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Original Research Article

Laparoscopic drainage of large liver abscess, postoperative course, safety and efficacy

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ABSTRACT

Background: In the era of minimal invasive surgical techniques, laparoscopic drainage provides faster recovery, shorter hospital stay, less surgical site infection and better cosmesis than open surgical drainage does with added advantage of accurate positioning of drainage catheter and simultaneous treatment of the abscess and underlying abdominal pathology.
Methods: A total of 33 patients of age group 18-65 years were enrolled. Diagnosis was made using ultrasonography and CECT abdomen and laparoscopic drainage done and drain placed. Adequacy of drainage of abscess was analyzed using ultrasonography on POD- 5, 20 and 30 and were followed upto 3 months. Day of intra-cavitary drain removal, duration of post operative hospital stay, complications after surgery, requirement of readmission and intervention after readmission were recorded and analyzed.
Results: Out of 33 patients, 1 patient developed sinus tract formation at intracavitary drain site. 3 patients had inadequate drainage for which drain change was required. 33% (N=11) patients showed complete resolution of abscess at post operative day 20 where as 72.7% patients (N=24) showed complete resolution of abscess on post operative day 30. All 33 patients showed complete resolution of abscess after 3 months of surgery.
Conclusions: Laparoscopic procedure provides every advantages of open surgical drainage of liver abscess while avoiding complications of open surgeries. It allows breakdown of loculations, drainage of viscid pus, necrotic tissues, adequate irrigation of abscess cavity and should be considered for patients with large, complex, septated or multiple abscesses and failed percutaneous drainage.

Key words: Liver abscess, Laparoscopic drainage, Safety, Efficacy

INTRODUCTION

In the era of minimal invasive surgical techniques, introduction of laparoscopic procedure for drainage of large liver abscess can be very beneficial for management of the disease. Laparoscopic surgery provides advantages of open and the minimal invasiveness for drainage for the abscess.[1] It provides faster recovery, shorter hospital stay, less surgical site infection and better cosmesis than open surgical drainage does.[2-5] A retrospective study comparing surgical drainage with percutaneous drainage for large liver abscess (>5 cm) has shown a better success rate with surgical drainage.[6] Percutaneous therapeutic procedures have been increasingly performed compared with surgical drainage and surgical drainage has usually been reserved for those that have failed percutaneous option or large sized liver abscess. Out of the two methods of surgical drainage of liver abscess, because of trend and advantages

of minimal access surgery, laparoscopic drainage becomes the obvious choice. Surgical intervention should be considered for patients with large, complex, septated or multiple abscesses, underlying disease or in whom percutaneous drainage has failed.[7] The surgical option also has the added advantage of accurate positioning of drainage catheter and simultaneous treatment of the abscess and underlying abdominal pathology.[8,9] Our objective was to study the Postoperative hospital stay, day of intracavitary drain removal, adequacy of drainage, duration of surgery, complications and secondary intervention required will be evaluated. Pain assessment using visual analogue scale at 6 hours after surgery, on morning of postoperative day 1 and before discharge.

METHODS

Institutional ethics committee approval was taken prior to the study commencement as it involved human participants. A randomized prospective study was conducted in our tertiary care center Lady Hardinge medical college and associated Smt. Sucheta Kriplani Hospital New Delhi from November 2017 to March 2019. All patients were enrolled in the study after taking written informed consent and after applying inclusion and exclusion criteria a total of 33 patients were enrolled in the study. Patients with liver abscess were worked up on OPD/emergency basis depending upon condition of the patient. Diagnosis was made using ultrasonography and CECT was done in every patient diagnosed with liver abscess for confirmation of diagnosis along with determining size/volume, number and extent of liver abscess. CT scan was also helpful in determining approach for drainage of liver abscess during laparoscopic drainage. Chest X ray was done in every patient to see pleural effusions associated with liver abscess. After detailed history and routine investigations patients were subjected to pre anesthetic clearance. Patients who were not given fitness in Pre anesthetic clearance were planned for percutaneous drainage of abscess.

Inclusion criteria

Inclusion criteria of current study were; all adult patients of either sex of >18 years of age and <65 years of age. Patient with liver abscess >5 cm in size. Patient with liver abscess either in right/left or both lobes of liver. Patients who are fit in Pre anesthetic check-up (PAC) Patients who gave informed and written consent.

