ORIGINAL RESEARCH PAPER

Medicine

KEY WORDS:

COMPARATIVE STUDY OF CATHETER DRAINAGE AND NEEDLE ASPIRATION IN MANAGEMENT OF LIVER ABSCESSES

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ABSTRACT

Currently, there are 2 alternative methods for drainage of pus from a large liver abscess. Percutaneous therapeutic procedures have been increasingly performed compared with open surgical drainage (SD). Liver abscesses larger than 5 cm are currently treated by intravenous antibiotics and either percutaneous continuous catheter drainage (PCD) or percutaneous intermittent needle aspirationThis study aims to compare the therapeutic effectiveness and necessity of 'Percutaneous continuous catheter drainage' versus 'Percutaneous intermittent needle aspiration' in the percutaneous group of treatment for large liver abscesses(>10cm size); thus making it the first study in the literature that compares the 2 percutaneous modalities for treatment of large liver abscesses >10 cm.

The combination of systemic antibiotics and percutaneous drainage has become the treatment of choice for the management of liver abscesses in most centers. In general, surgical drainage has been reserved for patients who fail to respond to treatment with percutaneous drainage and antibiotics or who have concurrent intraabdominal pathology which requires surgical management.

With the introduction of high-resolution imaging modalities including US and CT in the recent two to three decades, and advent of minimally invasive therapy such as image-guided percutaneous needle aspiration or catheter drainage and the availability of broad-spectrum antibiotics, patients with pyogenic liver abscess nowadays seldom require open surgery for treatment. This shift of practice has been guided by a drive for minimally invasive therapy whenever possible, and the advantages of avoiding general anaesthesia and an operative procedure.

Modern treatment has shifted the treatment of liver abscess toward IV broad-spectrum antibiotics and imaging-guided percutaneous needle aspirationor percutaneous catheter drainage (PCD).

This study includes all the patients with diagnosis of liver abscess, >10cm in size by sonography irrespective of their demographics, size of liver abscess, causative pathogen, clinical presentation, pretreatment LFT's and other blood investigations and concurrent illness for their treatment by 'percutaneous intermittent needle aspiration' or 'percutaneous continuous catheter drainage' AND to assess the relative effectiveness and need of either one of these two techniques.

Aims & Objective:

The study aims are:

1. To evaluate efficacy of catheter drainage versus needle aspiration along with medical therapy in management and outcome of liver abscess.
2. To study other causes which can mimic like liver abscess e.g infected hydatid cyst of liver
3. To assess post procedure complications related to both procedure.

MATERIALS AND METHODS:

4. Study area: department of medical gastroenterology, institute of medical sciences, BHU, VARANASI.

5. Study population: Patients diagnosed having liver abscess based on clinical findings and imaging techniques

6. Study period: August 2015 - July 2016

DISCUSSION

Liver abscess is a very commonly encountered problem in clinical practice in India (Mukhopadhya and Balaji et al.), which if not taken seriously carries a high mortality. Currently, there are 2 alternative methods for drainage of pus from a large liver abscess. Percutaneous therapeutic procedures have been increasingly performed compared with open surgical drainage (SD). Liver abscesses larger than 5 cm are currently treated by intravenous antibiotics and either percutaneous continuous catheter drainage (PCD) or open surgical drainage. Percutaneous techniques have been increasingly performed in place of open drainage as first-line treatment. This paradigm shift has been fueled by the drive for low-risk and less-invasive procedures and the surgical option being reserved for percutaneous failures. Yet there is a lack of data to support percutaneous drainage over percutaneous aspiration as first-line treatment for large liver abscesses of >10 cm size. Thus, the trend in management of liver abscesses has been moving strongly toward non-surgical methods. Large proportion of patients can be treated with excellent results with a combination of parenteral antibiotics and image-guided percutaneous treatment. Our own institute recommends intermittent needle aspiration even for very large abscesses, failing which open surgical drainage is recommended.

