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# COMPARISON OF LAPAROSCOPIC VS OPEN HYDATID CYST DEROOFING & OMENTOPLASTY

General Surgery

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## ABSTRACT

**Introduction:-** Hydatid cyst is zoonotic infection and treatment is mandatory to avoid complications. Surgery remains the first choice in the treatment. Open or laparoscopic approaches are available. However, comparative studies are limited.

**Materials and method:-** Data of patients who underwent deroofing and omentoplasty for hydatid cyst between January 2013 to January 2018 were evaluated retrospectively. Recurrent cases and the patients with previous hepatobiliary surgery were excluded. 8 patients were undergoing laparoscopic surgery (group A) and 8 underwent for open surgery (group B). Cyst characteristics, operative time, duration of drain, postoperative complications were evaluated.

**Results:-** Groups were similar in terms of cyst characteristics. Mean Operative duration for group A was 92 mins and for group B, it was 74 mins. Mean Postoperative pain score according to VAS is 2 for group A and 4 for open surgery. Mean Hospital stay for group A was 6 days for group A and 14 days for group B. No other significant postoperative complications present except only 1 patient present with wound infection in group B. No recurrences were found in any groups.

**Conclusions:-** Laparoscopy is a safe and feasible approach for surgical treatment of liver hydatid cyst.

## KEYWORDS

Cystic echinococcosis, Hydatid cyst, laparoscopic or open surgery

## INTRODUCTION

Cystic Echinococcosis (CE), also named hydatid cyst or hydatidosis, is a parasitic disease caused by metacestodes of tapeworm Echinococcus granulosus. E. granulosus infestation occurs in humans when they accidentally ingest tapeworm eggs.[1] It is endemic to regions in Indian subcontinent, Northern China, Mediterranean, Turkey, Australia, North Africa, New Zealand and South America.[2]

The infection is frequently targeting liver, about 75% of the cases.[3] Even though with benign nature, it may lead to lethal disability or come with many serious complications. Therapeutic methods of hepatic CE ranges from surgical intervention (conventional open procedure or laparoscopic approach) to PAIR or medical treatment.[4]

Surgical treatment, open and laparoscopic approach are more commonly used all over the world. Open procedure is widely accepted and performed by the surgeons all over the world, and shows a good result. After the first successful laparoscopic surgery reported by Katkhouda in 1992 [5], there has been steady growth present in the laparoscopic treatment of CE.[6]

### Minimally Invasive Surgery

In these procedures, only the parasitic cyst contents are removed, whereas the peri cystic membrane is retained and the residual cavity is managed with different techniques such as omentoplasty, capitonnage, or external drainage.

The cyst is exposed safely. The peri cystic area and operating field are covered with pads soaked with scolicidal agent to prevent the spillage of parasites into the surrounding tissue and peritoneal cavity. The cyst is punctured and aspirated.

Before instilling the scolicidal agent, as much fluid as possible is aspirated to prevent dilution of the scolicidal agent and fluid is looked for any biliary tinge, indicating biliary communication. After ruling out any biliary communication, the scolicidal agent is instilled into the cyst cavity and left for approximately 5–15 minutes.[7] Then, the scolicidal agent is aspirated, and the cyst is unroofed.

Whenever there was any biliary communication with the cyst, safest scolicidal agent i.e. hypertonic saline was used.

The cyst contents, such as the germinative membrane and daughter cysts, are evacuated. At this point, the cavity should be explored carefully for any gross communication with the biliary tract and for the presence of exogenous cysts embedded in the wall.

The next step in these treatments are to managing the residual cavity. This can be done using various methods such as external drainage, marsupialization, internal drainage, capitonnage, introflexion, and omentoplasty.

The Mabit procedure consists of deroofing the cyst and extraction of the parasite with omentoplasty and external drainage of the cyst cavity. The Posadas procedure consists of deroofing of the cyst with capitonnage (the surgical closure of a cyst cavity by applying sutures so as to cause approximation of the opposition surfaces) of the cavity without drainage.

During partial peri cystectomy, a deeply situated part of cyst wall is left within the liver.

