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Original Research Article

Management of giant amoebic liver abscess with severe sepsis by open drainage: a study of 28 cases in 20 years

M. S. Ray, Vishal Patel, Aditya Raval, Digpal Thakore*, Naresh Modi, Amandeep Singh, Milan Patel, Shyam Goyal, Rudrax Bhatt, Abhishek Yadav, Brinda Panchal

Department of Surgery, SGT Medical College, Budhera, Haryana, India

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***Correspondence:**
Dr. Digpal Thakore,
E-mail: digpalthakore10@gmail.com

ABSTRACT

Background: Presently large amoebic liver abscesses are treated by intravenous antibiotics coupled with less invasive procedure like pigtail drainage. Pigtail drainage may not be adequate enough to drain thick pus and solid necrotic component in good number of large amoebic liver abscesses. In these cases, with severe sepsis, open surgical drainage (OSD) is a life saver and a game changer. Aim of this study was to determine whether in critically ill patient with large amoebic liver abscesses with sepsis, results in good clinical outcome, when managed by OSD.
Methods: Over a 20-year period, 28 patients with giant amoebic liver abscesses, in severe sepsis, were managed by, an up-front OSD. In this prospective study we tried to evaluate the time to reversal of the toxic features of sepsis, recovery of hemodynamic stability, degree of morbidity and hospital stay.
Results: In all 28 patients treated by OSD, there was certainly rapid reversal of toxic features of sepsis, decrease in leukocyte count and accelerated recovery of hemodynamic stability in all are cases Three patients had surgical site infection, which were managed accordingly. The average hospital stay was 12 days. No mortality occurred in our study.
Conclusions: The results of our study show that for large amoebic liver abscesses with severe sepsis, OSD provides better clinical outcomes in terms of treatment success, rapid recovery, of hemodynamic stability, less morbidity and no mortality.

Keywords: Amoebic, Liver abscess, Open surgical drainage, Percutaneous needle aspiration, Pyogenic

INTRODUCTION

Behind every surgical scar there is an untold story of survival! Liver abscess is a common clinical problem in tropical countries and is most commonly caused by amoebic, pyogenic or mixed infections.[1] Less commonly, the infection causing a liver abscess may be fungal in origin. For amoebic liver abscesses (ALA), the primary treatment is medical; however, 15% of amoebic abscesses may be refractory to medical therapy and 20% of ALA may be complicated by secondary bacterial infection.[2,3] In the past, surgical drainage was the traditional mode of treatment in all ALA patients and in patients with pyogenic liver abscesses (PLAs).[4] However, this type of drainage was associated with remarkably high morbidity (47%) and mortality (10%) rates.[5] Over the last three decades, out comes in patients presenting with liver abscesses have improved as a result of advances in radiological diagnosis and percutaneous treatment options.[6–8] Currently, patients are treated with antibiotics along with percutaneous needle aspiration (PNA) or percutaneous catheter drainage (PCD), and surgical drainage is used only in patients who fail to respond to such treatment.[9,10] Previous studies have shown both

PNA and PCD to be effective and safe, although the optimal treatment remains unclear.[11-14] Meta analysis of randomized controlled trials (RCTs) comparing the effectiveness of PNA and PCD in the management of liver abscesses are unclear. In good number of ALA with thick pus and solid necrotic debris, which can not be managed by PNA OR PCD, are best treated by open surgical drainage which remain as the last, and often as the only life saving option to manage these cases. Objective of this study was to determine whether in critically ill patient with large ALA results in good clinical outcome, when managed by open surgical drainage (OSD).

METHODS

The study design was of prospective single surgeon work analysis over 20 years study. The study duration was from May 2003 to July 2022. Total 28 patients were included in the study. This study was done at 05 different hospitals, where method of OSD was under taken by the senior surgeon of this study (Army Hospital Delhi-Cantt; INHS- Ashwini, Colaba, Mumbai; Command Hospital Eastern Command Kolkata; Military Hospital, Jalandhar and SGT Medical College, Gurugram).

Inclusion criteria

There were 28 patients included in this study, diagnosed as ALA of all ages and both sexes were included in this study in whom PNA or PCD could not be done or the facility or feasibility for the same was not available in remote hospitals managed by the same single surgeon during those above mentioned 20 years period.

