



A STUDY OF PREDICTORS FOR IDENTIFICATION OF RISK OF COMPLICATIONS IN PATIENTS WITH LIVER ABSCESS IN VINDHYA REGION

General Surgery

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ABSTRACT

Introduction: Liver abscess can be defined as an infectious space occupying lesion of the liver. As India is a one of the tropical countries and home to 400 million people harboring *E. histolytica*, the causative organism of amoebic liver abscess, it is important to thoroughly understand of the liver abscess. It is caused by *Entamoeba histolytica* infestation. 3-9% Patients with amoebiasis may have amoebic liver disease. The amoebic liver tumor is more common in males but the pyogenic liver tumor has similar incidence of sex.

Methods: Approximate 100 cases, above 14 years of age, irrespective of sex, getting admitted through SOPD, casualty or transferred from other department diagnosed as liver abscess or based on clinical suspicion, during the period of study were included in the study. All patients were thoroughly examined and case sheets were written in same set pattern to facilitate later comparison and written consent was obtained from all the patients for our study.

Result: Mean age of our study group (cases) was found to be 43.45. Male: female ratio was found to be 6.12:1. The various parameters used in our study for develop scoring system are: age >50 years, duration of onset, history of alcoholism (5 to 10 years or more than 10 years), total leukocyte count (>15000/cumm), bilirubin (>1.5mg/dl), INR (>1.5), total Sr. albumin (3gm/dl), number of abscess cavity, total volume of cavity, pleural effusion if present on xray, diabetic status. Each parameter was assigned one point except for history of alcoholism more than 10 years, total leukocyte count >15000/cumm and multiple abscesses each of which was given 0 to 2 points.

Conclusion: Scoring systems can be introduced in any institution and can be incorporated into the management protocols of liver abscess.

KEYWORDS

Liver abscess, *Entamoeba histolytica*, amoebic liver abscess, pyogenic liver abscess.

INTRODUCTION

Liver abscess can be defined as an infectious space occupying lesion of the liver. It remains the most common type of visceral abscesses, because liver is subjected to numerous viral, bacterial, parasitic infections through portal circulation. It is caused by *Entamoeba histolytica* infestation. 3-9% Patients with amoebiasis may have amoebic liver disease. It affects younger people compared to pyogenic liver disease. The amoebic liver tumor is more common in males but the pyogenic liver tumor has similar incidence of sex.^(1,2,3) Large abscesses are seen mainly in the amoebic liver abscess.¹

Due to the rise in incidence in alcoholism, diabetes & immune compromised status, liver abscess becomes a matter of grave concern as complication rates are high especially in this sub-group, leading to increased morbidity and mortality. Liver abscess may even present with complications such as intra-abdominal rupture and peritonitis, septic shock, cholangitis, pericardial rupture or even death.

Ultrasonography is the main modality to diagnose the liver abscess. Abdominal CT scan can detect an abscess less than 0.5 cm. Serological examination confirms the diagnosis. Amoebic liver tumor while the culture of redness and sensitivity confirms pyogenic etiology. The main mode of treatment in amoebic liver abscess is medical management.

Antibiotics are the basis of the effective therapy for pyogenic liver abscess. The biggest change in the treatment of pyogenic liver tumor has been the emergence of ultrasonography guided drainage. In pyogenic liver abscess the main treatment should be drainage method and antimicrobials.³

With rural public constituting about 70 percent of India's population and keeping in mind all the above mentioned facts along with the fact that early diagnose and treatment can markedly decrease the morbidity and mortality has inspired me to choose Liver abscess as my thesis topic which supposedly has much importance in our country. Aim of the study, the various predictors that help in identification of risk factors of complications for liver abscess. To study various etiology associated with liver abscess evaluate laboratory investigation profile. Design a scoring system and correlate it with the risk of developing complications. To evaluate efficacy, morbidity, duration of hospital

stay, mortality associated with various modes of treatment based on the predictors and scoring system.

MATERIAL AND METHODS

The prospective study was carried out on patients admitted in surgical wards of Sanjay Gandhi Memorial Hospital associated with S.S. Medical College, Rewa (M.P.) during the period of February 2020 to July 2021 (18 months) with 100 cases, above 14 years of age, irrespective of sex, getting admitted through SOPD, casualty or transferred from other department diagnosed as liver abscess or based on clinical suspicion, during the period of study were included in the study.

