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# Comparative Study of Percutaneous Catheter Drainage versus Percutaneous Needle Aspiration in Treatment of Medium to Large Size Liver Abscess

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***Authors' contributions***

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## ABSTRACT

**Background:** Modern management of liver abscesses includes a combination of percutaneous needle aspiration or percutaneous catheter drainage along with intravenous antibiotics. Liver abscess is a common disease in India, if not treated properly can lead to hazardous complication. Still, there is not much data regarding the support of percutaneous methodology in the management of medium to large size liver abscess. The study was aimed to compare percutaneous catheter drainage versus percutaneous needle aspiration in the treatment of medium to large size liver abscess.

**Materials and Methods:** This was a comparative study of 100 patients from august 2017 to august 2019, presented in outpatient and emergency department at MGM Medical College and M.Y. Hospital, Indore (M.P.) randomization was done and divide into two groups of 50 each and assigned two groups as percutaneous catheter drainage and percutaneous needle aspiration. Both groups were given intravenous antibiotic at least for 7 days. Both modalities were performed under

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the guidance of ultrasonography. Percutaneous needle aspiration was repeated up to three times and after that, if the size of the abscess cavity was not reduced to half, is considered as the failure of treatment. The effectiveness of either treatment was measured in terms of days to achieve clinical improvement, total/near-total resolution of abscess cavity and duration of hospital stay. Independent t-test was used to analyse these parameters.

**Results:** PNA was successful in 43 of 50 (86%) patients (one aspiration in 15, two in 24, and three in 11 patients), whereas PCD was successful in 49 (98%) patients (p=0.027). Duration of parenteral antibiotics needed (9.02 [2.48] vs. 10.90 [2.22] days; p=0.001) was significantly lower in the PCD group. Duration of hospital stay was (9.54 [3.36] vs. 11.40 [2.15] days; p=0.001) were significantly lower in the PCD group. Four patients with PNA had a subcapsular hematoma and three with PCD had continuous bile leakage which stopped spontaneously. No patient in the study died.

**Conclusion:** From our prospective study, we can conclude that the percutaneous continuous catheter drainage is better modality as compared to percutaneous intermittent needle aspiration in medium to large size liver abscess. The duration of hospital stay is comparatively lower in percutaneous catheter drainage and days of clinical relief were earlier in percutaneous catheter drainage. This study also verifies that both the percutaneous modalities were adequately effective in the treatment of liver abscess in terms of improvement in clinical features and laboratory investigations.

*Keywords: Percutaneous catheter drainage; hospital stay; ultrasound; percutaneous needle aspiration.*

## 1. BACKGROUND

Liver abscess is an intra abdominal or visceral abscess, i.e, a cavity containing pus present in the liver. In a historical era when antibiotics were not available routinely and when drainage procedure was not in so use, the liver abscess was uniformly fatal [1-15]. But since then due to improved antibiotic spectrum morbidity and mortality has significantly reduced [16-24].

With the advent of newer imaging techniques and availability of broad-spectrum antibiotics, the management of liver abscess is now imaging-based percutaneous needle aspiration or catheter drainage [25-35]. Some consider percutaneous catheter drainage along with intravenous broad-spectrum antibiotics as a readily accepted and safe effective treatment of a liver abscess. Some consider needle aspiration as better procedure as it is less aggressive, risky and complicated, but this requires follow-up repeated monitoring by investigations [36-46].

There are many studies and reports for the comparison of safety and efficiency of these modalities, but no study is done to compare these management modalities exclusively for medium to large size liver abscess [47-55]. It was aimed to evaluate aetiology, clinical features, prognostic factors, morbidity, safety and effectiveness of these two management strategies.