Exclusion criteria

Pregnant patients and patients not fit for surgery due to their comorbidities were excluded.

No statistical analysis was done in this study as it was a pilot study.

Operative technique of giant ALA

In all our cases the abdomen was opened with a truncated “Roof Top” incision (Chevron/bilateral subcostal), extending the right limb of Chevron longer than the left .We have been routinely dividing rectus abdominis muscle (right) by our “London bridge technique” (as shown) where the rectus abdominis muscle was deliberately cut using coagulation electrothermocautery current over a wet gauze sling), to ensure deliberate electocoagulation of the divided muscles to avoid bleeding from the cut muscles resulting in post operative rectus sheath hematoma formation. In 04 cases we had free pus in the peritoneal cavity which were rapidly aspirated, sample for parasites, bacterial and fungal culture were sent and rest of the pus sucked out clean in sub and supra hepatic spaces, followed by right gutter, RIF (right iliac fossa) and pelvis. No peritoneal toilet was attempted at this point of surgery. Next the liver was mobilized by identifying the ligamentum teres at the lower edge of falciform ligament which was divided between double ligaturrs.

Further the falciform ligament between the right and leftlobes of liver was incised superiorly with coagulation current of cautry and ending at the beginning og the anterior fold of right and left coronal ligaments. This helped in decent and rotation of the liver which allowed application of self retaining costal arch retractor (Army Modified Rochard's retractor), anchored at the head end of the table as shown in sketch (Figure 3). This helped easy access to segment 02, 03, 04, 05 and 06 to some extent segment 07 and 08. Next, the abscess cavity (as estimated and directed by USG, CT abdomen and per OP sonography) was located, and cordoned off with generous number of saline wetted abdominal sponges. In cases of ruptured liver abscess, the rent in the roof of the abscess cavity was enlarged using coagulation mode of thermo-electo-cautery current (setting at 40 to 60), the muck in the cavity was sucked/mopped clean and packed with warm saline packs. Abscess in segment 02, 03, 04, 05 or 06 were deroofed using coagulation electro cautery, making a cruciate incision at the thinnest and the most flactuant portion of the abscess. After sucking out pus, the four limbs of the cruciate flaps of the abscess wall were excised and sent for HPE (histopathological examination).

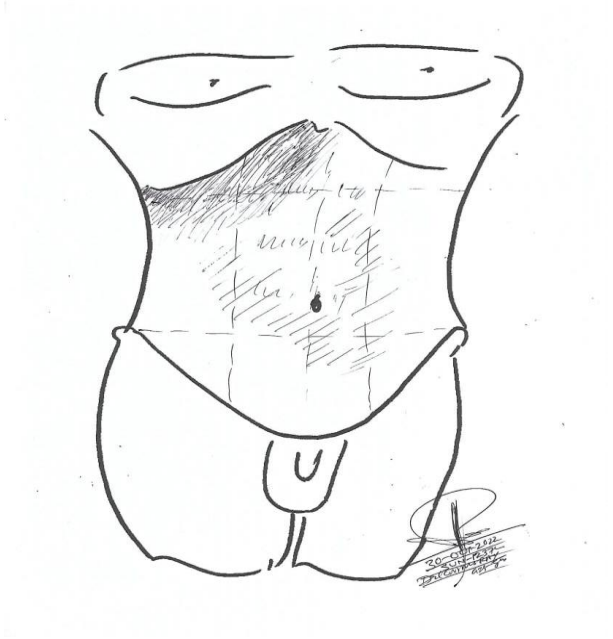

Figure 1: Clinically tender hepatomegaly.

Segment 02, 03, 04, 05 and 06 were deroofed using coagulation electro cautery, making a cruciate incision at the thinnest and flactuant portion of the abscess and after sucking out pus, the four limbs of the cruciate flaps were excised and sent for HPE (histopathological

examination). Abscess situated high up in segment 08 and 07, in the narrow suprahepatic space (sub diapharmatic space) can not be derooted safely by sharp cutting electrocautery or knife.

Figure 2: "London Bridge" technique of division of rectus abdominis muscle.

