

Origin of abscess:

Pyogenic and amoebic are the 2 most prevalent causes of liver abscesses. The knowledge on the origin is important for treatment protocol, antibiotic coverage and prognosis. In our study, pyogenic abscesses were in 54.2% i.e., 37 cases and amoebic were in 40% i.e., 28 patients and most ruptured abscesses are of pyogenic origin as 15 cases of 18 ruptured cases. Thus according to this study, pyogenic origin is considered as an important risk factor for rupture ($P<0.001$).

It mainly depends on the pathophysiology as, in amoebic abscess the trophozoites of pathogenic strains of *Entamoeba histolytica* that enter the liver through the portal vein colonise the liver. It results in hepatic parenchymal necrosis, which frequently results in a solitary cavity. This slower rate of progression shows its lower propensity of rupture. And in pyogenic abscess, arises when a germ enters the liver through the portal vein or the hepatic artery, or it may develop as a result of biliary blockage. This growth inducing the destruction of the parenchyma forms a purulent collection. The active infection caused by bacterial growth encourages rupture to occur.

Gas in the abscess:

Gas in the abscess cavity was also found to be responsible for rupture as the 5 cases with identified gas on radiological investigations were found to be ruptured. The gas in abscess is due to gas forming organism i.e., clostridium is identified in the microbiological testing. This presence of gas is also found to be considerable predictive risk factor in our study ($P<0.001$).

LIMITATIONS :

The main limitations of this study are :

- Shorter duration of study, as with more duration the analysis may vary.
- Hospital based study
- Low study population.

CONCLUSION :

In our study, 4 variables are identified as predominant predictors to know the rupture of liver abscess as : diameter of abscess more than 8cms ($P=0.004$), left lobe localisation ($P<0.001$) and sub capsular localisation ($P=0.017$) hence the location of abscess, pyogenic origin ($P<0.001$) and presence of gas ($P<0.001$). Independently they may be predict rupture but combined the chances of rupture are higher. This helps in early intervention, to guide the management modality and prevention of fatal mortality of patients, thus reducing morbidity and mortality of this condition.

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