In modern practice of minimally invasive therapies continuous catheter drainage and needle aspiration have come up as novel techniques; smaller ones can be treated with a combination of antibiotics and needle aspiration, but which is better in large liver abscesses (>10 cm): a catheter or needle is debatable.

Large abscesses usually need to be aspirated many times; repeated aspirations with a wide bore needle may be uncomfortable or more traumatic to the patients as compared to catheter which can be left in situ for long time. Also, an attempt to evacuate the abscess cavity completely may lead to haemorrhage; as it had occurred in one of our patients in aspiration group.

On the other hand, continuous catheter drainage is completely under control. It can be clamped at any moment during drainage to avoid potentially dangerous sudden decompression of abscess cavity.

Another advantage of continuous drainage with a catheter is that whatever pus is formed comes out and does not get accumulated inside the cavity.

Although, there studies have been done to compare the relative safety and efficacy of these two percutaneous treatment modalities, but no study have ever been conducted to compare these two modalities exclusively for large (>10 cm) liver abscesses. It has been recommended time to time by various workers that abscesses >5-6 cm should be subjected to continuous catheter drainage and smaller ones should either be aspirated or treated conservatively. We aim to compare these two treatment modalities in terms of their relative efficacy and safety for exclusively large abscesses.

This study is a prospective randomized trial comparing

percutaneous continuous catheter drainage and percutaneous intermittent needle aspiration in the percutaneous treatment outcome of liver abscesses of size more than 10 cm.

Between Jan 2015 and 0ct 2016, 144 patients of liver abscess (Both amoebic and pyogenic) size > 10cm were assessed for eligibility for participation in the study. Ten were excluded due to pretreatment rupture of abscess and two because of concomitant fulminant amoebic colitis for which urgent exploration was done, leaving a total of 132 patients to be randomized into the two percutaneous treatment groups. As follow up is a major problem being faced in India; only 15% pts. In aspiration group completed follow-up for six months, compared to 27% in catheter group. None of the patients had their treatment discontinued.

All the 132 patients included in the study diagnosed to have liver abscess (Both Amoebic and Pyogenic), had size of the abscess cavity >10 cm in atleast one dimension. All were started i/v ampicillin, gentamycin and metronidazole, as soon as the diagnosis is made. Thirty-three patients were randomized into each of the catheter drainage and needle aspiration groups. There was no statistically significant difference in patient charactristics and coexisting underlying disease/morbidity of the two groups (Table I,II and III).

The clinical features and laboratory results of the 132 patients at inclusion were studied. Features such as incidence of fever, incidence of chills and rigor, incidence of right hypochondrial pain, incidence of jaundice, nausea/vomiting and anorexia/malaise were recorded; and no statistically significant difference between the patients of two groups could be identified in any of these items (Table IV). Also there was no statistically significant difference between the patients of two groups when white blood cell count, bilirubin level, serum level of alkaline phosphatase, which is commonly elevated in patients with liver abscess, serum protein level and prothrombin time were analyzed.

Also, there was no statistical difference in abscess characteristics in the two groups, including the number of abscesses in each patient, lobe involvement and number of patients with amoebic and pygenic type of abscess in each treatment group.

It was noted that 84 (64% of total) cases belonged to amoebic category while pyogenic liver abscess was the diagnosis in only 48 (36%) patients.

It was recorded that right hypochondrial pain was the most common symptom in our study, present in 122 (92.4%) of patients; followed by fever in 108 (82%), and anorexia and malaise in 106 (80.2%) cases. Jaundice was seen in only 18 (13.6%) of patients (Table IV).

Gall bladder or CBD calculi were the most common co-morbidity being present in 34 (51.5% cases) followed by cholangitis(22) and diabetes mallitis (16) patients.

66% of total patients included in the study had leucocytosis (TLC >11,000/cmm).

Prothrombin time –INR was raised above 2 in around 30% of total cases, and serum total bilirubin was more than 2.0 in over 35 % of cases although clinical jaundice was evident only in 13.6 %.