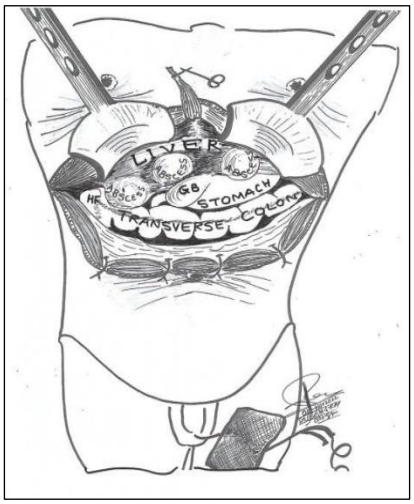

Figure 3: Abdomen opened by Chevron incision and Army modified Rochard's costal arch retractor applied and lower lip of the wound suture retracted.

In such situation we have resorted to "finger dissection" technique- in which the left index finger is used to poke and rupture the abscess cavity in the thinnest and the most flactuant portion of the abscess, after sucking all muck from the cavity, the jagged end of the roof were held by sponge holding forceps and excised using Mayo's scissors, to enlarge the opening of the cavity and to obtain tissue for HPE.

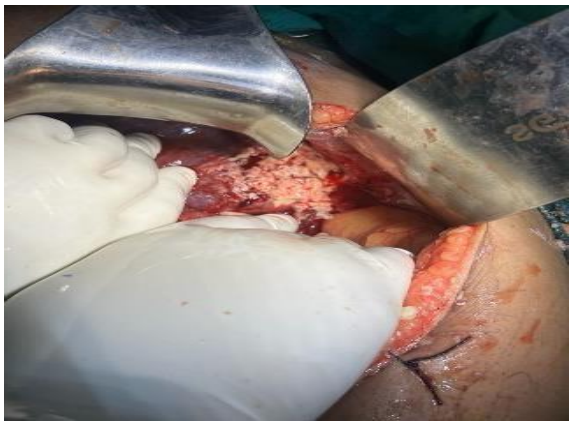

Figure 4: "ALA" in segment 06, deroofed, pus aspirated and muck (solid component) scooped out.

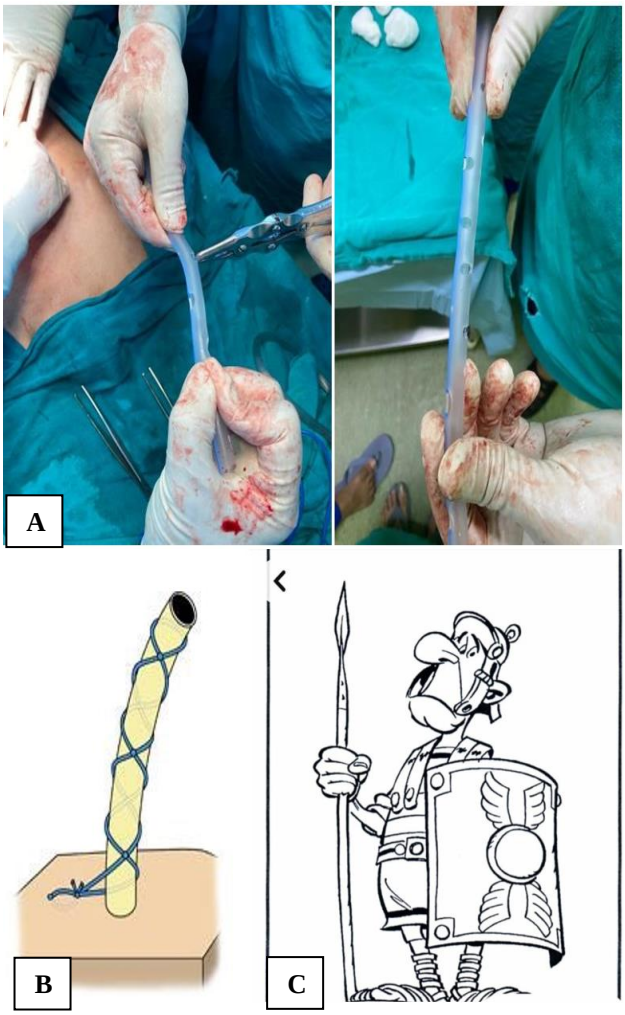

Figure 5: (A) Fabricated multiperforated 32F drain using double action bone nibbler (our technique). (B) Roman Sandal Pattern of fixation of drain (like the sandal of the Roman soldiers). (C) Roman soldier with his sandals secured to his feet by leather thongs tied around his legs.

