

## COMPARATIVE STUDY OF USG GUIDED PIGTAIL CATHETER DRAINAGE VS CONTINUOUS ASPIRATION IN LIVER ABSCESS

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### ABSTRACT

**Background:** Liver abscess is a disease of frequent occurrence which figures prominently in the differential diagnosis of upper abdominal and right lower respiratory tract diseases. These includes a recent increase in incidence reflecting more accurate diagnostic techniques especially after 1965 with the advent of radioisotopes scan and later on ultrasonography and CT scan. The reduction in mortality from 90% at the turn of century to the estimated 10-20% today cannot be ascribed to surgery alone. **Methods:** The study was conducted on 65 patients of liver abscess. Two compared modalities of percutaneous treatment of liver abscess were (1) needle aspiration and (2) pigtail catheter aspiration. All interventions were performed under ultrasonography guidance. Only those patients having liver abscess/abscesses greater than 5 cm in at least one dimension, liquefied & drainable were included in this study. **Results:** Amoebic liver abscess (68.33%) was more common than pyogenic liver abscess (31.67%). Clinical recovery was significantly earlier in catheter group (average 5 days) than in needle aspiration group (average 6.29 days) (p value 0.001). Average duration of i.v. antibiotic is significantly shorter in catheter group (6.4 days) than in needle aspiration group (9.5 days) (p value - 0.002). **Conclusions:** Thus, our study concluded that in view of greater volume of pus drained in first sitting, early clinical recovery, shorter duration of hospital stay and slightly more success rate continuous catheter drainage is effective percutaneous treatment modality than intermittent needle aspiration.

**KEYWORDS:** Amoebic liver abscess, Pyogenic liver abscess, pigtail catheter, Needle aspiration, Ultrasonography.

### INTRODUCTION

Liver abscess is a common condition in India. It is associated with high morbidity and mortality. It is a common disease of the tropical region. Abscess develops in liver due to various reasons, but is broadly classified into Amoebic and pyogenic. The options in managing liver abscess are medical and percutaneous or open surgical drainage. Uncomplicated liver abscess has been managed conservatively with amoebicidal and antibiotic drugs. The traditional therapy of intra-abdominal liver abscess has been operative drainage as originally described by Volkmann in 1879. The reduction in mortality from 90% at the turn of century to the estimated 10-20% today cannot be ascribed to surgery alone. During the last few year, the sophistication of newer radiological techniques namely computed

tomography (CT) and ultrasonography (USG),<sup>[1]</sup> has not only prescribed tools for accurate localization of these abscess but has also created the possibility for their safe aspiration and drainage in certain instances obviating the need for surgical intervention. 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). This study aims to compare the therapeutic effectiveness and safety of 'Percutaneous continuous catheter drainage using pigtail catheter' versus 'Percutaneous intermittent needle aspiration' in the percutaneous group of treatment for liver abscesses. Modern treatment has shifted the treatment of liver abscess toward IV broad-spectrum antibiotics and imaging-guided percutaneous needle aspiration or

percutaneous catheter drainage (PCD).<sup>[2]</sup> This study includes all the patients with diagnosis of liver abscess >5 cm in size by sonography irrespective of their demographics, size of liver abscess, causative pathogen, clinical presentation, pre-treatment 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.<sup>[3]</sup>

## METHODS

A prospective study of 65 patients with liver abscess were recruited for USG guided percutaneous catheter drainage at department of surgery, Patna Medical College and Hospital, Patna, Bihar India during period from January 2017 to June 2018. Consent for the study from ethical committee PMCH was taken. Diagnosis of liver abscess was made on basis of clinical history, physical examination followed by USG. Study cases selected according to following criteria and who give informed and written consent for same. Age group of our study is 23 to 67 years. Patients having abscess cavity size >5 cm, liquefied abscess, number of abscess < 3 with abscess cavity easily accessible for drainage are included in our study. Patients having rupture liver abscess into peritoneum or pleura, multiple ( $\geq 3$ ) liver abscess, solitary liver abscess <5 cm in size in USG, non-liquefied abscess, abnormal coagulation profile are excluded from the study.