Inclusion Criteria:

1. All cases of liver abscess from 15 to 75 years of age diagnosed clinically and Ultrasonographically.

Exclusion Criteria:

1. complicated hydatid cyst/ Traumatic or ruptured Liver abscess
2. Immuno-compromised patients.

Patient Data Collection:

- The patients will be evaluated according to the protocol. On admission detailed history and clinical examination will be conducted.
- The data will be noted on a predesigned proforma.
- Baseline investigations like complete blood count, serum urea/ creatinine, blood sugar (random, fasting, post-prandial), liver function tests, coagulation profile, urine (routine, microscopy), stool (routine, microscopy), HCV, HBsAg tests and CXR will be noted.
- Abdominal ultrasonography will be done to confirm diagnosis.
- Risk of complications will be assessed after calculating the scores of predictive factors
- Patient will be put on appropriate iv antibiotics, and followed up daily clinically.
- Patient will be informed about any surgical procedure and consent will be taken.
- Treatment to be undertaken will be decided upon the Pre-designed scoring system.

Predictive score for risk of complication in a patient with liver abscess

Factors	Standard score
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	25

Age>50	1
History of alcoholism	2
>10years	1
>5years(5 to 10years)	
Onset	
<10d	1
>10d	0
TLC>15000/cumm	2
Sr. albumin <3 gm/dl	1
Sr. bilirubin >1.5mg/dl	1
INR >1.5	1
Pleural effusion on CXR	1
Solitary abscess	1
Subcapsular location of abscess/bilobar/multiple abscess on USG	2
Size of abscess	
<150cc	0
>150cc	1
Diabetic status(known cases or newly diagnosed)	1
Total	15

Sample Size:

Approximate 100 patients during period of study as per hospital admission rate.

Procedure Plan:

Approximately 100 cases of liver abscess diagnosed clinically or sonographically, will be predicted for developing risk of complications and administered conservative or interventional management based on the scoring system.

Methods of Collection of Data

All patients were thoroughly examined and case sheets were written in same set pattern to facilitate later comparison and written consent was obtained from all the patients for our study.

All of them are investigated with ultrasonogram treatment proceeded and pus culture and sensitivity was done and were diagnosed either as pyogenic or amoebic liver abscess.

The following aspects are studied:

Age, Sex, Type of the Abscess, Site of the Abscess, Symptoms, Signs, Treatment Modalities, 50% Reduction of the Abscess Cavity, Duration of Hospital Stay, Secondary Procedure Done, Complications and Recovery Rate.

100 patients were selected and divided into 3 groups based on the scores obtained:

- Group I was treated with Drugs alone
- Group II was treated with ultrasound guided needle aspiration along with drugs. Maximum of two times repeated aspiration was done.
- Group III was treated with percutaneous catheter drainage (closed tube drainage) along with drugs in most of the cases either as primary intervention or after failed attempts of USG guided needle aspiration.

Treatment Outcomes:

Treatment outcomes were based on whether the cases got cured/relieved/ expired.

Following parameters were taken into account to decide the outcome:

- Clinical relief from symptoms/ Clinical improvement was monitored.
- Proper follow up was taken during the course of hospital stay in the form of investigations.
- Average number of days of hospitalization was observed.

Statistical Analysis:

The chi square test was used to analyse the correlation of various factors with the development of complications. A non-paired student's t test was used to assess difference in time needed for clinical improvement of cases, hospital stay of patients. A p value of <0.05 was considered statistically significant with a confidence level of 95%.

RESULTS:

Table 1- Age Distribution Relationship Between Age Distribution And Occurrence Of Liver Abscess

AGE	NO. OF CASES	TOTAL CASES	TOTAL CASES WITH COMPLICATIONS (n)	PERCENTAGE OF CASES DEVELOPING COMPLICATIONS
15 TO 25 YEARS	15	100	0	0
26 TO 35 YEARS	19		6	31.5
36 TO 45 YEARS	23		11	47.8
46 TO 55 YEARS	18		14	77.7
56 TO 65 YEARS	18		11	61.1
66 TO 75 YEARS	7		4	57.1

