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Ultra-sonography guided pigtail placement for drainage of liver abscess in 40 patients: A retrospective study

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Abstract

Aim and Objective:

1. To evaluate the advantages of USG guided pigtail catheter placement for drainage of liver abscess.
2. To assess the morbidity and complications of percutaneous pigtail catheter drainage in treatment of liver abscess.

Methods: The study was conducted at Zydus Medical College and Hospital, Dahod, Gujarat, January 2018 to January 2020. It included 40 USG confirm cases of liver abscess. The liver Abscess $\geq 5 \times 5$ cm underwent percutaneous drainage was determined by doing serial USG scans.

Results: Age group varied from 20 to 60 years. Out of 40 patients 36 were men and 4 were women. The male to female ratio 10:1. 28 patients had solitary abscess, while 12 had multiple abscess. Pigtail catheter 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, complications were minor and included catheter blockage in 8 patients and tract pain in 35 patients. There was no mortality associated with this procedure. This study shows a success rate of 96%. One patient required repeat pigtail placement after 6 months for recurrent liver abscesses.

Conclusion: This study concludes that drainage of liquefied moderate to large sized liver abscess by USG guided pigtail placement as a minimally invasive procedure with low morbidity and mortality and should be first line of management of 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 antibiotics 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 retrospective study of 40 patients with liver abscess underwent USG guided percutaneous catheter drainage at department of surgery, Zydus medical college and hospital, Dahod (Gujarat) during period from January 2018 to January 2020. Diagnosis of liver abscess was made on basis of clinical history, physical examination and followed by USG, CT-Scan was performed if required. All the necessary investigations CBC, RBS, Blood Urea, Serum Creatinine, LFT, HIV, HB_s Ag, HCV, CT, BT, PT, APTT, INR, Blood Grouping were done.

Study cases selected according to following criteria and who give informed and written consent for same.

Inclusion criteria

Age group of our study is 20 to 60 years. Patient having abscess cavity size $\geq 5 \times 5$ cm liquefied abscess. Number of abscess < 3 with abscess cavity easily accessible for drainage.

Exclusion criteria

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.

Technique

For pigtail drainage 10 or 12 French pigtail catheter (Figure 1) 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. 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 precaution 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 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 2.). The output was monitored at stat and then daily. Metronidazole and ciprofloxacin were given in therapeutic doses for a period of 2 weeks. 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.

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 dressing was applied.

All patients were advised for follow of after 15 days, 1 month and 3 months and were assessed clinically and ultrasonographical to see for residual cavity and recurrence or non-resolving abscess.



Fig 1: Pigtail catheter with needle and stellate



Fig 2: Pigtail catheter in situ

Results

In this study 40 patients underwent USG guided pigtail catheter insertion for $\geq 5 \times 5$ cm size liver abscess.

Age group of present study subjects varies from 20 to 60 years. Maximum patients were between 30 to 50 years. Out of 40 patients, 36 were men and 4 were women. Which suggested male predominance. Pain in abdomen right upper quadrant is most common. Presenting symptom seen in almost 100 % patients. The next common symptom is fever in 90% patents.

Table 1: Clinical manifestations of liver abscess

Symptoms	Patients	Percentage (%)
Pain abdomen	40	100
Fever	36	90
Generalised weakness	36	90
Hepatomegaly	26	65
Diarrhoea	22	55
Jaundice	21	52.5
Pallor	16	40
Anorexia	16	40
Weight loss	10	25
Vomiting	15	37.5
Pleural effusion	7	17.5

Routine haematological investigations (Table 2) show 45% of patients having anaemia (Hb <9 gm%), 80% of patients having PMN leucocytosis (>11000/cumm), 50% patient having raised Serum bilirubin (>2 gm%), 30% patients having raised Serum ALP (>290) and 40% patients having raised Serum 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	18	45
PMN leucocytosis	32	80
S. Bilirubin	20	50
ALP ↑	12	30
ALT ↑	16	40

Right hepatic lobe mainly involved. In present series 70% of patients having abscess cavity located in right lobe. 20% was located in left lobe and 10% of patients presented with involvement of both lobes (Table 3). Patients having non liquefied abscess were given injectable antibiotics and pigtail insertion done when abscess become liquefied on follow up USG.

Table 3: Location of liver abscess

Site	Abscess	Percentage (%)
Right lobe	28	70
Left lobe	8	20
Abscess in both lobes	4	10

Table 4: Amount of pus drained (24 hours)

Amount of pus (ml)	No. of patients	Percentage (%)
150-200	18	45
201-250	8	20
251-300	7	17.5
301-350	4	10
351-400	3	7.5
Total	40	100

Describe the volume of the abscess cavity. 150-200 ml (45%), 201-250 ml (20%), 251-300 ml (17.5%), 301-350 ml (10%), 351-400 ml (7.5%).

Table 5: Microbiology of pus

Organism	No. of patients	Percentage (%)
No organism	26	65
E. coli	8	20
Klebsiella pneumonia	3	7.5
Staph. Aureus	3	7.5

In our study, culture was found to be positive in 14 out of 40 cases. The rest were sterile (no organism found in pus culture). Among the pus culture positive cases E. coli was mostly frequently isolated organism. i.e. 8 out of 14 patients (Table 5).

Table 6: Complications

Complication	No. of patients	Percentage (%)
Pain at the catheter site	35	87.5
Blockage of catheter	8	20
Displacement of the catheter tips	2	5

As present study does not reveal any major complication, but some minor problem like catheter blockage in 8 patients (20%). Pain over the site of catheter insertion in 35 patients (87.5%). Displacement of the catheter tips in 2 patients (5%). One patient has developed recurrent liver abscess after 6 months. He was required repeat pigtail catheter insertion.

Discussion

The management of the 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]. Percutaneous treatment (needle aspiration or catheter drainage) is now a standard management for liver abscesses [8]. It has replaced surgical exploration and laparoscopic management which have very limited indications now a days. The present evaluated the role of USG guided percutaneous pigtail catheter drainage in the management of liver abscess in 40 patients over a period of 24 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]. Those problem can be avoided by using adequately 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 septicaemia [11]. But recent studies show very low complication rates. Our study did not have any major complication although the incidence of minor complications was 25% (10 patients).

The chief limitation of our study is small number of subjects included in study group, also the aetiology of abscess was not uniform, patients with amoebic and pyogenic liver abscess could

not be segregated due to the non-viability 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.

Two studies done by Gupta *et al.* and Malik *et al.* observed similar results in the drainage of liver abscess^[13,14].

Conclusion

Our study concludes that percutaneous pigtail catheter drainage is a safe and effective mode of treatment of liver abscess, 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 abscess 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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