



PERCUTANEOUS DRAINAGE OF LIVER ABSCESS AND ITS OUTCOMES AND FOLLOW UP

General Surgery

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ABSTRACT

Introduction: The percutaneous intervention can either be a percutaneous aspiration (PA) or a percutaneous catheter drainage (PCD), but to date which should be the first-line treatment remains debatable. Some experts advocate repeated PNA over PCD because it is simpler to execute, less aggressive, less hazardous for post-procedure septicemia, and less costly. However, published studies are conflicting and inconsistent about the best method for liver abscess drainage. The present study aimed to determine the efficacy of percutaneous drainage of pyogenic liver abscesses, the etiologic factors, and the management techniques that contribute to successful treatment. **Material & Method:** after approval from IEC, this prospective study was of carried out on 35 cases of liver abscess who were diagnosed clinically and radiologically at Department of Surgery at IMCHRC, Indore for a study duration of 10 months. Ultrasound guided PA (n=20) and PCD (n=15) in conjunction with appropriate antimicrobial therapy was undertaken. A median of 18 Gauge needle and 10 French catheters were utilised. Clinical features, mortality, treatment success, and complications were analysed using the Fisher's exact test. The level of significance was set at p value two-sided test <0.05. All statistical tests were done using the open-source R language. **Results:** 12 PA cases and 10 PCD cases were successfully drained on a single attempt ($p>0.05$). There were more males (66 per cent) than females (34 percent). Portal sepsis was the most common cause identified. Fever was the most frequent clinical presentation on admission. 26 patients had solitary abscesses in right lobe. CRP was significantly raised. The PCD group observed a significantly larger abscess size ($p=0.01$). *Klebsiella pneumoniae* was the most common organism isolated. Five procedure-related complications were noted, all in the PCD group. Success rates have been reported between 90–100 per cent for PA and between 69–100 per cent for PCD. **Conclusion:** A higher success rates have been reported for PA i.e., 90–100 per cent for PA as compared to 69–100 per cent for PCD. In conclusion, our findings could not reject the null hypothesis that both PA and PCD are equally effective in the drainage of liver abscess. Our study supports that PA should always be attempted first in the management of liver abscess due to its simplicity, effectiveness, and fewer procedural-related complications. Multiple abscess cavities can also be aspirated in the same setting. However, when draining abscesses larger than 5cm, PCD is deemed more effective. Finally, surgery is recognized as the treatment of choice for liver abscess drainage with concurrent intra-abdominal pathology, multiloculated abscess with biliary communication and failure of PCD.

KEYWORDS

Liver Abscess, Aspiration, Catheter Drainage

INTRODUCTION

Liver abscess is a rare but potentially fatal disease.¹⁻⁹ Historically, liver abscess has been managed exclusively by surgery.^{3,10-12}

Outcomes of therapy have improved dramatically over the past 40 years owing to earlier imaging diagnosis, more effective antibiotic coverage, and advances in percutaneous drainage techniques. Advances in imaging technology have advocated the shift to minimally invasive interventional procedure.^{2,9,11-14}

By the 1980s, percutaneous catheter drainage (PCD) with antibiotic therapy was accepted therapy for simple hepatic abscesses. Owing to advances in technique and management, PCD has supplanted surgical drainage as the first-line treatment of PLA. This development has been accompanied by a reduction in the need for general anesthesia and the complications of an open abdominal procedure. Surgery remains first-line treatment of patients who present with abscess rupture, peritonitis, or a concomitant surgical condition but is otherwise reserved for failure of PCD.^{2,3}

The advent and delivery of potent antimicrobials and improved ICU care have also improved patient outcomes.^{3,5,15,16} Surgery is now reserved for selected cases.

Percutaneous intervention can be performed using catheter drainage (PCD) or needle aspiration (PNA), but to date which should be the first-line treatment remains debatable.