## 2. MATERIALS AND METHODS

The study was carried out on 100 patients who were having liver abscess of 5 cm in any diameter by ultrasonography after taking a detailed history and general examination. The study conducted in a single unit conducted at MGM Medical College and M.Y. Hospital, Indore (M.P.) between December 2018 to February 2019. Patients were randomized into two groups i.e. 50 patients in Group A (catheter drainage) and 50 patients in Group B (needle aspiration). All patients were given parenteral antibiotics for an appropriate period. Each procedure was conducted under local anaesthesia. Patients with malignancy in the hepatobiliary system were excluded. A disposable trocar needle of 16G will be inserted, and the abscess from the cavity is aspirated until no pus comes out even after manipulating the needle and it is repeated if there is no reduction in the size of abscess cavity or no clinical improvement in clinical features. Aspiration is done maximum up to three times. For catheter insertion, a pigtail catheter of 12-20F with a guiding stilett will be inserted. The whole of the abscess cavity was evacuated by manual syringe suction, then the catheter will be sutured to the skin and connected to the collection bag. From this day USG is being done every third day till abscess cavity is fully evacuated and removed if the collection was nil for the last 24 hours. All patients were observed for any postoperative pain, bile leak, length of hospital stay and collection (hematoma, seroma)

were the outcomes measured per treatment arm. Using the Chi-square test, student t-test, results were evaluated within a 95% confidentiality range and a p-value of less than 0.05 was considered significant.

## 2.1 Statistical Analysis

**Table 1. Distribution of patients based on gender**

| Group → | Catheter drainage | Needle aspiration |
|---|---|---|
| **Gender** | | |
| Female | 10 (20%) | 12 (24%) |
| Male | 40(80%) | 38 (76%) |

**Age**

Table 3 shows that the mean of Needle Aspiration group is significantly higher than that of Catheter Aspiration group.

Duration of Hospital stay of Catheter Aspiration group patients was significantly lower than that of Needle Aspiration group patients.

Patients falling under Catheter drainage group show a higher percentage of 98% for Success while, lower percentage 2% belonged to failed. Similarly, patients falling under needle aspiration group show a higher percentage of 86% for success while a lower percentage 14% belonged to failed.

Table 5 shows the association between Different Groups and Reoccurrence after 1 Month which found to be significant (P <0.05). Patients falling under Catheter Drainage group show a higher percentage of 94% for No Reoccurrence after 1 Month while lower percentage 6% belonged to having it. Similarly, patients falling under Needle Aspiration group show a higher percentage of 80% for No Reoccurrence after 1 Month while lower percentage 20% belonged to having it.

The Table 6 shows the association between Different Groups and Reoccurrence after 3 Months which found to be non-significant (P >0.05).

The Table 7 shows the association between Different Groups and Reoccurrence after 6 Months which found to be non-significant (P >0.05).

**Table 2. Distribution of patients based on age**

| | Min | Max | Mean | Standard Deviation | p-Value |
|---|---|---|---|---|---|
| Catheter drainage | 20 | 70 | 47.96 | 11.590 | 0.718 |
| Needle aspiration | 20 | 70 | 47.12 | 11.616 | |

**Table 3. Comparison of mean of the duration of antibiotics and hospital stay between two groups**

| Parameter | Group statistics | N | Mean | Std. deviation | T-Test | P-Value | Result |
|---|---|---|---|---|---|---|---|
| Duration of I/V Antibiotics | Catheter Aspiration | 50 | 9.02 | 2.487 | 3.984 | 0.000 | Significant |
| | Needle Aspiration | 50 | 10.90 | 2.225 | | | |
| Hospital stay | Catheter Aspiration | 50 | 9.54 | 3.358 | 3.300 | 0.001 | Significant |
| | Needle Aspiration | 50 | 11.40 | 2.148 | | | |

*Student T Test Applied P < 0.05 Significant*

**Table 4. Association between different groups and outcome**

| Outcome | | Group | | Total |
|---|---|---|---|---|
| | | Catheter drainage | Needle aspiration | |
| Failure | Count | 1 | 7 | 8 |
| | % | 2.0% | 14.0% | 8.0% |
| Success | Count | 49 | 43 | 92 |
| | % | 98.0% | 86.0% | 92.0% |
| Total | Count | 50 | 50 | 100 |
| | % | 100.0% | 100.0% | 100.0% |