In these cases the abscess cavity was sucked clean, irrigated with warm saline (no Betadine to be used to avoid confusion with golden yellow color of bile leak) and packed with warm white abdominal sponge to check for bile leak, as revealed by "white test". In white test, milk white wet abdominal sponge are pressed into the clean abscess cavity and brought out to see tell-tale "Bile stain" spots, which revealed the sites of biliary communication between the abscess cavity and the intrahepatic biliary tract. These biliary communication were neutralized by 03/0 vicryl in figure of 08 suture. Peritoneal cavity was irrigated with copious volume of warm saline. Five 32 F abdominal drains were used (as shown in sketch Figure 6 and 7) one in the abscess cavity teethered to the edge of the cavity with 3/0 vicryl, using figure of "08" suture, one each in supra hepatic and sub hepatic area and pelvis.

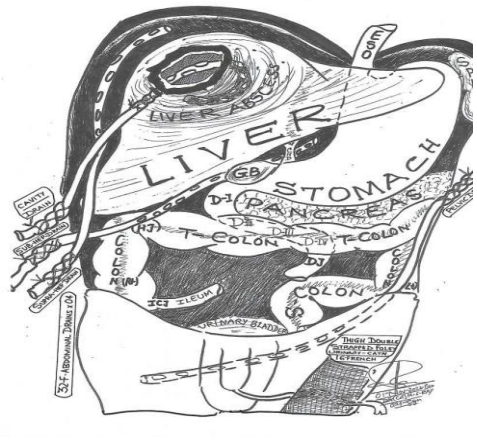

Figure 6: Multiple ALA in segment 06, 05, and 08 of liver, with deployment of drains.

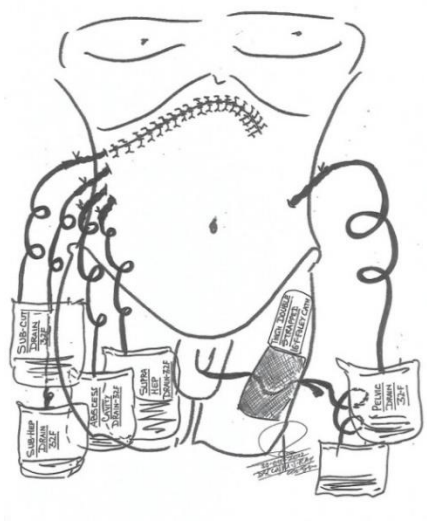

Figure 7: Deployment of cavity drain and placement of drain in other potential abdominal spaces and abdomen closed en mass.

The drains were anchored to skin "kink free" by our usual method of "Roman Sandal Pattern of Drain Fixation" using 01/0 black silk on curved cutting needle. Abdomen was closed en-mass using 01/0 PDS loop. In all are cases subcutaneous space was prophylactically drained with multi perforated 32 F drain anchored to the skin as above (we have been using multi perforation in 32 F drain using "double action" bone nibbler to achieve uniform machine-cut multiperforated drain (as shown in the Figure 5).

Post operatively patient was managed by using our standaed code "Panj Payara" ["Five essentials" as I/V fluids, broad spectrum antibiotics, PPI, Perinorm and narcotic pain killer (Tramadol with Phenaya)].

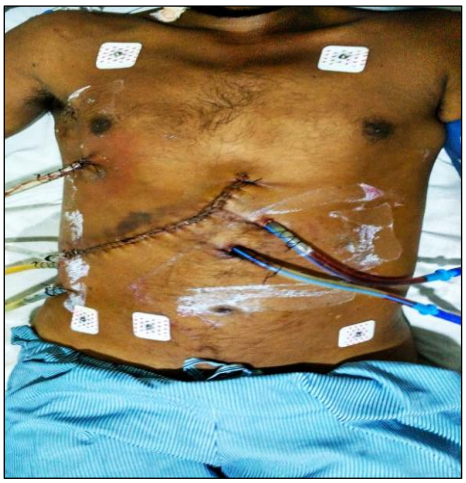

Figure 8: Drain in situ in one of the patients of ALA who had undergone OSD.