PCD is generally accepted as a safe and successful treatment option for liver abscess when combined with antibiotics. The reported failure rate of primary PCD ranges widely, from 0% to 30% with an infection-related mortality of 0–13.4%. Several studies have shown that PCD is

less effective than surgical drainage in the treatment of large loculated abscesses, variably defined as greater than 3–6 cm in diameter.^{8,22} In other series, however, no difference was found in drainage success rates of large and small abscesses, regardless of loculation. Variation may be due to differences in management given that follow-up practices are not standardized.²³ Few studies have included detailed analysis of percutaneous liver drain management, making extraction of best practices difficult.^{23,24} These include indications for additional drainage procedures and optimal duration of drainage.

Some experts advocate repeated PNA over PCD because it is simpler to execute, less aggressive, less hazardous for post-procedure septicemia, and less costly.²⁵ However, published studies are conflicting and inconsistent about the best method for liver abscess drainage. A previously published systematic review and meta-analysis showed the superiority of PCD over PNA in some aspects, however, the data were derived from only five randomized controlled trials (RCTs).²⁶

In advent of same, the present study was planned with an aim to determine the efficacy of percutaneous drainage of pyogenic liver abscesses, the etiologic factors, and the management techniques that contribute to successful treatment.

The objectives of the study were:

1. To compare the effectiveness of percutaneous catheter drainage (PCD) and percutaneous needle aspiration (PNA) of pyogenic liver abscesses;
2. To evaluate the duration required for 50 percent resolution and the duration for complete resolution of the abscess as evaluated by ultrasound examination and

3. To highlight the factors that lead to good clinical outcomes, complete resolution of the abscess and shortened hospital stay

MATERIAL AND METHOD

After approval from the institutional ethical committee, this prospective study was carried out on 35 cases of liver abscess who were diagnosed clinically and radiologically at Department of Surgery at IMCHRC, Indore for a study duration of 10 months. A written informed consent was taken from patients before inclusion into the study.

Inclusion Criteria comprised of all cases of liver abscess diagnosed clinically and radiologically, within the age group of 18-70 years.

Exclusion Criteria were uncertain diagnosis, uncorrectable coagulopathy, abscess cavity less than 5cm in their greatest dimension, concomitant biliary tract malignancy, ruptured liver abscess and prior intervention and treatment.

Methodology: Clinical data was retrieved for patients who underwent percutaneous aspiration and/or catheter drainage at our hospital during 10 months. Thirty-five patients underwent a total of 52 procedures. Out of 35, 20 underwent PA and 15 underwent PCD.

A procedure was considered successful if there was no change in the initial procedure from aspiration to drainage or vice-versa, or subsequent surgery and successful drainage of the abscess allowing for clinical discharge.

Written consent, coagulation profile assessment, and coagulopathy correction were performed prior to the procedure.

Lignocaine 1 per cent was the choice for local anaesthesia and conscious sedation with Fentanyl and Midazolam was sometimes used.

Aspiration: PA was performed using either needle (size range 17–21 Gauge, median 18 Gauge) or pig-tail catheters (size range 6–10 French, median 10 French).

Once the needle tip or catheter is within the abscess cavity, it is aspirated until no more pus can be aspirated. This was followed by needle or catheter removal.

Drainage: PCD was performed using self-locking pig-tail catheters (size range 6–14 French, median 10 French). Under image guidance, the catheter was placed within the abscess cavity using the modified Seldingers technique. Aspiration of the abscess material was then performed until no more pus could be aspirated. The catheter was secured to the skin for continuous external drainage. Follow-up imaging was performed only in patients who were not improving clinically. Dislodged catheters were either re-positioned or removed with subsequent PA being performed.

Statistical Analysis:

Quantitative variables (patient demographics, laboratory findings, abscess characteristics, and length of stay) were analysed using Welch t-test for normally distributed data or a non-parametric test (Kruskal-Wallis rank sum test). Test of normality was performed using Shapiro Wilk test. Categorical variables (clinical features, mortality, treatment success, and complications) were analysed using the Fisher's exact test. The level of significance was set at p value two-sided test <0.05. All statistical tests were done using the open-source R language.

