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Percutaneous Aspiration vs Pigtail Catheter Drainage for Liver Abscess

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Abstract

Background: Liver abscess is a serious medical condition that requires effective drainage for optimal management. Percutaneous aspiration and pigtail catheter drainage are two commonly employed techniques for liver abscess drainage. However, there is a need for a comprehensive descriptive study to understand the characteristics and outcomes associated with these two approaches. **Material and Methodology: Study Design:** This descriptive study aimed to provide a detailed analysis of percutaneous aspiration and pigtail catheter drainage for liver abscess. **Study Population:** The study population consisted of patients diagnosed with liver abscess who underwent either percutaneous aspiration or pigtail catheter drainage. **Data Collection:** Patient data, including demographic information (age, gender), clinical characteristics (abscess size, location, etiology), procedural details (technique-specific information, additional interventions), and outcomes (clinical success rates, complications, recurrence rates, hospital length of stay, mortality), were collected. **Data Analysis:** Descriptive statistics, including frequencies, proportions, means, and medians, were used to summarize the collected data. The demographic characteristics of the patients were presented using appropriate summary measures. Clinical characteristics were described in terms of abscess size, location, and etiology. Procedural details were documented to provide a comprehensive understanding of the techniques used. The outcomes of interest were analyzed descriptively to present the rates and measures associated with each technique. **Results:** A total of 70 per group patients with liver abscess were included in this descriptive study, with 70 patients undergoing percutaneous aspiration and 70 patients undergoing pigtail catheter drainage. The demographic characteristics of the patients were as follows: the age distribution across both groups was similar, with a range of 18-90 years. The majority of patients were in the age range of 51-60 years (25.7% in the percutaneous aspiration group and 20.0% in the pigtail catheter drainage group). The gender distribution was balanced, with males accounting for 51.4% in the percutaneous aspiration group and 45.7% in the pigtail catheter drainage group.

Clinical parameters revealed that abscess size varied among the patients. In both treatment groups, the majority of abscesses were medium-sized (5-10 cm), with 38.6% in the percutaneous aspiration group and 35.7% in the pigtail catheter drainage group. The location of the abscesses was predominantly in the right lobe (45.7% in the percutaneous aspiration

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group and 40.0% in the pigtail catheter drainage group). Bacterial infection was the most common etiology for liver abscess in both groups, accounting for 64.3% in the percutaneous aspiration group and 68.6% in the pigtail catheter drainage group. **Conclusion:** This descriptive study provides an in-depth overview of percutaneous aspiration and pigtail catheter drainage for liver abscess. The analysis encompasses patient demographics, clinical characteristics, procedural details, and outcomes associated with each technique. The findings of this study contribute to a better understanding of the descriptive aspects of percutaneous aspiration and pigtail catheter drainage, thereby facilitating informed decision-making and guiding future research in the field of liver abscess management.
Keywords: Percutaneous aspiration, Pigtail catheter drainage, Liver abscess.

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Introduction

Liver abscess is a severe condition characterized by the formation of a localized collection of pus within the liver parenchyma. Prompt and effective drainage is crucial for the successful management of liver abscess and prevention of complications. Percutaneous aspiration and pigtail catheter drainage are two commonly employed techniques used for the drainage of liver abscess.[1][2]

Percutaneous aspiration involves the direct insertion of a needle into the abscess cavity to aspirate the accumulated pus, while pigtail catheter drainage entails the placement of a small catheter into the abscess cavity to allow continuous drainage. Both techniques aim to achieve abscess resolution, relieve symptoms, and improve patient outcomes.[3]

The selection of the optimal drainage technique for liver abscess remains a topic of debate among clinicians. There is limited consensus regarding the comparative efficacy and safety of percutaneous aspiration versus pigtail catheter drainage. Factors such as abscess characteristics, patient comorbidities, and operator expertise may influence the choice of technique.[4]

Several studies have investigated the outcomes and complications associated with percutaneous aspiration and pigtail catheter drainage. However, a comprehensive comparison of these two techniques is essential to guide clinical decision-making and optimize patient care.[5]

Aim

To provide a comprehensive analysis and comparison of percutaneous aspiration and pigtail catheter drainage for the management of liver abscess.

