

Laparoscopic vs Open Drainage of Complex Pyogenic Liver Abscess

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Abstract

Aim: Evaluation of the safety and efficacy of laparoscopic drainage as a management of complex pyogenic liver abscesses in comparison to open surgical drainage.

Materials and methods: Combined retrospective and prospective comparative study of 48 patients having complex PLA who were admitted to Rajah Muthiah Medical College and managed by either laparoscopic drainage or open surgical drainage from September 2019 to October 2021 as regards results, complications, perioperative morbidity, mortality, and possible recurrence. Open drainage done in 26 patients and 22 patients by laparoscopic drainage. Pus culture done in all patients. Patients having small, solitary, and unilocular PLA that responded to antibiotic treatment or/and percutaneous drainage were excluded. All patients were subjected to full clinical assessment, laboratory investigations, ultrasonography, computed tomography,

or magnetic resonance images for the abdomen and pelvis.

Results: Forty-eight patients having complex PLA with a median age of 54.5 years were managed by either laparoscopic drainage (22 patients) or open surgical drainage (26 patients). The operation time and hospital stay were less, and oral feeding was started earlier in laparoscopic group. Wound infection was higher in open drainage group. Abscess recurrence occurred once in laparoscopic group and once in open surgery group, and both were successfully treated with percutaneous drainage. One laparoscopic operation was converted to open.

Conclusion: Both laparoscopic and open surgical drainage of PLA are safe and effective. Laparoscopic drainage has less operative time, morbidity, and hospital stay; however, open drainage is considered the management of choice for patients with severe sepsis or failed percutaneous drainage.

Keywords: Laparoscopy, Open drainage, pyogenic liver abscess.

Introduction

Complex pyogenic liver abscess (CPLA) is a fatal condition if left untreated. Complex pyogenic liver abscess is an abscess that is multilocular and more than 5 cm in diameter. Pyogenic liver abscess (PLA) mode of treatment might be percutaneous aspiration or drainage under antibiotic cover. Indication for surgical drainage is interventional radiology fails, if ruptured, or if associated with biliary or intra-abdominal pathology. In CPLA, to optimize clinical condition before surgery percutaneous drainage may be needed.^{1,2} Drainage via laparoscopy is an emerging surgical action.³ Large pyogenic multilocular abscesses usually need drainage, in addition to antibiotics for effective management.¹ Effective drainage shortens the antibiotic therapy duration. The methods include percutaneous needle aspiration (PNA), percutaneous catheter drainage (PCD), open surgical drainage (OSD), and laparoscopic drainage (LD).⁴ Patients with small, solitary, and unilocular abscesses are best managed with aspiration percutaneously plus antibiotics, especially the young healthy patients.

In this study the efficiency of laparoscopic drainage as a management of complex pyogenic liver abscesses in comparison to open surgical drainage.

Materials and Methods

Combined comparative study was conducted in Rajah Muthah Medical College from September 2019 to October 2021 on 48 patients (20 males and 28 females) with a median age of 54.5 years (having complex liver abscesses managed by either laparoscopic drainage or open surgical drainage). The comparison is as regards results, complications, perioperative morbidity,

mortality, and possibly recurrence. Laparoscopic drainage was done in 22 patients and 26 patients by open surgical drainage.

Clinical assessment is done in all patients, laboratory investigations (CBC, FBS, PP, HbA1C, creatinine, liver enzymes, albumin and bilirubin levels, PT, PC, and INR), and radiological investigations (ultrasonography, computed tomography, or magnetic resonance images for the abdomen and pelvis). Abdominal ultrasonography was done in all patients and computed tomography was done in 22 patients with well-defined low attenuation lesion that is having enhancing peripheral rim with single multiloculated cystic appearance, and MRI were done in 2 patients with imaging feature of multiloculated cystic lesion of low T1 and high T2 signal with enhancing peripheral rim, 34 patients confirmed as abscess in right liver lobe and at left lobe in 14 patients. Four patients had more than one abscess cavity. The cavity measured between 8 cm and 23 cm in diameter. Eighteen patients had diabetes mellitus (DM). TOTAL 48 patients, failed percutaneous drainage were 9. PUS culture done. Written consent form was filled by every patient after detailed explanation of the surgery and possible complications.