It was noted that number of aspirations required in the needle aspiration group was once in 32 patients (49%), twice in 24 patients (38%), and three times or more in 10 patients (13%).

The total duration of catheter insertion for each patient in the catheter drainage group ranged from 6-34 days, with a median of 9 days and an average of 9.6 days.

The abscess cavity was found to be absent by sonography done at the time of discharge in 46 (69.7%) patients in catheter group, and in 38 (57%) patients in aspiration group.

The median value of pus evacuated at first sitting was 200 ml in aspiration group and 280 ml in catheter group, with an average of 198.5 ml and 310 ml in both groups respectively.

Total mean duration of intravenous antibiotic administration needed for patients in needle aspiration group was 10 days with an average of 10.1 days; while values for catheter group were 8 and 8.7 days respectively.

There was no statistically significant difference in the success rate and recurrence rate of two groups. The success rate was 91% and 97% in aspiration group and catheter group respectively. Needle aspiration failed in 6 out of 66 patients, as either abscess did not show signs of resolution or there was no clinical relief attained even after three aspirations. Main reason for failure of needle aspiration was presence of thick pus in three of these. In one patient, pus re-accumulated again quickly after each aspiration. Continuous catheter drainage failed in two case only that was due to pyogenic liver abscess. Reason for failure was rupture of abscess.

At six months of follow-up recurrence rate for aspiration and catheter group was 0.12 and 0.06 respectively.

Four of the six failures of aspiration group were treated by successful open surgical drainage while two underwent successful laparoscopic surgical drainage. There were two patient in the catheter drainage group suffering from pyogenic liver abscess that required surgery due to rupture, during treatment leading to peritonitis and sepsis. These patients underwent exploration with curettage of abscess cavity along with peritoneal lavage and placement of abdominal drains. Unfortunately, we lost this patient because of persistent sepsis and multi-organ failure. There was no death in first group.

Only procedure related complication in two case undergoing needle aspiration was hemorrhage which lead to the formation of sub capsular hematoma without hemodynamic compromise.

Complications related to catheter drainage included bile leak in four cases that stopped spontaneously; and rupture in two patient who then needed open surgical drainage and eventually died.

This is the first study in the literature comparing these two treatment options exclusively for large sized liver abscesses.

Previously only two studies have been done directly comparing catheter drainage and needle aspiration:

1. Rajak et al. in 1998, did randomize 50 patients with liver abscesses into a needle aspiration group and a catheter drainage group and showed a significantly higher success rate in the catheter drainage group. They also included patients with both amoebic and pyogenic liver abscesses, but they also included abscesses smaller than 10 cm size. In addition, they had limited their aspiration attempts to two times, which is likely to reduce the overall success rate of needle aspiration (60%) compared with catheter drainage (100%). In view of only large sized abscesses included in present study, we decided to limit our aspiration attempts to three. Any patients (three in number) needing more than three attempts to cause successful treatment is considered as one of the criteria for failed aspiration treatment.
2. Simon Yu et al. in 2003, also did a prospective randomization of 64 patients of liver abscess cases to compare these two treatment modalities, but they only included pygenic liver abscess cases. They concluded both these techniques equally effective and safe for treatment as far as hospital stay, clinical relief, morbidity, mortality, success rate etc. are concerned; while because of easier procedural technique, less time-consuming, and cost effectiveness the intermittent needle aspiration technique deserves to be considered a first-line drainage approach for pyogenic liver abscesses.

Right hypochondrial pain was the most common symptom in

Rajak et al's (96%) and present study (92%) while in Simon Yu's groups fever was most common finding (83%) and fever was noted in only 25% cases.