RESULTS

Out of 28 cases, 04 had ruptured liver abscess with peritoneal soiling, peritonitis and sepsis. Six cases had abscess cavity having billiary communication as revealed by "white test" and they were suture obliterated with 3/0 vicryl. Nine cases had large (>20 cm diameter), intact, solitary abscess located in segment 08 and 07. Five had bilobed/twin or hourglass shaped abscess cavitites, of which 02 extended from segment 08 to 06 and rest 03 form segment 04 to 03, where each lobe had a diameter of 10 to 15cm. Three cases had bulging, "near- bursting", 10cm diameter abscess cavity in segment 05, 06 and one in segment 04 of about 05 cm diameter each. The maximum volume of pus drained in 03 of our cases were 800 to 1000 cc, with limited fluidity of pus and the rest was made up of dark clay like fishy smelling "muck"(solid necrotic component of the pus). Four of our cases had long term (>10 days) high volume "golden" bile drainage form the cavity drain (200 to 700 ml/day). Three of them showed progressive reduction in bile output to nil by 04th to 06th post operative week, when the cavity drain was removed. One remaining case with abscess cavity in segment 08 and 07 had persistent high bile output about 1000 to 1200 ml in cavity drain, even after 06 week, we termed it as as "bilio- cavitio-

cutaneoustubed-fistula" (a controlled fistula). The case was subjected to ERCP + EPT +stenting (07 F Biliary Stent) to create low pressure in the billiary system by neutralizing the sphincter of Oddi by endoscopic papillotomy (EPT), in order to "dry-out" the "controlled fistula". This resulted in total drying up of the cavity drainage and the drain was removed a week later (08th post op week). A month later the biliary stent was removed.

Table 1: Clinical presentations of ALA.

Description of ALA status	No. of cases	Liver lobe involved	Size in cms	Shape	Mode management
Ruptured liver abscess with peritonitis	05	07 and 08	>20cms	Globular	OSD (open surgical drainage)
Abscess cavity having billiary communication	06	07 and 08	10cms	Globular	OSD
Solitary liver abscess	09	08, 06, 04 and 03	10-15 cms	Hour glass	OSD
Near Bursting abscess	03	05, 06	05-10 cms	Globular	OSD
Bilobed/twin abscesses	05	08, 06, 04, 03	10-15 cms	Hour glass	OSD

Table 2: Post-op cavity drainage of ALA.

Location of abscess cavity	Nature of drainage	Volume of drainage	No. of days drainage persistent	Resolution of the condition
Large abscess cavity in segment 07 and 08	Pus	800 to 1000 cc	10	Spontaneous
Large abscess cavity in segment 08	Bloody pus	200-700 ml	07	Spontaneous
Large abscess cavity in segment 08 and 06	Golden bile	200 ml	10	Spontaneous
Large abscess in segment 08 and 07	Golden bile	1000 to 1200	>06	ERCP EPT + Study

In our study all 28 very sick patients with ALA were treated by OSD, which resulted in rapid reversal of toxic feature of sepsis, decrease of leukocyte count, accelerated recovery of hemodynamic stability. Three patients had SSI (Surgical Site Infection) which were managed surgically. Nine cases had very large (>15 cm diameter) intact solitary ALA mostly in segment 08 and 07 of liver eroding into the diaphragm to reach the right pleural cavity. Five had bilobed (hourglass shaped) abscess that straddled across two or more segment of liver about 07 and 08 cms in diameter. Three cases had large "near bursting abscess" (10 to 15 cm diameter), in segment 06 and 05. None of our cases had ALA bursting into right pleural cavity. Gender wise there were 19 male and 09 female patients, with an average age of 43 years. The youngest in our study was 27 years, and oldest was 52 years. All male patients gave history of regular alcohol abuse. No one was immune compromised. Most cases had negative pus culture, perhaps due to prolonged pre operative antibiotic misuse elsewhere, before the cases were reffered to us. Three cases had bacteriologically positive culture and the infective agent was *E coli*. The average hospital stay was 14 days. We did have prolonged morbidity (15 to 20 days in hospital) but no mortality in our study.