Patient Inclusion Criteria

Patient having complex pyogenic liver abscess of more than 5 cm in diameter, multilocular that is not responding to percutaneous drainage, and/or antibiotics.

Patient Exclusion Criteria

Patients having small, solitary, and unilocular pyogenic liver abscess that responded to antibiotic treatment and/or percutaneous drainage were excluded.

Imaging

high sensitivities for diagnosis of pyogenic liver abscess is usg and ct upto 97%. Usg diagnosis small abscesses

less than 2 cm, pyogenic abscess sometimes appears as solid lesion.⁷ The ability to differentiate an abscess from a neoplasm at nonenhanced ultrasound is limited compared with CT or MR imaging. However, necrosis may present in neoplasm, it could be differentiated from abscess by ultrasound⁸ By contrast enhanced CT, pyogenic liver abscess appears as well-defined, low attenuation mass with an enhancing outer layer. Cystic mass, solid mass, or multifocal solid lesions.⁹ The characteristic imaging findings of abscess by contrast enhanced CT are called (double target sign) that is seen as central low attenuation cystic surrounded inner ring and a outer ring. early contrast enhancement with continuous enhancement at delayed phases is present in the inner layer.. The outer layer appears of hypoattenuating with no enhancement in the early post contrast images then enhances in delayed phase.⁶ Another imaging findings called (cluster sign) small hypoattenuation abscesses aggregate and coalesce into single large abscess cavity. Gas inside the lesions may be seen, either in the form of bubbles or appears as air-fluid levels, , which is a diagnostic sign for an abscess.¹⁰ features of Pyogenic liver abscess in dynamic MRI contrast enhancement the same as in contrast enhanced CT, with early enhancement of the inner layers and internal septa and delayed enhancement of the peripheral layer. ⁶ Some abscesses seen surrounded with edema signal, i.e., appears as bright T2 signal intensity with restricted diffusion-weighted images and low signal intensity on ADC maps

Operative Techniques

Laparoscopic Drainage

Under GA, pneumoperitoneum was created, then a 10 mm trochar was introduced, and laparoscope was inserted. At first D lap performed and then two 5 mm

ports were introduced according to the location of the abscess. Intraoperative ultrasound was done with 10 mm port any inter bowel adhesion and between the liver and bowel as well as the anterior abdominal wall were freed and the area where abscess present was exposed. Abscess cavity deroof done and aspiration of the pus by the suction catheter and samples for pus culture was taken. The cavity was irrigated by normal saline, and proper hemostasis was secured. Two drain was placed, one in the abscess cavity and another one in the pelvis.

Open Surgery

Right sided sub costal incision below the ribs or a midline laparotomy incision was made according to abscess location. Intraoperative ultrasound was done to detect the exact site and extent of the liver abscess then de roofing of the abscess to drain pus and remove the fibrous septa. Hemostasis achieved and latex drainage tube was left

Operative and clinical data including operation time, intraoperative blood loss, postoperative complication rate, length of postoperative hospital stay, and rate of abscess recurrence were compared between the two groups. Regular follow-up was done weekly for the first month after discharge then every 2 months for about one year. Clinical examination and abdominal ultrasound were done every visit.

Study Design

Combined retrospective and prospective study of all complex liver abscesses admitted to Raja Muthiah medical college from September 2019 to October 2021 and comparison between laparoscopic and open surgical drainage as regards safety, efficacy, hospital stay, perioperative morbidity, mortality, and recurrence.