Exclusion criteria

Exclusion criteria of current study were; patients with immunocompromised states, patients not fit for general anesthesia, patients with deranged coagulation profile, patients with pregnancy, patients with portal hypertension, history of upper abdominal surgery, patients with ruptured liver abscess with peritonitis, patients with deranged kidney function tests, patients allergic to iodinated contrast media.

Statistical analysis

Statistical analysis was performed by the SPSS program for Windows, freely available version (SPSS, Chicago, Illinois). Continuous variables were presented as mean±SD, and categorical variables were presented as absolute numbers and percentage. Data was checked for normality before statistical analysis. Normally distributed continuous variables were compared using the unpaired t test, whereas the Mann-Whitney U test was used for those variables that were not normally distributed. Categorical variables were analyzed using either the chi square test or Fisher's exact test. For all statistical test, $p<0.05$ was considered statistically significant.

Surgical procedure

Details of the study were explained to every patient and written and informed consent was taken. Under General Anesthesia, after nasogatric tube insertion and emptying of urinary bladder done, abdomen was draped and prepared with antiseptic solution. Access to peritoneal cavity for pneumoperitinium was obtained using Open Hasson's technique or Veress needle and umbilical port was inserted. Carbondioxide gas was used for creating pneumoperitoneum and intra-abdominal pressure was created between 10-15 mmHg. Two more ports were inserted with their site of insertion depending upon size and position of liver abscess. Thorough visualisation of peritoneal cavity was done and adhesions if any present at site of intervention were separated using electrocautery. Abscess cavity was identified and confirmed using suction needle and syringe (Figure 1).

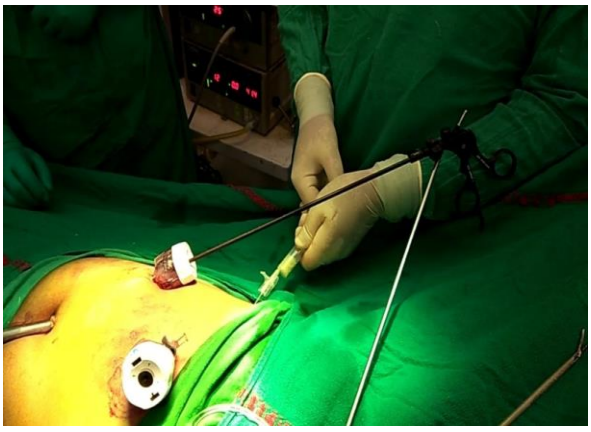

Figure 1: Aspiration of pus by syringe for confirmation of abscess from the abscess cavity.

In large and superficial liver abscess, the surface of liver could be visualized as locally elevated with gray and white or yellowish white color. Abscess cavity was unroofed using electrocautery followed by suction evacuation of pus. Intracavitary drain was placed (Figure 2) and saline wash was given with normal saline. Camera was inserted via intracavitary drain to look for septaions in the cavity

and septations were broken if present (Figure 3). Subhepatic drain was placed.

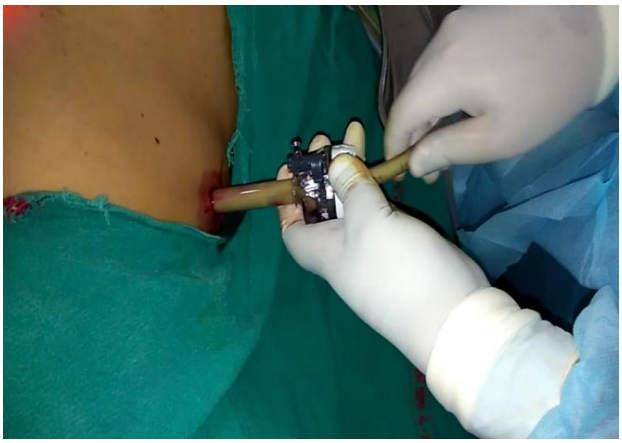

Figure 2: Intracavitary drain placement.