One patient with DM type 2 had SSI (surgical site infection) despite having multiperforated subcutaneous drain. It was managed with removal of few skin sutures, irrigation of wound with EUSOL using feeding tube #08 (EUSOL-Edinburgh University Solution of Lime). The wound healed by secondary intention in 02 week's time.

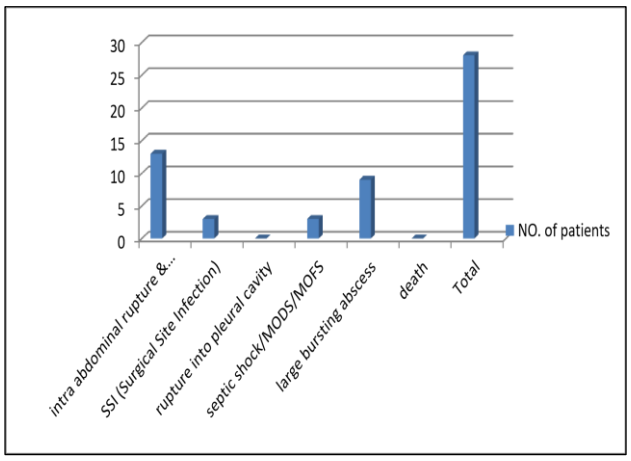

Figure 9: Complications of ALA.

Post OP care were provided according to the standard line of management, such as care of lungs and limbs, Chest physio, ambulation and enteral feeding at the earliest. All drains, except cavity drains were removed by first post op week and sutures removed by the end of

second week. Cavity drain was removed between 04to 06 post OP week. Patient was put on long term anti amoebic therapy, as a cycle of Tab. Albendazole (Zentel) 400mg 01 bd for 06 weeks followed by 01 week of "drug holiday"-and then repeat of such cycles for at least 08 to 10 times, with regular monthly LFT checkup. In our study we had limited morbidity as explained above and no mortality.

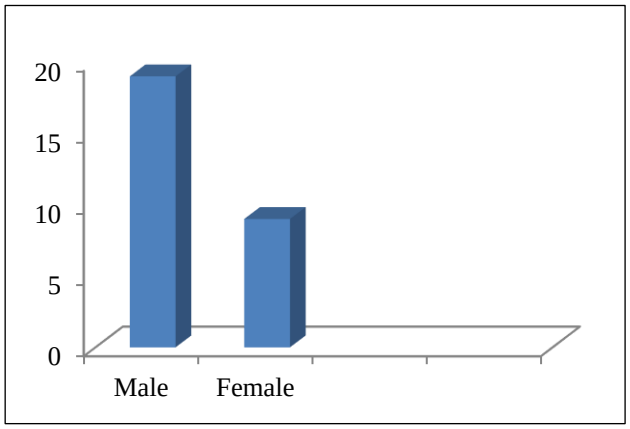

Figure 10: Gender ratio.

DISCUSSION

OSD for amebic liver abscess (ALA) is strongly indicated in the following conditions:-

Firstly when the abscess cavity is large, containing thick pus with solid necrotic debris as the main source of sepsis; which cannot be aspirated even with 14- or 16-gauge needle or drained by pigtail drain (12F catheter).

Secondly when there is secondarily infected abscess cavity, septic shock with MODS or MOFS.

Thirdly when the abscess cavity is located in untamponadable segments of the liver, such as segment 06, 05, 04, 03 and 02. (Abscess in segments 07 and 08 are tamponadable due to avalaibility of chest wall and diaphragm, which effectively tamponads the puncture wound in liver around the pigtail).

Fourthly when there is liver abscess with gross ascites (ascites act as an interface between the chest wall and the liver, which nullifies the tamponade effect of the chest wall as explained above there by encouraging the leakage and spillage of pus around the liver puncture wound or pigtail into the abdominal cavity through the ascetic fluid causing acute peritonities.

Fifthly patients of ALA managed in remote surgical unit, where minimally invasive technique of drainage of liver abscess (aspiration/pigtail drainage) is not available or the surgeon is inexperienced in such methods, and the very sick patient cannot be referred to higher surgical centre and needs urgent life saving drainage there and then!.