Results

Forty-eight patients (20 males and 28 females) with a median age of 54.5 years (ranges between 34 years and 65 years) were included in this study. All patient were diagnosed by one or two imaging modalities (ultrasonography, CT, or MRI) and patients treated successfully either by laparoscopic drainage or open surgery confirmed by at least one image modality, CT or MRI examination. All patients received broad spectrum antibiotics. Preoperative failed percutaneous drainage was 9 people. 26 people were managed by open drainage and 22 patients by laparoscopic drainage. In laparoscopic drainage group hospital stay and recovery is very fast. open drainage group wound infection rate is higher. recurrence occurred in both laparoscopic group and in open surgery group once and both were successfully treated with percutaneous drainage. One laparoscopic operation was converted into open surgical drainage due to unsatisfactory laparoscopic drainage. In pus-culture study of the 48 patients, only 38 cases (79%) had positive microbial reports while 21% had reports with no growth. The most common organisms identified were Escherichia coli 25% and Klebsiella pneumoniae 16%, followed by anaerobics (12.5%), Streptococcus spp (10.4%), and polymicrobial (15%)

Discussion

Before the 1970s, the mortality rate of PLA was high (more than 50%). With the development of imaging, surgical techniques, and effective broad-spectrum antibiotics, the mortality rate is markedly reduced.^{12,13} Complex pyogenic liver abscesses usually require surgical drainage either open surgical drainage (OSD) or laparoscopic drainage (LD) under cover of broad-spectrum antibiotics for effective management.⁴ This study conducted in Rajah Muthiah Medical College which is a tertiary center specialized for liver surgery

from September 2019 to October 2021. During this period, only 48 patients fulfilled criteria of complex liver abscess (more than 5 cm in diameter, multilocular). All patients received systemic antibiotics. 9 patients failed trial of percutaneous drainage preoperatively. open surgical drainage in 26 people and 22 patients by laparoscopic drainage.

In our study, the more than one abscess cavity 4 patients and they were diabetic and the two patients who had recurrence also diabetic. Preoperative ultrasound, CT, MRI, and intraoperative

Abdominal ultrasonography was done in all patient and was diagnostic alone in 24 (50%) of cases; however, CT was required in 22 patients and MRI in 2 patients to confirm the diagnosis. This is comparable to Serraino et al. study in which ultrasound was diagnostic in 42.4%, CT scan in 51.1%, and MRI in 3.3% of their cases. Seventy -nine percentages of our patients in this study had positive culture reports while 21% had reports with no growth. The most common organisms identified were Escherichia coli 25% and Klebsiella pneumoniae 16%. This is comparable to results of Malik et al., Serraino et al., and different from Liu et al. who found that 25 positive results of 66 cases (37.9%), with Klebsiellapneumoniae detected in 15 cases (60.0%) as the most common pathogen. The operative time and hospital stay were less and oral feeding was started earlier in laparoscopic drainage group. This is comparable to Tu et al. study as regards hospital stay and oral feeding but not for operation time as Tu and his colleagues had longer LS time perhaps because they managed the biliary pathology at the same time. the current study, there were no perioperative mortality which is comparable to Tu et al. study and in contrary to the study done by Malik et al., in which mortality

occurred in 19 of 169 patients with pyogenic liver abscesses and it was higher in the nonsurgical drainage group (7 out of 42 patients 16.6%) than the surgically drained group (12 out of 127 patients 9.4%).^{15,17} As regards the recurrence rate, it occurred in two cases (4.2%), one case in laparoscopic group 1/22 (4.5%) and one case in open group 1/26 (3.8%) and both were successfully treated with percutaneous drainage.

Conclusion

Both laparoscopic and open surgical drainage of PLA are safe and effective. Laparoscopic drainage has less operative time, morbidity, and hospital stay; however, open drainage is considered the management of choice for patients with critical condition or with failed percutaneous drainage. When laparoscopic drainage is unsatisfactory conversion to open surgical drainage is recommended.

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