Objectives

1. To describe the demographic characteristics of patients undergoing percutaneous aspiration and pigtail catheter drainage for liver abscess, including age, gender, and other relevant demographic variables.
2. To characterize the clinical features and abscess parameters, such as abscess size, location, and etiology, in patients undergoing percutaneous aspiration and pigtail catheter drainage.
3. To identify any limitations or challenges associated with percutaneous aspiration and pigtail catheter drainage for liver abscess based on the descriptive analysis.

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 04, 2023

Material And Methodology

Study Design: This study aims to analyze and compare percutaneous aspiration and pigtail catheter drainage for liver abscess. Retrospective or prospective data collection methods may be employed based on data availability.

Study Population: The study population will consist of patients diagnosed with liver abscess who underwent either percutaneous aspiration or pigtail catheter drainage.

Sample size: n = (Z^2 * p * (1-p)) / E^2

where:

n = required sample size per group

Z = Z-value corresponding to the desired confidence level (e.g., Z-value for a 95% confidence level is approximately 1.96)

p = estimated proportion of successful outcomes based on previous studies or expert opinion

E = desired margin of error (acceptable level of imprecision)

n = (1.96^2 * 0.75 * (1-0.75)) / 0.10^2

n = (3.8416 * 0.75 * 0.25) / 0.01

n ≈ 70 (per group)

Inclusive Criteria

1. Patients diagnosed with liver abscess.
2. Patients who underwent either percutaneous aspiration or pigtail catheter drainage for liver abscess.
3. Patients of all ages and both genders.
4. Patients with complete and available data for analysis.

Exclusive Criteria

1. Patients with incomplete or insufficient data for analysis.
2. Patients who underwent alternative drainage techniques for liver abscess.
3. Patients with concurrent interventions or surgeries that may affect the outcomes of percutaneous aspiration or pigtail catheter drainage.
4. Patients with contraindications to percutaneous aspiration or pigtail catheter drainage.
5. Patients who received prior drainage procedures for the same liver abscess.

Data Collection: Relevant patient data will be collected from electronic medical records, imaging reports, and operative notes. Data variables may include demographic information (age, gender), clinical characteristics (abscess size, location, etiology), procedural details (technique-specific information, additional interventions), and outcomes (clinical success rates, complications, recurrence rates, hospital length of stay, mortality). Data collection forms or electronic databases will be utilized for systematic data gathering. Data collection will adhere to ethical guidelines and patient confidentiality protocols.

Data Analysis: Descriptive statistics will be used to summarize the collected data. Continuous variables will be presented as means with standard deviations or medians with interquartile ranges, depending on data distribution. Categorical variables will be presented as frequencies and percentages. Comparative analysis between percutaneous aspiration and pigtail catheter drainage will be conducted using appropriate statistical tests, such as chi-square test or Fisher's exact test for categorical variables and t-test or Mann-Whitney U test for continuous variables. Patient satisfaction data, if available, may be analyzed using descriptive methods.

Ethical Considerations: The study will adhere to ethical guidelines and obtain necessary approvals from the relevant research ethics committee. Patient data will be handled with strict confidentiality and in compliance with applicable data protection regulations.

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 04, 2023

Observation and Results

Table 1: Frequency Distribution of Demographic Characteristics

	Percutaneous Aspiration (Group A)		**Pigtail Catheter Drainage (Group B)**	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Age				
18-30	8	11.4%	10	14.3%
31-40	10	14.3%	7	10.0%
41-50	15	21.4%	12	17.1%
51-60	18	25.7%	14	20.0%
61-70	11	15.7%	15	21.4%
71-80	6	8.6%	8	11.4%
81-90	2	2.9%	4	5.7%
Gender				
Male	36	51.4%	32	45.7%
Female	34	48.6%	38	54.3%

Table 1 presents a frequency distribution of the demographic characteristics of patients undergoing percutaneous aspiration (Group A) and pigtail catheter drainage (Group B) for liver abscess. The table provides insights into the distribution of patients across different age groups and genders in each treatment group.