In our study of 100 liver abscess subjects, patients were chosen from age groups ranging from 15 years to 75 years. In our study it was seen that between the age group 56 to 65 years, around 61% of the cases developed complications followed by 47.8% cases of liver abscess developing complications between the age group 36 years to 45 years, age group between 46 to 55 years had maximum number of cases (78.4%) cases developing complications. It was seen that between 15 to 25 years, there was no complications seen. It can be seen in our study that above 50 years of age, 71.7% cases (n=28) developed complications. **(Table-1)** Male to female ratio in this study is 6.12:1. History of alcohol consumption was seen in 57% cases, all of which were male patients. **(Graph 1)** 68 Percent cases with history of consumption between 5 to 10 years developed complications. In subjects with more than 10 years of alcohol consumption, 67% cases developed complications. **(Graph 2)**

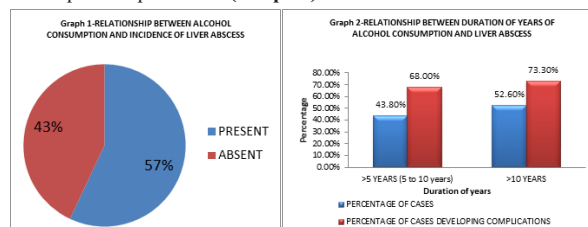


Table 2- Relationship Between Score And Management Mode

TOTAL SCORE	No. of cases	MODE OF MANAGEMENT
0-3	14	ANTIBIOTICS ALONE
4-8	44	ANTIBIOTICS WITH USG GUIDED NEEDLE ASPIRATION(IN SELECTED CASES)
9-15	42	USG GUIDED PIGTAIL CATHETERISATION AND/OR USG GUIDED NEEDLE ASPIRATION UNDER ANTIBIOTIC COVERAGE

In our study of 100 cases, a total score ≤ 3 : antibiotics alone were the main modality of treatment, Scores 4 to 8: USG guided aspiration was done in selected cases with antibiotic coverage, Scores 9 to 15: USG guided pigtail catheterization and or USG guided aspiration was done in all cases with antibiotic coverage. In our study, conservative management with antibiotics alone was done in 14 cases (14 percent) Intervention was done in total 86 cases : USG guided needle aspiration in 44 cases (51.16 percent) USG guided pigtail catheterization in 42 cases (48.83 percent) **(Table-2)**

Table 3- Relationship Between Total Score & List Of Complications And Number Of Patients Developing It

COMPLICATIONS	TOTAL CASES	PERCENTAGE OF CASES DEVELOPING COMPLICATIONS	TOTAL SCORE
INTRAABDOMINAL RUPTURE & PERITONITIS	1	2.04%	13
CHOLANGITIS	3	6.1%	12 to 15
RUPTURE INTO PLEURAL CAVITY	43	63.2%	4 to 14
SEPTIC SHOCK	10	20.4%	5 to 15
PERICARDIAL RUPTURE	4	8.16%	13 to 15

DEATH	0	0	0
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In our study of 100 cases, 49 cases were found to have developed complications. There were no deaths reported. The greater the score, more severe is the complication associated with it. (**Table-3**) In cases with diabetes (49 percent), 73.4 percent cases developed complications in our study. In non diabetics (51 percent), only 21.5 percent cases developed complications. In our study of 100 cases, 67 percent cases of liver abscess had amoebic etiology and 33 percent had pyogenic etiology. (**Graph-3 & 4**)

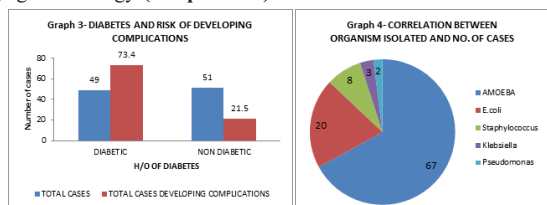


Table 4- Correlation Between Scoring And Development Of Complications

RANGE OF SCORE	NO. OF TOTAL PATIENTS	NO. OF COMPLICATED CASES	PERCENTAGE OF CASES DEVELOPING COMPLICATIONS	CLINICAL SIGNIFICANCE
0-3	11	0	0	Zero/minimum chances of developing complication
4-8	45	8	17.7%	Moderate chance of developing complications
9-15	44	39	88.6%	Maximum chances of developing complications

In our study of 100 cases, 44 percent cases had a score ranging from 9 to 15 with a total of 39 cases (88.6 percent) developing complications which implies that greater the score more is the chance of developing complications. 45 percent cases with score ranging from 4 to 8 had a total of 8 cases with complication (17.7 percent) that is there are some chances of developing complications. Cases with score ranging from 0 to 3 with total of 11 percent cases didn't develop any complications which mean there are almost zero chances of developing complications with lower score.

