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Record based Study of Percutaneous aspiration Versus Pigtail catheter drainage in the management Of Liver abscess at a tertiary care centre

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Background

A liver abscess is a common disease prevalent in the tropical countries. Effective treatment involves appropriate antibiotics and draining the abscess cavity. Different modalities of percutaneous drainage of liver abscess are increasingly popular. We analysed the effectiveness of pigtail catheter drainage compared to percutaneous needle aspiration in managing liver abscesses.

Methods and material

This retrospective analytical study was carried out at a tertiary care teaching hospital in southern India. It included adults aged ≥18 years admitted and treated for liver abscess. Patients were categorized into three groups for analysis: Group A (conservative treatment), Group B (percutaneous needle aspiration), and Group C (pigtail catheter drainage).

Results

A total of 96 patients with liver abscesses were analyzed, with a predominance of males (93.75%). The mean abscess volume in Group C (330 ± 22.6 ml) was significantly higher than in Group A (110 ± 64.1 ml, p = 0.03) and Group B (151 ± 142.7 ml, p = 0.024). Hospital stay duration and residual abscess volume at discharge did not differ significantly between treatment groups. Notably, pigtail catheterization reduced hospital stay for abscesses >150 ml but prolonged it for abscesses <150 ml.

Conclusion

Percutaneous pigtail catheter drainage should be considered for managing liver abscesses. Specifically, its use in abscesses >150 ml showed improved clinical outcomes.

Keywords: liver abscess, pyogenic, amoebic, pigtail catheter drainage, percutaneous needle aspiration.

Introduction

A liver abscess is a collection of pus within the liver, typically caused by microorganisms transferred through the bloodstream or the biliary system. The primary causes are amoebic or pyogenic infections, and occasionally a combination of both. In developed countries, polymicrobial pyogenic abscesses are frequent, whereas in tropical countries, amoebic abscesses predominate. Despite improvements in health care standards, both amoebic and pyogenic liver abscesses remain significant causes of morbidity and mortality in tropical and subtropical regions worldwide. [1]

The primary modality of treatment for liver abscesses is antimicrobial therapy, with additional radiologically guided drainage procedures when needed. However, approximately one-fifth of patients do not respond adequately to antibiotics alone. Modern diagnostic tools such as ultrasound and CT scans have significantly improved early detection and treatment of liver abscesses.[2]

Pigtail catheter drainage (PCD) and percutaneous needle aspiration (PNA) are increasingly recognized as effective interventions, especially for large abscess cavities, that do not respond to conservative antibiotic treatment. Current evidence supports a preference for pigtail catheterization in managing liver abscesses.[3]

Materials and methods

Our study is record based and includes patients admitted and treated from January 2022 to June 2023 at Department of surgery at MIMS Teaching hospital. A total of 62 patient records with confirmed liver abscess diagnoses were considered. Data of clinical features, suspected risk factors, investigation reports, treatment modalities and outcomes were collected. Patients who were serology positive for E. histolytica, negative pus c/s reports, positive stool microscopy for amoebic trophozoites and cysts and USG characteristics of smooth wall homogenous cavity with no internal echoes, had been treated as amoebic etiology. Positive pus culture and/or blood culture for bacteria and ultrasonography characteristics of poorly demarcated hypoechoic cavity with internal echoes had been treated as of pyogenic origin. Mixed etiology (amoebic and pyogenic) was considered if both were positive.

All patients had received empirical antibiotics i.e. i.v ceftriaxone (1 gm bid) and metronidazole (500 mg tid) during hospitalization. Antibiotics had been modified as per culture sensitivity and when nonresponsive to empirical therapy. Records were pooled into 3 groups based on the treatment undergone.

Group A is of patients who had received conservative management in the form of intravenous antibiotics only, Group B includes patients who underwent percutaneous needle aspiration (PNA) and Group C includes those who underwent pigtail catheter drainage (PCD). Details of post procedure recovery, residual collection in the abscess cavity on USG and duration of hospital stay in days were noted for outcome analysis. Records of Patients aged <18 years and of those undergoing surgical intervention in the form of laparotomy or laparoscopy for ruptured liver abscess were excluded.

All patients recovered and were discharged, with the duration of hospital stay in days used for outcome assessment.

Statistical analysis of data was performed using SPSS version 2.0 (IBM Corp). Continuous variables were expressed as mean (± standard deviation), while categorical variables were presented as numbers and percentages. The ANOVA test and Pearson's coefficient were used to find out the statistical significance and assess associations of variables.

Results

A Total of 96 patients diagnosed and treated for liver abscess were analysed. The mean age of the study population was 41.16 ± 17 years, with a predominance of males (93.75%). Alcohol intake and smoking were the most commonly associated risk factors. Abdominal pain was the predominant presenting complaint (84.3%), followed by fever (78%). The most common sign was right hypochondrial tenderness (Table 1).

Table 1

Demography, etiology, and clinical profile of patients with a liver abscess

Total Patients: 96	**Parameters**	**Number**
Gender	Male	90 (93.75%)
	Female	6 (6.25%)
Risk Factors	Alcoholic	59 (61.8%)
	Smoking	57 (59.4%)
	Diabetic	9 (9.4%)
Etiology	Amoebic	75 (78%)
	Pyogenic	9 (9.38%)
	Mixed	12 (12.5%)
Symptoms	Pain abdomen	81 (84.3%)
	Fever	75 (78%)
	Anorexia	60 (62.5%)
	Nausea/vomiting	39 (40.6%)
	Weight loss	39 (40.6%)
Signs	Pallor	8 (8.3%)
	Icterus	8 (8.3%)
	Ascites	12 (12.5%)
	Pleural effusion	29 (30.2%)

Right lobe was the commonest site of abscess (80%), followed by bi-lobar involvement (8%), and multiple abscesses were observed in 12% of patients. The etiology was identified as amoebic infection in 78%, pyogenic bacteria in 9.4%, and mixed in 12.5%. All patients received antibiotic therapy.