### Technique

**For pigtail drainage:** 10 or 12 French pigtail catheter was selected according to viscosity of pus under USG guidance. Injection atropine 0.5 mg IM stat was given half hour before procedure. Liver abscess located by USG and the site for drainage was marked. Painting, draping and isolation of part were done. Under all antiseptic precautions drainage site was infiltrated with 2% lignocaine. Skin incision of 0.5 cm was made at drainage site. Under real time sonographic guidance the initial puncture needle (18G, 21 cm long) was inserted through the skin stab and guided to the centre of the abscess cavity. The stellate was taken out and pus was aspirated to confirm the position and the aspirated pus was collected for culture, sensitivity and routine microbiology. A 'J' tip guide wire was inserted through the needle and the needle was taken out without displacing the guide wire. Serial dilators were passed keeping guide wire in situ and tract was dilated adequately. Pigtail catheter was introduced and positioned into centre of cavity. Guide wire was withdrawn and pigtail was connected to a closed drainage bag and fixed to the skin. Sterile dressing was applied. The output was monitored at stat and then daily. Metronidazole and ciprofloxacin were given in therapeutic doses for a period of 2 weeks. Gentamycin was given for 5 days. Alternate day USG studies were done post procedure to monitor the cavity

size, volume and to confirm the position of tip of the catheter. Clinical improvement in the patient's condition was noted in terms of relief from pain, fever and decreased WBC count.

The pigtail catheter was removed when drainage become serous and it either ceased or was minimal (<10 ml in 24 hours) and USG was suggestive of reduced size/collapsed cavity without any residual pus. On removal of the catheter, sterile dressings were applied. All patients were advised for follow up after 15 days, 1 month and 3 months and were assessed clinically and ultrasonographically to see for residual cavity and recurrence or non-resolving abscess.

**For needle aspiration:** Depending upon the abscess to be drained the patient was given appropriate position.

- Intravenous line was set up.
- The appropriate part of the abdomen and lower chest was cleaned thoroughly with Spirit and Betadine. The cleaned part was then draped. The transducer probe was covered with sterile gloves.
- The abscess cavity was located, and appropriate route decided to avoid important structures (bowel loops and costo-phrenic recess).
- The shortest path that causes minimal liver parenchymal trauma was chosen.
- Depth of abscess from skin, appropriate angle of the approach and exact site of puncture was determined.
- Local anaesthesia with 2% xylocaine was given so as to raise small wheal and then at the site of puncture a small nick was given on the skin with the help of 11 no. blade.
- The patient was asked to hold his breath and the 18G needle was passed towards the abscess cavity with predetermined angle and up to the predetermined depth.
- Presence of needle in the abscess cavity was confirmed by a giving way sensation, scanning needle tip echo and the free flow of pus.
- Syringe was applied on the 18G needle and aspirated. Pus sample as collected in a sterile specimen bottle for microscopy and culture sensitivity. Pus was drained till the cavity collapsed (as confirmed by ultrasound) or till no more pus is aspirated, even after manipulating the needle.
- Intermittent needle aspiration will be done with 18G disposable needle. Aspiration will be repeated if there is either no clinical improvement or no reduction in size of the abscess cavity/cavities. Aspiration is done up to maximum of three times.

## RESULTS

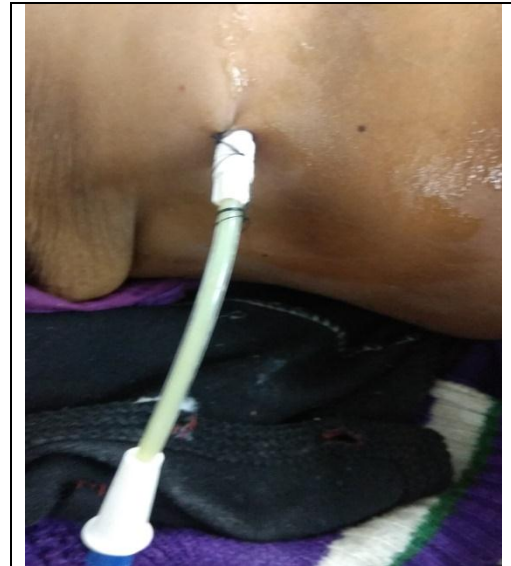
The study was conducted on 65 patients of liver abscess. Out of 65 patients, 4 were excluded because of pre-treatment of rupture of abscesses and one because of negative consent of patient for any percutaneous intervention. Remaining 60 patients were divided into two groups consists of 27 patients in each needle aspiration group and 33 pigtail catheter group. In all

patient iv ampicillin, gentamycin and metronidazole were started, as soon as diagnosis was made. All interventions were performed after taking strict aseptic measures. There was no statistically significant difference found in patient characteristics like age, sex, religion, comorbidities etc., between two groups. It was observed that:

- Commonest age group for occurrence of liver abscess was between 21 to 40 years (53.33%)
- Liver abscess occur more commonly in males (78.33%) than in females (21.66%)
- Commonest comorbidity in both groups was dyspepsia (61.66%)
- Commonest symptom in both groups was fever (81.66%)
- Solitary abscesses (86.33%) were more common than multiple abscesses (13.66%)
- Right lobe abscesses (81.66%) were more common than left lobe abscesses (6.66%) where as both lobes were involved in (11.66%) cases.
- Amoebic liver abscess (68.33%) was more common than pyogenic liver abscess (31.67%).
- Volume of pus drained in first sitting by catheter group was significantly more than needle aspiration group (p value 0.0011)
- Clinical recovery was significantly earlier in catheter group (average 5 days) than in needle aspiration group (average 6.29 days) (p value 0.001). Average duration of i.v. antibiotic is significantly shorter in catheter group (6.4 days) than in needle aspiration group (9.5 days) (p value 0.002)
- Duration of hospital stay is significantly shorter in catheter group than in needle aspiration group (p value 0.001)
- 32 patients out of 33 were successfully treated by catheter group (97%) whereas 24 patients out of 27 were successfully treated by needle aspiration group (89%) (p value 0.045). i.e. catheter drainage was slightly more successful.

## DISCUSSION

As per Mukhopadhyaya and Balaji *et. al.* liver abscess is very common clinical problem in India, which if not taken seriously carries high mortality<sup>4,5</sup>. First published review of liver abscess was done by Bright in 1936.



**Fig: Pig tail catheter drainage.**

Berger and Osborne reported improvement after needle aspiration in 15 patients only two require more than two aspirations<sup>6</sup>. While performing this prospective study it is observed that patient suffering from liver abscess are also simultaneously suffering from other diseases. These comorbidities includes gall bladder/common bile duct calculi, cholecystitis, diabetes mellitus, cholangitis, colitis, appendicitis and dyspepsia etc.<sup>[8]</sup>

The most common comorbidity 61.66% (37/60) among both groups in our study is found to be dyspepsia<sup>9</sup>. In our study most common complaint 81.66% (49) was found to be fever i.e. 81.48% (22) in aspiration group while 81.18% (27) in catheter group.

There was no significant statistical difference found in abscess characteristics in the two groups, including the number of abscess in each group. In our study it was observed that solitary abscesses were more common 86.33% (50) as compare to multiple liver abscess. In needle aspiration group 81.14% (22/27) and in catheter drainage group 84.84% (28/33). On applying chi-square test, chi-square value is 2.20 and p-value is 0.152 which (>0.05) non-significant implying that solitary and multiple abscesses are similarly distributed in both groups.

Majority of liver abscess are divided in three types namely amoebic, pyogenic and fungal.<sup>10</sup> In present perspective study we found no positive case of fungal abscess. Amoebic abscesses are more common 68.33% (41/60) finding in our study 66.66% (18/27) in aspiration group and 69.70% (23/33) in catheter group. Pyogenic abscess is found in 31.67% (19/60). 33.33% (9/27) in aspiration group and 30.30% (10/33) in catheter group. On comparing two groups by chi-square test p-value is 0.28 (>0.05) which is non-significant i.e. there is no statistical difference in distribution of type of liver abscess between two groups exist. Standard text book of General Surgery- quote's that "in United States pyogenic

hepatic abscess constitute over 80% of liver abscesses rest being amoebic in nature".<sup>[11]</sup> Another standard textbook of General Surgery -quote's that "Pyogenic liver abscess are more common in Eastern countries."<sup>[12]</sup> It has an increased incidence in elderly, diabetics and the immunosuppressed patients who usually present with anorexia, fever and malaise accompanied by right upper quadrant discomfort". It also text that "Entamoeba histolytica is endemic in many part of the world mainly eastern countries which accounts for more incidence of amoebic liver abscess in these countries probably because of poor sanitation". Over all incidence of amoebic liver abscess are more common in world as compare to pyogenic liver abscess.<sup>[13]</sup> Rajak in his study conducted at Post Graduate Institute of Chandigarh in 1998 also found that incidence of amoebic liver abscess were more common i.e. 80% (20 patients out of 25).