DISCUSSION

The various parameters used in our study for develop scoring system are: age >50 years, duration of onset, history of alcoholism (5to 10 years or more than 10 years), total leukocyte count(>15000/cumm), bilirubin(>1.5mg/dl), INR(>1.5), total Sr. albumin,(3gm/dl), number of abscess cavity, total volume of cavity, pleural effusion if present on xray, diabetic status. Each parameter was assigned one point except for history of alcoholism more than 10 years, total leukocyte count >15000/cumm and multiple abscesses each of which was given 0 to 2 points.

Age:

In our study of 100 cases of liver abscess, majority of the cases belonged to the age group 36 years to 45 years. Almost similar finding was seen by Sukhjeet et al⁴ in their work in 2013 where most of the cases belonged to third and fourth decade.

In a study done by Navneet Sharma et al⁵ on Amoebic Liver abscess of 86 cases, the mean age of the patients was found to be 40.5+- 2.1 years.

Overall, It can be seen in our study that above 50 years of age, 79.79 % cases (n= 28) developed complications as compared to only 29.5 % cases (n=18) developing complications in age<50 years.

In study done by Satish et al⁶, it was seen that after 50 years of age, 87.5% cases developed complications.

Therefore it can be predicted that higher age groups are more prone to developing complications.

Gender:

In our study of 100 cases, majority of the cases were males, 86 % and

only 14% were females. Male to female ratio was found to be 6.12:1

Similar results were seen in study done by Sourabh Sharma et al⁷ in 200 cases of liver abscess wherein ratio of male: female was found to be 13.3:1

The age predilection and gender differences can be due to difference in iron stores in body. In a study done by Makkar et al⁸, the liver iron store was found to be raised in cases of amoebic liver abscess, irrespective of alcohol consumption. There was a positive correlation between alcohol consumption and level of iron in body in cases of liver abscess. Also as a result of regular blood loss in menstruating female, there are low body stores of iron, which makes it unsuitable for E. histolytica to grow in women, thereby acting as a protective factor. Recently there has been improvement in general family status and nutritional habits in female, thereby increasing incidence of liver abscess in female.

Alcoholism:

History of alcohol consumption was found in 58 % cases, of which 43 % had history of intake for 5 to 10 years and 51 % had history of intake for more than 10 years. The risk of development of complications in a case of liver abscess in a chronic alcoholic (>10 years) was found to be 73.3 % whereas 68 % cases with history of consumption between 5 to 10 years developed complications.

All cases were males. In a study by Saha et al⁹ 2010, 61% cases had history of alcoholism similar to our studies.

Ghosh et al¹⁰ (2018) have reported that alcohol suppresses the function of Kupffer cells in the liver that is otherwise responsible for clearing of bacteria and amoeba.

Similar results were suggested by Raja and Karthik¹¹ (2016) that the invasive capacity of E. histolytica is facilitated by alcohol which is harmful to liver and by nutritional deficiencies leading to higher incidence of liver abscess in alcoholics.

Clinical Symptoms:

Most common symptom which cases presented with was abdominal pain, which was found in almost all of the cases followed by fever and loss of appetite.

The findings were in correspondence to other studies where also most common presenting symptom was found to be abdominal pain in right side upper quadrant of abdomen. In a study done by Singh et al¹² (2013), weakness (90%) and Fever (88%) were second and third common symptom.

In our study 26% had complaint of nausea and vomiting which was the fourth common symptom.

Only 9 % cases had diarrhoea as the symptom.

Respiratory distress and cough was found in cases presenting with pleural effusion.

As per previous studies, in cases with pyogenic liver abscess, most common symptom was found to be fever with chills. In amoebic liver abscess fatigue was the most common symptom.

