

Research Article

A prospective study of USG guided pigtail catheter drainage in management of liver abscess

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ABSTRACT

Background: Treatment of the liver abscess of any etiology has evolved in the recent years. Percutaneous drainage of liver abscess has been an important advancement in the treatment of pyogenic liver abscesses. Aim: to evaluate and assess response, morbidity and complication rates of percutaneous pig tail catheter drainage in treatment of liver abscess.

Methods: During a period of 27 months, 25 patients with liquefied liver abscess $\geq 5 \times 5$ cm underwent percutaneous drainage under sonographic guidance.

Results: 18 had solitary abscess, while 7 had multiple abscesses. Pigtail catheters of various sizes (10 F or 12 F) were introduced in these patients using the Seldinger technique. The volume of pus drained ranged from 150 to 400 ml, while the period of catheter drainage ranged from 6 to 17 days. Complications were minor and included catheter blockage in 2 patients and tract pain in 8 patients. There was no mortality associated with this procedure. This study shows a success rate of 96% (successful treatment in 24 out of 25 patients).

Conclusion: Percutaneous catheter drainage of liver abscesses is successful with a low morbidity and mortality and should be the first line of management in liquefied moderate to large sized liver abscesses.

Keywords: Liver abscess, Pigtail catheter, Percutaneous drainage

INTRODUCTION

A liver abscess is a suppurative cavity in the liver resulting from the invasion and multiplication of microorganisms, entering directly from an injury through the blood vessels or by the way of the biliary ductal system. Liver abscesses are most commonly due to pyogenic, amoebic or mixed infections. Less commonly these may be fungal in origin.

Although amoebic liver abscess occurs more commonly in men between 20 and 40 years of age, but can occur at any age. Approximately 60% are solitary and mainly located in the right lobe of the liver, as a result of the streaming of portal blood flow secondary to the fact that

the right lobe is predominantly supplied by the superior mesenteric vein, and because most of the hepatic volume is in the right lobe. When multiple abscesses are present, pyogenic or mixed is the most probable type. Patients usually present with a constant dull pain in the right upper quadrant of the abdomen which may be referred to the scapular region or the right shoulder. These patients usually have fever of between 38°C and 40°C.

Liver abscesses, both amoebic and pyogenic, continue to be an important cause of morbidity and mortality in tropical countries.¹ However, recent advances in interventional radiology, intensive care, progress in antibiotic therapy, liberal use of sonography and computerized tomography scanning of the abdomen have

led to early diagnosis and treatment of patients with liver abscess, thus improving the patient outcome.² Percutaneous drainage of liver abscess has been an important advancement in the treatment of pyogenic liver abscesses. Percutaneous treatment (needle aspiration or catheter drainage) is now a standard management for liver abscesses.³ It has replaced surgical exploration which now has very limited indications.⁴ Needle aspiration is less expensive avoids problems related to catheter care and long-term hospital care. Multiple abscesses can be aspirated through different tracts in the same sitting.⁵ However, needle aspiration has lower success rate than catheter drainage.⁶ Another problem with aspiration is that repeated needle aspirations (average number per patient ranging from 1 to 5) may be required in a single patient over a short period of time from 5 to 14 days. This may be painful and unpleasant for the patients and hence may not be acceptable to them.⁷ To avoid these problems associated with needle aspiration, percutaneous pigtail catheter drainage is now used as the first tool in the management of liver abscesses.⁸ The advantage of catheter drainage is that it provides a continuous outlet to the pus and hence the problems of incomplete and repeated evacuations are not encountered.⁹

METHODS

A prospective study of 25 patients with liver abscess underwent USG guided percutaneous catheter drainage at department of surgery, P. D. U. government medical college & hospital, Rajkot during period from July 2012 to September 2014 (27 months). Diagnosis of liver abscess was made on basis of clinical history, physical examination followed by USG. CT scan was performed if required.

Study cases selected according to following criteria and who give informed and written consent for same. Age group of our study is 20 to 70 years. Patients having abscess cavity size $\geq 5 \times 5$ 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 (≥ 3) liver abscess, solitary liver abscess $< 5 \times 5$ 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 (Figure 1, Devon Innovations Private Limited, Bangalore, India) was selected according to viscosity of pus under USG guidance (low frequency 3-5 MHz, C5-2 curved probe, Philips IU 22) using Seldinger technique.⁹ Informed and written consent was taken. Inj. atropine 0.5 mg i.m. stat. was given half an 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 center of the abscess cavity. The stellate was taken out and pus was aspirated to confirm the position and the aspirated pus was sent to the laboratory for culture and routine microbiology. A 'J' tip guide wire (Cordis 0.038, Johnson and Johnson) was inserted through the needle and the needle was taken out without displacing the guide wire. Serial dilators (Figure 2, Devon Innovations Private limited, Bangalore, India) were passed keeping guide wire in situ and tract was dilated adequately. Pigtail catheter was introduced and positioned into center of cavity. Guide wire was withdrawn and pigtail was connected to a closed drainage bag and fixed to the skin. Sterile dressing was applied (Figure 3). 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 patients' condition was noted in terms of relief from pain, fever and decreased WBC count.

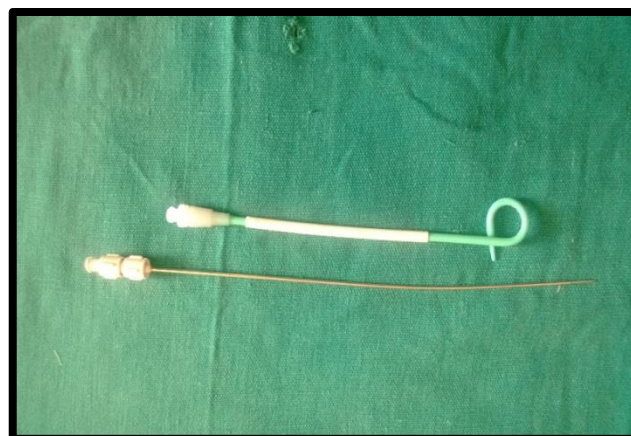


Figure 1: Pigtail catheter with needle and stellate.