On further studying there were no statistically significant difference found between the patients of two groups when white blood cell count, bilirubin level, serum level of alkaline phosphatase, which is commonly elevated in patient with liver abscess, serum protein level and prothrombin time were analysed. 78.33% of total patient had leucocytosis (TLC >11,000/cu/mm<sup>3</sup>), where as in Rajak's and Simon's study the figures were 83% and 89% respectively.

In present study success rate between aspiration group is 88.88% (24 patients) and catheter group is 93.39% (31 patients). Catheter group is slightly more successful as compared to aspiration groups on applying chi-square test p-value is 0.065 (>0.05).

Simon YU's et al. in 2003 done on 64 patients of liver abscess cases to compare these two treatment modalities concluded both these techniques equally effective and safe for treatment as for 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 techniques deserve to be considered as first line drainage approach for liver abscess.

## CONCLUSION

From this prospective study we can concluded that in view of greater volume of pus (> 5 cm) drained in first sitting, early clinical recovery, shorter duration of hospital stays and slightly more success rate continuous catheter drainage is more effective percutaneous treatment modality than intermittent needle aspiration. Because of small no. of patient studied (65 patients) in shorter duration (1.5 years) of study and follow-up, human, instrumental and technical error is always possible, hence larger study group and more extensive study is needed to be studied for generalizing the results.

## REFERANCES

1. Katzenstein D, Rickerson V, Braude A. New concepts of amebic liver abscess derived from hepatic imaging, serodiagnosis, and hepatic enzymes in 67 consecutive cases in San Diego. *Medicine (Baltimore)*, 1982; 68: 237-46.
2. Seeto RK, Rockey DC. Pyogenic liver abscess. Changes in etiology, management, and outcome. *Medicine (Baltimore)*, 1996; 75(2): 99-113.
3. Krige JE, Beckingham IJ. ABC of diseases of liver, pancreas, and biliary system: liver abscesses and hydatid disease. *BMJ*, 2001; 322(7285): 537.
4. Pitt HA, Zuidema GD. Factors influencing mortality in the treatment of pyogenic hepatic abscess. *Surg. Gynecol. Obstet*, 1975; 140: 228-34.
5. Mischinger HJ, Hauser H, Rabl H, Quehenberger F, Werkgartner G, Rubin R, et al. Pyogenic liver abscess: studies of therapy and analysis of risk factors. *World J Surg*, 1994; 18: 852-7.
6. Chou FF, Sheen-Chen SM, Chen YS, Chen MC, Chen FC, Tai DI. Prognostic factors for pyogenic abscess of the liver. *J Am Coll Surg*, 1994; 179: 727-32.
7. Zibari GB, Maguire S, Aultman DF, McMillan RW, McDonald JC. Pyogenic liver abscess. *Surg Infect (Larchmt)*, 2000; 1: 15-21.
8. Rajak CL, Gupta S, Jain S, Chawla Y, Gulati M, Suri S. Percutaneous treatment of liver abscesses needle aspiration versus catheter drainage *AJR Am J Roe.*, 1998; 170(4): 1035-9.
9. Yu SC, Ho SS, Lau WY, Yeung DT, Yuen EH, Lee PS, et al. Treatment of pyogenic liver abscess: prospective randomized comparison of catheter drainage and needle aspiration. *Hepatol*, 2004; 39: 932-8.
10. Wong WM, Wong BC, Hui CK, Ng M, Lai KC, Tso WK, et al. Pyogenic liver abscess: retrospective analysis of 80 cases over a 10-year period. *J Gastroenterol Hepatol*, 2002; 17: 1001-7.
11. Fischer JE, Bland KI. *Mastery of Surgery*. In: Callery MP, Ed. Philadelphia: Wolters Kluwer Health, 5th edn, 2007.
12. Barakate MS, Stephen MS, Waugh RC, Gallagher PJ, Solomon MJ, Storey DW, et al. Pyogenic liver abscess: a review of 10 year's experience in management. *Aust N Z J Surg*, 1999; 69: 205-9.
13. Wang W, Lee WJ, Wei PL, Chen TC, Huang MT. Laparoscopic drainage of pyogenic liver abscesses. *Surg Today*, 2004; 34: 323-5.