Recurrence And Risk Of Complications:

In our study, it is found that in cases with recurrence, risk of developing complications was 100%. All the cases those who had history of liver abscess previously or had been admitted previously for liver abscess, had developed complications in the current study.

Diabetic History And Risk Of Developing Complications:

In our study, it was seen that in cases with diabetes (49%), 73.4 % cases developed complications. In non-diabetics (51%), only 21.15% cases developed complications. In studies done by Peter Jepsen et al¹³ (2007) it was seen that people with diabetes had higher rate of hospital stay compared to those without diabetes (24.8% vs 18%)

Complications Associated:

In our study it was found that 47% cases of liver abscess had developed complications of which rupture into pleural cavity and effusion was the most common complication seen(63.2%). Second most common complication was found to be septic shock (20.34%) followed by

pericardial effusion (8.16%) seen more in left lobe involved cases. Fourth most common complication found in our study was cholangitis in 6.1% cases. Rupture into abdominal cavity was the least common complication and most severe one found, with only one case developing it (2.04%). Pleural effusion was more common on the right side as compared to left denoting the right lobe involvement in maximum cases. In our study it was found that cases with higher scores (9 and above) had greater chances of developing effusion which had to be intervened. Cases with larger abscess volume was more prone to rupture into pleural cavity and developing empyema. no deaths were reported in our study.

Amongst the 33 cases with pleural effusion on x-ray, 60.6% cases (n= 20) underwent tapping for effusion. 29.27% cases (n=9) had to undergo ICD insertion for effusion.

Similar results were seen in studies by Yang et al¹⁴ wherein pleural effusion was seen as the most common complication. In a study done by Ghosh et al¹⁰ (2014), 30% cases of liver abscess had presented with pleural effusion.

It was seen in our study that complications were seen in cases in higher scores with intraabdominal rupture being seen in a greater score of 13. Minimum score wherein complication was seen in our study was found to be 4 and maximum being 15.

Clinical Improvement & Hospital Stay:

In our study of 100 cases average number of hospital stay was found to be 12 days. In cases with complications, average number of days of hospital stay was found to be 20.14 days. complicated cases had longer number of days of hospital stay than non-complicated cases.

And average number of days of clinical improvement was found to be 4 days. In cases with complications, average days of clinical improvement were found to be 6.38 days. in uncomplicated cases, mean days of clinical improvement was found to be decreased(3.09 days)

Total Scores And Risk Of Complications

In our study of 100 cases, 44 % cases had a score ranging from 9 to 15 with a total of 39 cases (88.6 %) developing complications which implies that greater the score, more is the chance of developing complications

45% cases with score ranging from 4 to 8 had a total of 8 cases with complication (17.7%) that is there are some chances of developing complications

Cases with score ranging from 0 to 3 with total of 11 % cases didn't develop any complications which mean there are almost zero chances of developing complications with lower score.

Cases belonging to group A was treated using antibiotic alone in our study. Group b was treated with antibiotics along with USG guided needle aspiration in selected cases in Group C intervention was adopted for all cases either in the form of pigtail catheterization or needle aspiration.

In a prospective study by Sharma et al¹⁵, multiple factors like bilirubin level>3.5mg/dl, volume and number of abscess cavity, encephalopathy, hypoalbuminemia (serum albumin <2.0gm/dl) were taken into account. In our study also, some of the above mentioned factors like volume and number of abscess cavity, bilirubinemia (>1.5mg/dl), hypoalbuminemia (<3gm/dl) were included. Other factors like INR and alcoholic history >10 years were also found to have strong correlation with the risk of developing complications. In another study by Sharma, he compared outcomes of antibiotics vs needle aspiration in uncomplicated cases and it was seen that both had similar results. Our study helps to identify cases that may develop complications and may need needle aspiration. It can help identify the true candidates needing chemotherapy.

The clinical confusion as to whether to have an interventional treatment (needle aspiration/ pigtail catheterization) or medical treatment has been to most extent cleared in our study based on the scores advocated.