Figure 2: Dilators of various size.



Figure 3: Pigtail catheter *in situ*.

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. Study subject-patient’s record was entered in study proforma. Finally all data was entered in Microsoft excel 2013 and statistically analyzed by calculating mean, median, average and percentage.

RESULTS

Age group of present study subjects varies from 20 to 70 years. Maximum patients were between 30 to 50 years. Out of 25 patients, there were 24 males and 1 female which suggested male predominance. Pain in abdomen, right upper quadrant is most common presenting symptom, seen in almost 96% patients. The next common symptom is fever in 88% patients (Table 1).

Table 1: Clinical manifestations of liver abscess.

Symptoms	Patients	Percentage (%)
Pain abdomen	24	96
Vomiting	10	40
Fever	22	88
Diarrhoea	11	44
Hepatomegaly	9	36
Jaundice	8	32

Routine hematological investigations (Table 2) show 36% of patient having anemia (Hb <9 gm%), 48% of patients having PMN leucocytosis (>11000/cumm.), 40% of patients having raised S. bilirubin (>2 gm%), 28% patients having raised S. ALP (>290) and 32% patients having raised S. ALT (>40). Bleeding time, clotting time and prothrombin time were within normal limit in all patients.

Table 2: Laboratory investigations.

Parameters	No. of cases	Percentage (%)
Anaemia	9	36
PMN leucocytosis	12	48
S. Bilirubin (total) ↑	10	40
ALP ↑	7	28
ALT ↑	8	32

Right hepatic lobe mainly involved. In present series 68% of patients having abscess cavity located in right lobe, 20% was located in left lobe and 12% of patients presented with involvement of both lobes (Table 3). Out of 25 patients, 22 patients had liquefied or partially liquefied abscess and 3 patients had non liquefied abscess at the time of presentation. Patients having non liquefied abscess were given injectable antibiotics and pigtail insertion done when abscess became liquefied on follow up USG.

Table 3: Location of liver abscess.

Site	Abscess	Percentage (%)
Right lobe	17	68
Left lobe	5	20
Abscess in both lobes	3	12

The median duration of drainage in present study was 9.8 days with an average amount of pus drained is 236 ml (Table 4). Cultures were found to be positive in 5 out of 25 (20%) cases. The rest were sterile (no organism found in pus culture). Among the pus culture positive cases E. coli was most frequently isolated organism.i.e.3 out of 5 patients (Table 5).

Table 4: Amount of pus drained (24 hours).

Amount of pus (ml)	No. of patients	Percentage (%)
150-200	9	36
201-250	7	28
251-300	5	20
301-350	2	8
351-400	2	8
Total	25	100

Table 5: Microbiology of pus.

Organism	No. of patients	Percentage (%)
No organism	20	80
E. coli	3	12
Klebsiella pneumonia	1	4
Staph. aureus	1	4

As present study does not reveal any major complication, but some minor problems like catheter blockage in 2 patients, pain over site of catheter insertion in 8 patients. Clinical improvement, USG suggestive of total resolution or reduction of cavity size to <3 cm and there was no evidence of relapse or recurrence on follow up after 3 months was considered as successful treatment. In present study success rate is 96%.

DISCUSSION

The management of liver abscess has drastically changed with significant reduction in mortality and morbidity after the advent of antibiotics and imaging modalities. Currently, there are two alternative methods for drainage of pus from a large liver abscess.¹⁰ Percutaneous therapeutic procedures have been increasingly performed compared with open surgical drainage.¹¹ This paradigm shift has been fuelled by a drive for a low-risk and less invasive procedure. Percutaneous treatment (needle aspiration or catheter drainage) is now a standard management for liver abscesses.⁸ It has replaced surgical exploration which have very limited indications now a days. The present study evaluated the role of USG guided percutaneous pig tail catheter drainage in the management of liver abscess in 25 patients over a period of 27 months duration. The problem of failure of this procedure as reported by earlier studies has been due to the thick and viscid pus, which cannot be easily drained by percutaneous drainage or early premature withdrawal of the catheter.¹² These problems can be avoided by using adequate sized pigtail catheters depending on the viscosity of pus and following a strict protocol for catheter flushing and removal.

One of the major problems is a prolonged duration of the catheter. This led to some authors considering this procedure as slow.¹² Percutaneous catheter drainage is a safe procedure with very few reported complications. Which includes haemorrhage, perforation of hollow viscera, peritoneal spillage, catheter displacement or blockage and septicemia.¹¹ But recent studies show very low complication rates. Our study did not have any major complication although the incidence of minor complications was 40 % (10 patients).

The chief limitation of our study is small number of subject included in study group; also the etiology of abscess was not uniform, patients with amoebic and pyogenic liver abscesses could not be segregated due to the nonavailability of serological tests. We recommend large scale study and randomized comparative study with other modality of treatment for liver abscess will help in confirmation of safety, effectiveness in treatment of liver abscess.

CONCLUSION

Percutaneous pigtail catheter drainage is a safe and effective mode of treatment of liver abscesses, both

amoebic and pyogenic. It results in an early relief of symptoms and faster resolution of abscess cavity. The low morbidity and high success rate in treating liver abscesses by this minimally invasive method suggests that this therapy should be the first line of management in liquefied moderate to large sized liver abscesses.

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