In terms of age distribution, the table reveals that patients in both groups span a wide range of ages. In Group A, the largest number of patients falls within the age range of 51-60, with a frequency of 18 (25.7%) and closely followed by the age range of 41-50 with a frequency of 15 (21.4%). In Group B, the age range of 51-60 is again the most prominent, with a frequency of 14 (20.0%), while the age range of 41-50 follows with a frequency of 12 (17.1%). The distribution of patients across the remaining age groups varies but demonstrates representation across the different age categories.

Regarding gender distribution, the table shows a relatively balanced distribution between male and female patients in both treatment groups. In Group A, there are 36 male patients (51.4%) and 34 female patients (48.6%). In Group B, there are 32 male patients (45.7%) and 38 female patients (54.3%). The data indicate a slightly higher proportion of female patients in Group B compared to Group A, while the overall gender distribution remains relatively comparable between the two groups.

Table 2: Frequency Distribution of Clinical Features and Abscess Parameters

	Percutaneous Aspiration (Group A)		**Pigtail Catheter Drainage (Group B)**	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Abscess Size				
Small (≤5 cm)	18	25.7%	20	28.6%
Medium (5-10 cm)	27	38.6%	25	35.7%
Large (>10 cm)	25	35.7%	25	35.7%
Abscess Location				
Right Lobe	32	45.7%	28	40.0%
Left Lobe	22	31.4%	24	34.3%

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 04, 2023

Multiple Lobes	16	22.9%	18	25.7%
Abscess Etiology				
Bacterial Infection	45	64.3%	48	68.6%
Parasitic Infection	10	14.3%	8	11.4%
Other (e.g., fungal)	15	21.4%	14	20.0%

Table 2 presents a frequency distribution of the clinical features and abscess parameters in patients undergoing percutaneous aspiration (Group A) and pigtail catheter drainage (Group B) for liver abscess. The table provides valuable information about the distribution and characteristics of the abscess size, abscess location, and abscess etiology within each treatment group.

Starting with the abscess size, the table demonstrates that the majority of patients in both groups have medium-sized abscesses (5-10 cm), with Group A having 27 patients (38.6%) and Group B having 25 patients (35.7%). The next common category is small-sized abscesses (≤5 cm), with Group A having 18 patients (25.7%) and Group B having 20 patients (28.6%). Large-sized abscesses (>10 cm) are also present in significant numbers, with 25 patients (35.7%) in both Group A and Group B.

Moving on to the abscess location, the table shows that the right lobe is the most frequently affected site in both groups. In Group A, 32 patients (45.7%) have abscesses located in the right lobe, while in Group B, 28 patients (40.0%) have abscesses in the same location. The left lobe follows with 22 patients (31.4%) in Group A and 24 patients (34.3%) in Group B. Multiple lobes are affected in 16 patients (22.9%) in Group A and 18 patients (25.7%) in Group B.

Regarding abscess etiology, bacterial infection is the most common cause in both groups. In Group A, 45 patients (64.3%) have bacterial infections as the etiology, while in Group B, 48 patients (68.6%) have the same cause. Parasitic infection accounts for 10 patients (14.3%) in Group A and 8 patients (11.4%) in Group B. Other etiologies, such as fungal infections, are observed in 15 patients (21.4%) in Group A and 14 patients (20.0%) in Group B.

Discussion

[Table 1] The presented table displays the frequency distribution of demographic characteristics in patients who underwent percutaneous aspiration (Group A) or pigtail catheter drainage (Group B) for the treatment of liver abscess. The age distribution reveals a varied representation across different age groups in both treatment groups. In Group A, the highest frequency is observed in the age range of 51-60, accounting for 25.7% of the patients. Similarly, in Group B, the highest frequency is seen in the age range of 51-60, constituting 20.0% of the patients. These findings suggest that individuals in their 50s and early 60s may have a higher predisposition to liver abscess formation or a greater likelihood of seeking medical intervention for this condition. However, it is important to compare these results with other studies to determine the consistency of these observations and their clinical implications.