CONCLUSION

There is a strong correlation of various factors like age>50 years,

leukocytosis(>15000/cumm), acute onset of illness, chronic alcoholic history, hypoalbuminemia, hyperbilirubinemia, raised INR, multiple abscesses on USG, associated comorbidities and larger abscess volume with development of complications. Greater the score, more is the chances of development of complications. Patients can be categorized into 3 groups and managed accordingly. Most of the cases with greater scores, falling to group C underwent pig tail catheterization in almost all cases and USG guided needle aspiration in fewer cases. Cases falling into group B underwent needle aspiration in about 75% cases.

On the basis of this scoring system, we can prevent the delay in the intervention arising due to dilemma as to whether to go for percutaneous needle aspiration or percutaneous catheter drainage or only medical treatment. It avoids any unnecessary investigations and procedures for the patients.

These scoring systems can be introduced in any institution and can be incorporated into the management protocols of liver abscess.

REFERENCES

- Schackelford's surgery of the alimentary tract chapter 115, p-1640
- L.H. Blumgart Surgery of the liver biliary tract and pancreas 4th ed.vol 2.p 927-943.
- Diseases of the liver. Leon Schiff and Eugene and Schiff J.B. Lippincott company 1993 chap 46 p1320-1333.
- Singh S, Chaudhary P, Saxena N, Khandelwal S, Poddar DD, Biswal UC. Treatment of liver abscess: prospective randomized comparison of catheter drainage and needle aspiration. *Annals of Gastroenterology: Quarterly Publication of the Hellenic Society of Gastroenterology*. 2013;26(4):332.
- Sharma N, Sharma A, Varma S, Lal A, Singh V. Amoebic liver abscess in the medical emergency of a North Indian hospital. *BMC Research Notes*. 2010 Dec;3(1):1-4.
- Kumar S, Sathyanarayana BA, Gupta A, Vupputuri H. A study of predictors for identification of risk of complications in patients with liver abscess. *Tropical Gastroenterology*. 2015 Oct 31;36(2):96-100.
- Ghosh S, Sharma S, Gadpayle AK, Gupta HK, Mahajan RK, Sahoo R, Kumar N. Clinical, laboratory, and management profile in patients of liver abscess from northern India. *Journal of tropical medicine*. 2014 Jun 4;2014.
- Makkar RP, Sachdev GK, Malhotra V. Alcohol consumption, hepatic iron load and the risk of amoebic liver abscess: a case-control study. *Internal Medicine*. 2003;42(8):644-9.
- Saha A, Gaurav AK, Bhattacharya S, Bhattacharya A. Molecular basis of pathogenesis in amoebiasis. *Current Clinical Microbiology Reports*. 2010 Dec;2(4):143-54.
- Ghosh S, Sharma S, Gadpayle AK, Gupta HK, Mahajan RK, Sahoo R, Kumar N. Clinical, laboratory, and management profile in patients of liver abscess from northern India. *Journal of tropical medicine*. 2014 Jun 4;2014.
- Raja M, Raja RK, Ramkumar R, Kavitha M, Aiswarya D, Deepak P, Perumal P. First report on the occurrence of abnormal vertebrae-containing Giant Danio-fish, *Devario aequipinnatus* (McClelland, 1839) in Stanley Reservoir of Cauvery River, Tamil Nadu (India). *Int J Fish Aquat Stud*. 2016;4(3):528-31.
- Singh A, Banerjee T, Kumar R, Shukla SK. Prevalence of cases of amoebic liver abscess in a tertiary care centre in India: A study on risk factors, associated microflora and strain variation of *Entamoeba histolytica*. *PloS one*. 2019 Apr 3;14(4):e0214880.
- Jepsen P, Ott P, Andersen PK, Sørensen HT, Vilstrup H. Clinical course of alcoholic liver cirrhosis: a Danish population-based cohort study. *Hepatology*. 2010 May;51(5):1675-82.
- Yang CC, Chen CY, Lin XZ, Chang TT, Shin JS, Lin CY. Pyogenic liver abscess in Taiwan: emphasis on gas-forming liver abscess in diabetics. *American Journal of Gastroenterology (Springer Nature)*. 1993 Nov 1;88(11).
- Sharma A, Mukewar S, Mara KC, Dierkhising RA, Kamath PS, Cummins N. Epidemiologic factors, clinical presentation, causes, and outcomes of liver abscess: a 35-year Olmsted County study. *Mayo Clinic Proceedings: Innovations, Quality & Outcomes*. 2018 Mar 1;2(1):16-25.