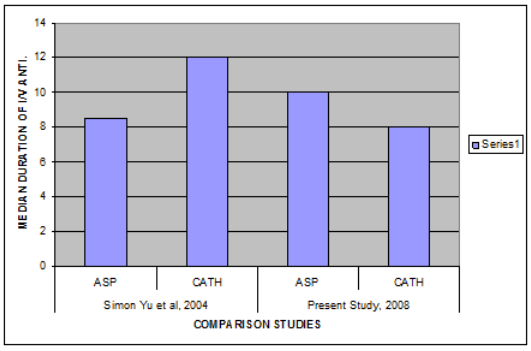
Lecocytosis was noted in 66% of total no. of patients in present study while in Rajak's and Simon's studies the figures were 83% and 89% respectively.

Most common comorbidity in Simon's series was diabetes mallitis. On the other hand gall bladder and CBD diseases including calculi and cholecystitis were among the most common in our series.

MEDIAN DURATION OF I/V ANTIBIOTICS NEEDED (DAYS)

	Simon Yu et al, 2004		Present Study, 2008	
TREATMENT GROUP	ASP	CATH	ASP	CATH
MEDIAN DURATION OF I/V ANTIBIOTICS NEEDED (DAYS)	8.5	12	10	8

Median duration for which parenteral antibiotics were needed, was significantly higher in catheter group when compared to patients in aspiration group, in Simon's study. But in present study this was lower than as for aspiration group. This fact definitely adds to the cost effectiveness of catheter insertion.

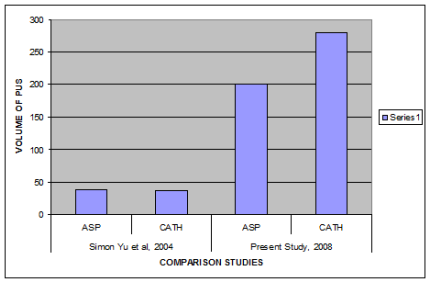


VOLUME OF PUS- DRAINED AT FIRST SITTING

	Simon Yu et al, 2004		Present Study, 2008	
TREATMENT GROUP	ASP	CATH	ASP	CATH
VOLUME OF PUS- draining at first sitting(PUSV)-ml	38.5	37.5	200	280

In Simon's done in 2004, volume of pus drained at first sitting was almost same in both groups and was very low. Present study showed a significantly higher volume of pus that can be drained at first sitting probably because of large size of catheter and manipulation of catheter which can break any loculi if present.

This fact is suggested as the probable cause of early clinical recovery, shorter duration of medical treatment and hospital stay and thus lesser cost of therapy with catheter drainage.



Success rate of present study and Simon Yu's study did not show significant difference in two groups, while Rajak et al. showed 100% success rate in catheter group compared to 60% in aspiration.

In Simon Yu's study statistical significance, in all three outcome measures—hospital stay duration, treatment success rate, and mortality rate was not there—still he favored the intermittent needle aspiration group.

Our study showed statistically significant difference ($p < 0.05$) in following categories:

- Volume of pus evacuated at first sitting
- Duration for which I/V antibiotics were needed
- Duration to achieve clinical relief
- Duration of hospital stay
- Presence or absence of abscess cavity at discharge

CONCLUSION

- A "Randomized Comparative Study between Percutaneous Intermittent Needle Aspiration & Continuous Percutaneous Catheter Drainage in the Percutaneous Treatment of Large Liver Abscess" is done, and the available literature has been reviewed and presented. It is observed that in view of very significant difference in volume of pus that can be drained at very first sitting, duration to attain clinical relief, duration of Hospital stay, and thus duration I/V antibiotics needed-- the technique of continuous catheter drainage is cost effective.
- The repeated aspirations with a wide bore needle may be uncomfortable or more traumatic to the patients as compared to catheter drainage.
- As the volume of pus drained at first sitting is significantly higher in catheter group, these patients get relieved of septic load of pus at the very first sitting- thus clinical improvement is faster.
- In view of the study done to compare the two treatment modalities for large liver abscesses it cane be concluded that continuous catheter drainage is a better treatment when compared with intermittent needle aspiration, in terms of Hosp. stay, duration of treatment needed with parentral antibiotics and hence is more cost effective and more acceptable as far as patients comfort is considered, and hence should be given priority over intermittent needle aspirations.

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