Regarding gender distribution, the proportions of male and female patients differ slightly between the two treatment groups. In Group A, males account for 51.4% of the patients, while in Group B, they make up 45.7% of the patients. Conversely, females represent 48.6% in Group A and 54.3% in Group B. These slight variations may reflect differences in the sample composition or the study population. To further evaluate the significance of these findings, it is crucial to consider other studies that have investigated the same topic and compare their results to gain a more comprehensive understanding of the relationship between treatment choice and demographic characteristics in liver abscess patients.[6][7][8]

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 04, 2023

[Table 2] provides a frequency distribution of clinical features and abscess parameters in patients who underwent percutaneous aspiration (Group A) or pigtail catheter drainage (Group B) for the treatment of liver abscess. The first feature examined is abscess size, categorized as small (≤5 cm), medium (5-10 cm), or large (>10 cm). In both groups, the majority of abscesses fall into the medium size category, with Group A accounting for 38.6% and Group B accounting for 35.7%. This suggests that medium-sized abscesses are the most commonly encountered in clinical practice, regardless of the treatment approach chosen. It would be valuable to compare these findings with other studies to determine if this distribution aligns with previous research and to assess the impact of abscess size on treatment outcomes.

Next, the table displays the distribution of abscess location among the two treatment groups. In Group A, 45.7% of the patients had abscesses in the right lobe, while 31.4% had abscesses in the left lobe. In Group B, the corresponding percentages were 40.0% for the right lobe and 34.3% for the left lobe. These results demonstrate that liver abscesses in both lobes are common, and there is a slight predilection for abscesses to occur in the right lobe. It would be worthwhile to investigate whether the location of the abscess affects the choice of treatment and if it influences treatment outcomes or procedural challenges.[9][10][11]

Conclusion

The comparison between percutaneous aspiration and pigtail catheter drainage for the treatment of liver abscesses presents valuable insights into their clinical efficacy and outcomes. Based on the available evidence, both techniques show promising results in terms of abscess resolution and clinical improvement. However, further research is necessary to establish a clear superiority of one approach over the other.

The study's findings suggest that percutaneous aspiration and pigtail catheter drainage are effective treatment options for liver abscesses of varying sizes and locations. Both techniques demonstrate similar success rates in abscess size reduction and clinical improvement. The choice of treatment should be tailored to individual patient characteristics, abscess etiology, and local expertise.

It is important to note that this study has limitations, including its retrospective nature, potential selection bias, and confounding factors that may influence the results. Therefore, the findings should be interpreted cautiously, and additional well-designed prospective studies are needed to confirm these results and overcome the limitations.

Overall, the comparison of percutaneous aspiration and pigtail catheter drainage provides valuable information for clinical decision-making in the management of liver abscesses. The choice between the two techniques should consider factors such as abscess size, location, patient characteristics, and local expertise. Further research is warranted to elucidate the optimal treatment approach and address the limitations identified in this study, ultimately improving patient outcomes in the management of liver abscesses.

Limitations and Challenges

1. **Selection bias:** The study may suffer from selection bias due to its retrospective nature or specific inclusion criteria. The patients included in the study might not be representative of the overall population with liver abscesses, which can affect the generalizability of the findings.
2. **Confounding factors:** The presence of confounding factors, such as comorbidities, underlying liver disease, abscess location, or abscess size, may influence the treatment outcomes. Failure to account for these confounding factors adequately could affect the validity of the results.

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 04, 2023

3. **Lack of randomization:** If the study design did not involve random allocation of patients to treatment groups, there is a potential for treatment allocation bias. The choice of treatment might have been influenced by factors such as physician preference or patient characteristics, which could introduce bias into the study.
4. **Sample size:** The study might have a small sample size, which can limit the statistical power and precision of the results. Small sample sizes can also increase the risk of type II errors, where true differences between treatments are not detected.
5. **Follow-up duration:** The study might have a relatively short follow-up duration, which may not capture long-term outcomes and complications. Liver abscesses can have complex clinical courses, and assessing the durability of treatment effects over an extended period is essential.
6. **Variability in operator expertise:** The technical proficiency and experience of the operators performing percutaneous aspiration or pigtail catheter drainage can vary, which may introduce variability in the outcomes. Standardization of procedural techniques and operator experience should be considered.
7. **External validity:** The study's findings may not be applicable to different healthcare settings or populations with varying demographics, healthcare resources, or treatment practices. The generalizability of the results should be interpreted within the context of the study population.

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