Percutaneous needle aspiration (PNA) was performed in 12 patients (18.8%), and pigtail drainage was used in 35 patients (54.7%). The decision for intervention was based on clinical judgment involving both the clinician and interventional radiologist.

Demographic, laboratory, and management data were analyzed across three treatment groups (Table 2). The mean abscess volume in Group C (330±224.6ml) was significantly higher compared to Group A (110±64.1 ml; p=0.03) and Group B (151±142.7; p=0.024). However,

there was no significant difference in abscess volume between Group A and Group B (p=0.26). The duration of hospital stay and residual abscess volume at discharge did not show significant differences between the treatment groups (Table 2).

Table 2
Comparative analysis of data between treatment strategies groups

Variable	Total (96)	Group A(26)	Group B(18)	Group C(52)	P Value
Age	43±16.7	40±18.6	43±16.2	44±15.6	0.57
Duration of Hospital Stay	17.1± 10	13.7±14	17±7.4	19.1±8.7	0.28
Hb	11.1±2.2	13.4±1.8	11.2±1.5	10.8±2.2	0.003
TLC	15211±6125	14047±6212	12221±6024	16221±5008	0.16
Total Bilirubin	1.5±1.0	0.8±0.7	1.2±0.9	1.7±1.2	0.22
Abscess Volume at admission	240± 197.6	110±64.1	151±142.7	330±224.6	0.001
Abscess Volume at Discharge	22±14	15±17.2	14.6±14.2	20.7±16.1	0.28
Duration Of iv Antibiotics	23±8	20±7.1	24±8	25±9	0.27

On analyzing the association between duration of hospital stay and treatment strategies based on liver abscess volume at admission, pigtail catheter drainage (PCD) for abscess volumes < 150 ml was significantly associated with an increased duration of hospital stay ($p = 0.012$). However, PCD for abscess volumes between 150-300 ml did not show a significant increase in hospital stay duration.

Discussion

Liver abscesses are a critical health concern in tropical regions. They are commonly caused by E. histolytica (amoebic), bacteria (pyogenic), and Mycobacterium tuberculosis.[5] Amoebic liver abscesses are particularly prevalent in these areas, with over 50 million cases and 100,000 deaths annually.[6-7] In this study, 80% of cases involved the right lobe, consistent with previous research. The etiology was 78% amoebic. The disease is more common in younger individuals, highlighting the need for effective treatment to reduce morbidity and mortality in this age group. Common symptoms include abdominal pain, fever, loss of appetite, and weight loss.[9] Ultrasound has made diagnosing liver abscesses easier, Interventional radiology has made percutaneous treatments like needle aspiration (PNA) or catheter drainage (PCD) for managing liver abscesses, preferable. In this study, Group C (PCD group) had a significantly larger mean cavity volume compared to Groups A and B, yet had similar hospital stays and antibiotic therapy durations. Various randomized control trials have compared PCD and PNA, with mixed results. Three trials found PCD preferable for abscesses larger than 10 cm.[10,13,14] Yu et al. found no significant difference in hospital stay and clinical outcomes between PCD and PNA for abscesses around 5 cm, while Zerem and Hadzic preferred PNA for smaller abscesses. [11,12] A meta-analysis by Cai YL

favoured PCD, citing a lower success rate for PNA due to the need for multiple aspirations in larger abscesses and the risk of re-accumulation. [4]. The success rate of PNA is probably low due to the need for multiple aspirations in larger cavity sized abscesses and the risk of re-accumulation. On analysis of effect of abscess volume and treatment strategies on the duration of hospital stay, PCD was found to be effective for abscess drainage if the volume was >150 ml. However in abscess volumes <150 ml, it was associated with higher duration of hospital stay. Kulhari M et al. reported better clinical outcomes with PCD over PNA in the patients with approximately similar volumes of liver abscess (293.2±130.3 mL in the PCD group and 291.4±138.8 mL in the PNA group, P = 0.925)[14]. Rajak et al. also showed that higher abscess volume was associated with PNA failure [10].

In this study, conservative management was not found to be inferior to PNA for the duration of hospitalization and duration of antibiotics used even when abscess volume was similar in both groups (110±64.1 vs 151±142.7ml, p = 0.28).

PCD-related complications were major issues in previous reports [17]. There were no significant complications found due to PCD in this study. The recent studies also favour that complication rates were not significantly different in PCD vs PNA in the management of liver abscesses [18], while PCD reduces cavity size and abscess volume faster and is associated with fewer complications than PNA.

Retrospective nature of this study and selection bias regarding the preferable use of pigtail catheterization in patients with large abscess volumes are its major limitations.

Conclusions

Liver abscess commonly affects young and middle-aged men. Percutaneous drainage can shorten the duration of antibiotic treatment and hospital stays. Percutaneous catheter drainage (PCD) has become the preferred method for managing liver abscesses. Both pigtail catheterization and percutaneous needle aspiration (PNA) improve clinical outcomes and reduce morbidity for abscess volumes greater than 150 ml. Pigtail catheterization is particularly more effective than PNA for abscesses larger than 300 ml.

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