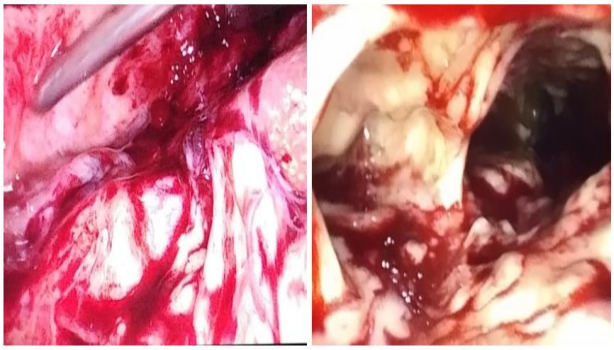

Figure 3: Intra-operative laparoscopic image showing removing of adhesions and identification of abscess cavity.

Figure 4: Drainage of pus through drain.

Patient was orally allowed after 6 hours of surgery and fully allowed from postoperative day one. Intracavitary drain was left in situ at the time of discharge. Urostomy bag was placed over drain after cutting the length of drain which would help patients to carry out daily activities easily. Patients were followed up on OPD basis.

RESULTS

The mean age of patients were 34±11.90 (19-64) years. In total of 33 patients 30 were male and 3 were female and 26 patients had history of alcohol intake. Out of 33 patients, 6 (i.e., 18%) required preoperative chest tube insertion in view of pleural effusion.

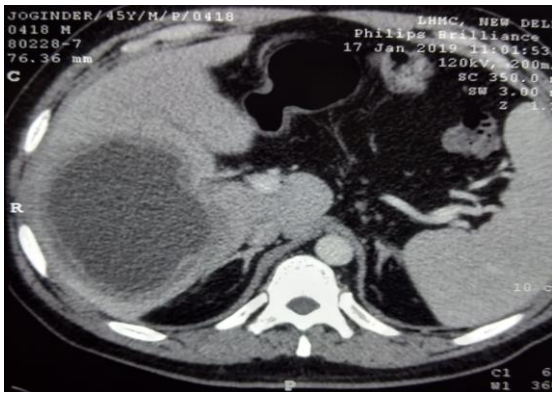

Figure 5: CECT abdomen preoperative axial view.

Figure 6: CECT abdomen post operative axial view.

In our study mean abscess volume in right lobe was 578.90±411.73 (115-1620) and in left lobe was 139.29±113.40 (20-300). In our study 26 (78.8%) patients had abscess cavity restricted to right lobe, 2 (5%) had isolated left lobe abscess, whereas 5 (15.2%) patient had liver abscess in both lobes. Mean duration of surgery was 37 minutes. Mean postoperative hospital stay was 3.76±3.08 (1-15) days. Drain was removed when both, residual abscess volume was less than 20 cc and there was no output of pus in drain bag. 40% (N=13) of patients got intracavitary drain removed before post operative day 10 and 33% (N=11) patients got drain removed between post operative day 11-20. Only 6 patients had drain removal after Post operative day 20 and only 3 patients had inadequate drainage and had to undergo drain change. In our study 1 patient (3.0%) develop sinus tract formation at drain site, 3 (9.1%) patients who had inadequate drainage and had to undergo drain change after readmission and no complication was noted in rest 29 (87.9%) cases.

Table 1: Preoperative data.

Age (years)		
Mean±SD	34.18±11.90	
Median	34	
Min-Max	19-64	
Sex	**N**	**%**
Female	30	90.9
Male	3	9.1
History of alcohol intake		
Present	26	78.8
Absent	7	21.2
Pre-op chest tube insertion		
No	27	81.8
Yes	6	18.2
Liver lobe involved		
Left	2	6
Right	26	78.8
Both	5	15.2
Volume of liver abscess	**Mean±SD**	**Range**
Right	578.90±411.73	115-1620
left	139.29±113.40	20-300
No of liver abscess cavities	**N**	**%**
Multiple	2	6
Two	5	15.2
Single	26	78.8
Duration of surgery (minutes)		
25-35	19	57.6
35-45	13	39.4
>45	1	3
Post op hospital stay (days)		
Mean±SD	3.76±3.08	
Min-Max	1-15	
Complication	**N**	**%**
Inadequate drainage	3	9.1
Sinus Tract formation at intra-cavitary drain site	1	3
No complications	29	87.9
Intracavitory drain removal (residual abscess volume was less than 20 cc and no output of pus in drain bag) days		
≤10	13	40
11-20	11	33
>20	6	18
Drain change	3	9
Post-operative USG on day 5		
No residual abscess	0	0
Residual abscess	33	100
Post-operative USG on day 20		
No residual abscess	11	33.3
Residual abscess	22	66.7
Post-operative USG on day 30		
No residual abscess	24	72.7
Residual abscess	9	27.3
Post-operative USG after 3 months		
No residual abscess	33	100
Residual abscess	0	0
Postoperative pain (VAS score)	**Mean**	**Range**
6 hours after surgery	4.15	3-6
Morning of POD-1	1.78	1-3
Before discharge	0.84	0-2