RESULTS

Patient's Demographics:

Thirty-five patients aged between 18–78 years underwent interventional procedures.

There were more males (66 per cent) than females (34 percent). There was no significant difference noted in both the age and sex when both groups were compared. (Table 1)

Clinical Features:

Fever (47.6 per cent), abdominal pain (40.0 per cent), and septic shock (28.6 per cent) were the three main clinical presentations documented at admission. However, there was no significant difference observed between both groups when compared. (Table 2)

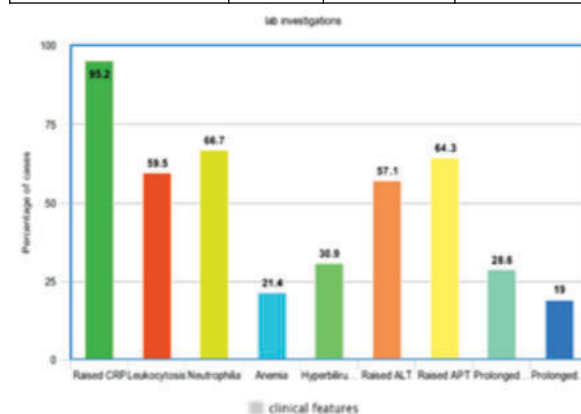
Table 1: Patient Demographics

Parameters	PA(n=20)	PCD(n=15)	P value
Age(years)	18-60	22-78	NS*
Sex (M: F)	18:6	8:3	NS+

NS: Non-significant; *Shapiro wilk normality test; +Fisher test

Table 2. Clinical Features

	P value	interval	Odd's ratio
Fever	0.54	0.44-7.14	1.74
Abdominal pain	0.74	0.32-6.58	1.42
Shock/sepsis	0.32	0.08-2.12	0.45
Lethargy	0.48	0.37-11.05	1.9
Chills/rigors	0.45	0.34-15.56	2.07
Loss of weight	0.67	0.04-4.07	0.51
Diarrhoea	0.66	0.18-23.15	1.74
Nausea/vomiting	0.60	0.11-143.9	2.29
Confusion	1.00	0.01-90.77	1.1



Graph 1. Lab Investigations

Table 3: Abscess Characteristics

Characteristics	PA (n=20)	PCD (n=15)	Total n (%)	P value
Number				NS*
Single	12	10	22	
Multiple	8	5	13	
Site				
Right	14	12	26	NS*
Left lobe	1	1	2	
Bilobar	5	2	7	
Size				<0.001^
Mean	53.7	72.4	-	
SD	±20.1	±36.3		
Median	50	64.5		

Table 4. Microbial Data

Characteristics	PA (n=20)	PCD (n=15)	Total n (%)
Growth culture			
Positive pus culture	18	13	31(88.5)
Monomicrobial culture	15	12	27(77.4)
Polymicrobial culture	3	1	4(11.4)
Positive blood culture	8	8	16(45.7)
Positive blood and pus culture	8	8	16(45.7)
Organism cultured			
Klebsiella pneumoniae	8	2	10
E. Coli	3	1	4
Streptococcus Intermedius	1	1	2
Enterobacter Faecalis	0	1	1

Table 5. Blood Culture

Bacteria	PA(n=20)	PCD(n=15)	Total
K. Pneumoniae	3	2	5
Streptococcus	0	2	2
E. Coli	1	1	2
Staphylococcus species	1	1	2
Bacteroides	1	0	1
Enterobacter Faecalis	0	1	1

Microbiological Data:

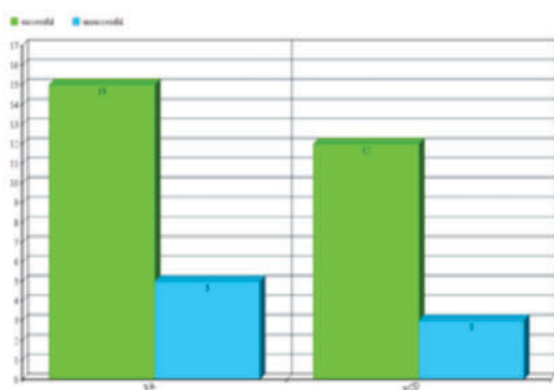
Out of the 16 patients who had both positive blood and pus cultures, seven (43.75 per cent) positive blood cultures had completely different microbes isolated from the pus specimen, while another three (18.75 per cent) had additional organisms cultured. The most common first-line antimicrobial therapies commenced were intravenous tazobactam plus piperacillin in combination with metronidazole.

Outcome:

A successful outcome was noted in 80% patients treated with Percutaneous Catheter Drainage and in 40% patients treated with Percutaneous Needle Aspiration.

The duration for clinical improvement, > 50% resolution of the abscess cavity was recorded by repeated ultrasonography and blood investigations done at 1, 2, 4 weeks and subsequently 6 weeks.

The duration was lesser in patients managed by Percutaneous Catheter Drainage. Broad spectrum antibiotics were given prior to the drainage and post procedure, Cultures were obtained, K. Pneumoniae and E. Coli were found to be present in maximum number of cases, culture sensitive antibiotics were given.



Graph 2. Distribution Of Successful And Unsuccessful Patients In The Study

DISCUSSION

In our study, a slight male predominance was observed which was in concordance with previous studies.^{1,4,6-8,10,12,15,16,18} Portal sepsis has been recognised as a common aetiology in the past.¹² Other reports have shown that biliary pathology is increasing in prevalence.^{1,3-5,7,8,10,12,14,17,18,20,21,23,26-28}

Liver metastasis has resulted in the rise of liver abscess incidences from one per cent to seven per cent.²

Diabetes mellitus is the most common co-existing disease in the series which was similar to previous studies.^{1,2,3,5,8,12,29} In concurrence with earlier studies,^{6,8,10,12,20,22} majority of the liver abscesses in our study were cryptogenic.

The classical triad of fever, right upper-quadrant pain, and jaundice is often described in literature but is rarely seen clinically as the symptomatology is often non-specific.^{3,17} As a result, a high index of suspicion is often required for early diagnosis of liver abscess.^{22,30}

Laboratory findings are non-specific to diagnose liver abscess. Reports have shown raised C-reactive protein (CRP) and leucocytosis as common laboratory findings, but nearly all were statistically insignificant. This was in concurrence with studies done earlier.^{1,16,18,22}

Klebsiella pneumoniae, was most commonly cultured and it was suggested that the increased use of indwelling biliary stents and broad-spectrum antibiotics in the management hepatobiliary and pancreatic neoplasms could be a possible cause.^{1,2}

Average catheter drain remained in-situ is reported between five to eight days.^{28,31} Generally, mortality rates are recorded between 1.5–31 per cent^{2,4,6,10,12–14,18,20,28–30} and we observed an overall mortality of 23.8 per cent due to various underlying pathologies and a 30-day mortality of 2.4 per cent as a direct result of the liver abscess complications.¹

Contrasting reports on the duration of hospital stay was observed suggesting that there is no particular procedure superior to the other in terms of recovery and hospitalization.^{3,11,13–16,22,27}

CONCLUSION

Success rates have been reported between 90–100 per cent for PA and between 69–100 per cent for PCD. In conclusion, our findings could not reject the null hypothesis that both PA and PCD are equally effective in the drainage of liver abscess.

Our study supports that PA should always be attempted first in the management of liver abscess due to its simplicity, effectiveness, and fewer procedural-related complications. Multiple abscess cavities can also be aspirated in the same setting. However, when draining abscesses larger than 5cm, PCD is deemed more effective.

Finally, surgery is recognized as the treatment of choice for liver abscess drainage with concurrent intra-abdominal pathology, multiloculated abscess with biliary communication and failure of PCD

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