*Chi-Square Test = 4.891, df = 1, P-Value = 0.027 Significant*

**Table 5. Association between different groups and reoccurrence after 1 month**

| Reoccurrence after 1 month | | Group | | Total |
|---|---|---|---|---|
| | | Catheter drainage | Needle aspiration | |
| No | Count | 47 | 40 | 87 |
| | % | 94.0% | 80.0% | 87.0% |
| Yes | Count | 3 | 10 | 13 |
| | % | 6.0% | 20.0% | 13.0% |
| Total | Count | 50 | 50 | 100 |
| | % | 100.0% | 100.0% | 100.0% |

*Chi-Square Test = 4.332, df = 1, P-Value = 0.037* Significant*

**Table 6. Association between different groups and reoccurrence after 3 months**

| Reoccurrence after 3 Month | | Group | | Total |
|---|---|---|---|---|
| | | Catheter drainage | Needle aspiration | |
| No | Count | 48 | 47 | 95 |
| | % | 96.0% | 94.0% | 95.0% |
| Yes | Count | 2 | 3 | 5 |
| | % | 4.0% | 6.0% | 5.0% |
| Total | Count | 50 | 50 | 100 |
| | % | 100.0% | 100.0% | 100.0% |

*Chi Square Test = 0.211, df = 1, P Value = 0.646 Non-Significant*

**Table 7. Association between different groups and reoccurrence after 6 months**

| Reoccurrence after 6 month | | Group | | Total |
|---|---|---|---|---|
| | | Catheter drainage | Needle aspiration | |
| No | Count | 46 | 46 | 92 |
| | % | 92.0% | 92.0% | 92.0% |
| Yes | Count | 4 | 4 | 8 |
| | % | 8.0% | 8.0% | 8.0% |
| Total | Count | 50 | 50 | 100 |
| | % | 100.0% | 100.0% | 100.0% |

*Chi Square Test = 0.000, df = 1, P Value = 1.000 Non-Significant*

## 3. RESULTS AND DISCUSSION

A hundred patients of liver abscess and were randomly distributed into catheter drainage and needle aspiration groups. It was found that 60 (60% of total) cases belonged to amoebic liver abscess while 40 (40% of total) cases belonged to pyogenic category.

The total median duration of intravenous antibiotic administration needed for patients in the catheter drainage group was 8 days with an average of 8.9 days; while values for needle aspiration group were 9.5 and 10.5 days respectively.

The total median duration of hospital stay for patients in the catheter drainage group was 9 days with an average of 9.62 days; while values for needle aspiration group were11.5 and 11.3 days respectively. There was a statistical difference between two groups in the duration of intravenous antibiotics and days of hospital stay. Regarding clinical efficacy of the two percutaneous methods, it was found that both of them were effective against treatment of liver abscess which was recorded in terms of post-intervention improvement in various clinical parameters as relieve in pain, relieve in jaundice, relieves of fever, decreases in hepatomegaly.

Out of 50 patients in the catheter drainage group, 3 (6%) patient showed recurrence after 1 month. Out of 50 patients in the needle aspiration group, 10 (20%) patient showed recurrence after 1 month. There was a statistical difference in recurrence rate after 1 month of two groups, (p-value=0.037). The success rate in catheter drainage group was 98% and that in needle aspiration group was 86% (p-value = 0.027) The difference in success rate in the two groups were statistically significant.

There was no mortality or death in both groups.

Complication related to needle aspiration was haemorrhage in four cases which stopped spontaneously without hemodynamic compromise.

Complication related to catheter drainage group was bile leak in three cases which stopped spontaneously.

There was no statistical difference in recurrence after 3 and 6 months in two groups.

## 4. CONCLUSION

From our prospective study, we can conclude that the percutaneous continuous catheter drainage is better modality as compared to percutaneous intermittent needle aspiration in medium to large size liver abscess in several aspects.

The duration of hospital stay is comparatively lower in percutaneous catheter drainage and days of clinical relief were earlier in percutaneous catheter drainage. This study also verifies that both the percutaneous modalities were adequately effective in the treatment of liver abscess in terms of improvement in clinical features and laboratory investigations.

Our study also verifies that the recurrence rate is considerably higher in percutaneous needle aspiration.

## CONSENT AND ETHICAL APPROVAL

The approval was taken from the ethical committee before initiating the study and informed consent was taken from the patients, we explained all surgical procedures and their possible consequences to the patients.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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