On sequential usg monitoring 11 (33.3%) patients showed complete resolution of abscess at post operative day 20 whereas 24 (72.7%) patients showed complete resolution of abscess on post operative day 30. All 33 patients showed complete resolution of abscess after 3 months of surgery. Postoperative pain was assessed using visual analogue scale. Score from 0 to 10 was used as the pain score with 0 measuring' no pain' and 10 measuring `worst possible pain. The pain score was measured three times; 6 hours after surgery, in the morning on postoperative day 1 and while discharging the patient. The Mean pain on post operative day 0, 6 hours after surgery was 4.15 (3-6) and on morning of post operative day 1 was 1.78 (1-3) and on before discharge of the patient was 0.84 (0-2).

Figure 7: CECT abdomen preoperative coronal view.

Figure 8: CECT abdomen postoperative coronal view.

DISCUSSION

In our study 30 patients out of 33, i.e., 91% patients had complete drainage of abscess and rest of 3 patients (10%) required second intervention as drain change and saline wash. One patient developed sinus tract along intracavitary drain insertion site in which excision of sinus tract was required. Ultrasonography findings of all 33 patients at the end of 3 months after surgery showed 100% resolution of abscess and no patients had recurrence. Our results were slightly better than study carried out by Tay et al on laparoscopic drainage of liver abscess in 20 patients, where 17 (85%) patients were drained successfully whereas 3 (15%) patients developed recurrent symptoms, of which two resolved with conservative measures and one required second laparoscopic drainage.[10] Similar results were seen in study carried out by Tan et al where results of percutaneous drainage and laparoscopic drainage of liver abscess were compared. 27 patients (40.3%) in percutaneous drainage group did not respond to primary intervention compared to 2 patients (11.1%) in laparoscopic drainage.[11] In their study 2 patients in percutaneous drainage group died from progression of sepsis despite proper intervention. No such mortality was observed in laparoscopic drainage group in their study and was not seen in our study as well. In our study no surgery was converted to open surgery. No patient developed peritonitis after laparoscopic drainage of liver abscess. No patient developed pulmonary complications like pneumothorax, pneumonia, pleural effusion or empyema. All parameters of sepsis were evaluated and ruled out. No patient developed fever during hospital stay post surgery. All three patients with inadequate drainage came with history of fever.

Limitations

The main limitation of our study was its small sample size, which limits the wider application of the results of this study. As multiple teams operated the patients so there is scope for bias due to surgical technique in this study. As the study was performed in a single tertiary care centre, there may be centripetal bias. Studies on larger patient groups are required to validate the results of this study on larger populations.

CONCLUSION

Current study highlights the efficacy of laparoscopic drainage of liver abscesses >5 cm in size. Although percutaneous drainage of liver abscess has obtained much popularity in recent times, this method of treatment has its own disadvantages like inadequacy to drain thick and viscid pus, long duration for resolution of abscess and failure of drainage in multiloculated abscess and drainage of multiple liver abscesses. Laparoscopic method of drainage provides advantages over percutaneous drainage in respect to all these factors. Laparoscopic procedure provides every advantage of open surgical drainage of liver abscess while avoiding complications of open surgeries. It allows breakdown of locules and drainage of viscid pus and necrotic tissues, adequate irrigation of abscess cavity. Large bore tube drains used and saline wash given in laparoscopic drainage gives advantage in early resolution of abscess. This method also provides advantage of treatment of underlying disease. Fast recovery, early return of gastrointestinal function, less duration of surgery, easy surgical procedure, less complications and less post operative hospital stay are various other factors in favor of this surgery. Failure of

conservative therapy, presence of multiloculated abscesses, and complications from percutaneous drainage may necessitate laparoscopic drainage. Therefore, laparoscopic drainage of liver abscess should be considered for patients with large, complex, septated or multiple abscesses, underlying disease or in whom percutaneous drainage has failed.

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