Until 1994, OSD was a standard procedure for liver abscess the world over. The procedure was considered safe, feasible in any operation theatre, anywhere. Smaller ALA were managed successfully in some centres routinely by OSD. But in most cases and with large ALA antibiotic alone did not resolve the issues and their use exclusively did not replace adequate drainage of ALA by OSD.

Historically pigtail catheter (named so as it resembles, the tail of a pig) was invented in a cruder form, as a flexible catheter by Benjamin Franklin in 1752 (Benjamin Franklin-1706-1790- was an American polymath who had may inventions and discoveries to his credit), Since then the crude catheter has undergone great modification, till the latest catheter as pigtail catheter, which since late 1960s has been extensively used as a minimal access procedure (MAP), to drain pus, fluid and blood. With the advent of improved version of ultrasonography machine, pigtail drainage of most collection of pus, blood, fluid became the ultimate MAP of the above mentioned collections- this was a "Paradigm Shift" form the conventional open method of management of the same, But pigtail drainage has had its limitations as mentioned in the beginning of this discourse and OSD has not been totally removed as a treatment procedure and relegated to surgical museum, as an outdated mode of management of ALA. OSD of ALA, as mentioned above, is still the ultimate weapon in the armamentarium of a surgeon, to manage giant ALA with sepsis, as a life-saving technique! Here one may quip as "*Its better to have a big scar in a living patient, then a small scar or no scar in a dead one*"! (M.S. Ray).

Since late 1990s, ethusiastic laproscopic surgeons, went a step forwarded and laparoscopically drained large ALAs located in accessible as well as in non-accessible areas and they could drain the abscess in some selected cases and could manipulate an externally introduced catheter into the abscess cavity. Laproscopic drainage of ALA had an ever-present threat of spillage of pus into the peritoneal cavity which invariably result in acute peritonitis. This procedure, one may consider as a dangerous "*surgical gymnastics*" in the name of MAS (minimal accessive surgeries). In many cases the risk of peri cavity catheter leakage of pus into the peritoneal cavity loomed large, threatening peritoneal soiling and peritonitis. Laproscopic drainage of ALA has not gained traction with most surgeons, but most rookie laproscopic surgeons, climbing the ladder of experience insist on drainage of ALA laproscopically, stretching their imagination to unbelievable lengths! *It seems that they often consider their laproscope as a "hammer" and believe that any conceivable surgical issue is a "nail" to be hammered in with it*! Ultrasonography has a high accuracy rate of over 95% and has been considered the gold standard imaging technique for the diagnosis of ALA.[15-17] This was utilized to confirm the diagnosis of ALA in our patient. However, ultrasound-guided aspiration was not exploited in our case, because of lack

of resources in many hospitals where the senior author served in Army.

Nevertheless, this was one of the reasons we decided to write on this case to show that with limited facilities, health professionals in resource limited hospitals can still do well to diagnose ALA and effectively manage the same OSD. Another important finding was the presence of right lower pleural effusion, a common manifestation of pulmonary amoebiasis. Pulmonary amoebiasis has been postulated to result from direct extension of ALA in 35% of patients.[18] It presents with right lower pleural effusion, as evident in our case. Advanced techniques like PCR and ELISA for analysis of pleural fluid could not be exploited in our setting. ALA with dimensions greater than 10 cm with variegated density of pus is indicative for surgical intervention i.e., OSD.[19]

Pigtail drainage of liver abscess as in MAP does have an established standing as a mode of management of ALA, before OSD is called in, indifficult and dire situations, to tide over a life threating crisis! Laproscopic drainage of ALA is still in its infancy, and may have years to mature as an effective mode of Management of ALA.-(as MAP Management) and becomes a very efficient method to replace an OSD once forever!.

Limitation for the study remain the same as given under exclusion criteria, under methods.

CONCLUSION

OSD is a time tested, sure shot method of management of critical ALA with acute sepsis and hemodynamic instability, when other minimal access procedure (abscess aspiration and pigtail drainage) have been found to be" precious time" consuming, exercise, inadequate and risky mode of management, then OSD is a "Life Saver" and a "Game Changer"! However onetime aspiration of ALA is not a recommended method. it is mentioned to be condemned once forever!

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Ethical approval: The study was approved by the Institutional Ethics Committee

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