Marsupialization is the surgical exteriorization of a cyst by resection of the anterior wall and suture of the cut edges of the remaining cyst to the adjacent edges of the skin, thereby establishing a pouch of what was formally an enclosed cyst.

Minimally invasive surgery is easy, safe, and rapid, but has high morbidity and recurrence rates.

### Radical Surgery

Radical surgery refers to the removal of the cyst along with the peri cystic membrane and parasitic contents; it may also include liver resection if indicated.

Radical surgical approach aims toward the eradication or elimination of local relapse or complications due to false orbiting. Additionally, it radically deals with the residual cavity, especially in cysts with partial calcification of the wall and biliary communication.

There are two methods: the open-cyst method and the closed-cyst method. Radical procedures include: sub adventitial cystectomy, peri cystectomy, and hepatic resection.

The **sub adventitial peri cystectomy** technique is enabled by understanding the surrounding structure of the cyst. The peri cyst consists of two layers of different histological origin. Closest to the liver parenchyma is located the sub adventitial layer, which is formed by fibrosis and by compression of the Glisson's capsules and hepatic veins. Next up closest to the parasitic cyst is the exocyst layer, which is caused by granulomatous reaction. In between the exocyst and the adventitial layer, there can be found the peri cyst and it is the space formed in the in-between that is ideal for smooth detachment.[7] This approach however is not suitable for patients with cysts near the vital vessels or bile ducts.

During the **peri cystectomy** procedure, the cyst is dissected along its boundary with healthy liver tissue, blood vessels, and small biliary structures passing through the plane between the normal liver tissue and cyst are clamped and divided, but this is associated with fair amount of blood loss and longer operating time.

During a hepatic resection operation, the cyst along with the peri cyst and in conjunction with normal hepatic parenchyma is removed. Hepatic resection takes longer time to perform and is associated with more blood loss but presents a low rate of cyst recurrence.

Peri cystectomy and partial peri cystectomy are easy to perform and associated with fair amount of blood loss and more operative time. The rate of recurrence of cysts is lower in sub adventitial cystectomy and hepatic resection. Sub adventitial cystectomy causes less damage to healthy liver tissue than hepatic resection.

In any case, treatment aims to one great common goal, that is, the residual cavity must always be treated with excellent care. This is critical to prevent biliary leakage, biliary fistula, and abscess formation. It is in the hands of the surgeon to decide how to go about treating each case separately, depending on the location of the cyst and always aiming towards the safest and most effective method.[7]

Radical surgical approaches are associated with a high risk of postoperative complications, fewer relapse cases, long postoperative hospitalization, and low mortality rates; they are all operations with a high difficulty level mostly suitable for highly specialized to the liver surgeons. Radical surgery is superior to minimally invasive surgery with lower recurrence rates but more morbidity and mortality.[7]

### Radiofrequency energy in hydatid disease surgery

The use of radiofrequency under ultrasound guidance allows for very little blood loss and results in minimal coagulation on the liver parenchyma. Ultrasonography (US)-guided RF peri cystectomy is recommended specifically for cases where the cyst is not located near the liver helium.[7]

## AIMS AND OBJECTIVES

Aim of the study is to compare the outcome of laparoscopic and open conventional hydatid cyst deroofing and omentoplasty.

## METHODOLOGY

**Study Design:**- Retrospective Cohort Study

We have included all patients, diagnosed with liver hydatid cyst during January 2013 to January 2018 at department of general surgery, SMIMER, Surat, Gujarat, India.

Each patient's medical cases were reviewed retrospectively for following parameters:
1. Clinical presentation
2. Contributory laboratory findings
3. Abdominal ultrasound
4. CT scan
5. Intra-operative findings
6. Histopathologic examination.

All cases were studied and randomized to group A and group B:

Group A: laparoscopic hydatid cyst deroofing and omentoplasty.

Group B: Conventional open hydatid cyst deroofing and omentoplasty.

The following parameters were analyzed:
1. Size and location of hydatid cyst
2. Signs & symptoms
3. Duration of drain
4. Post-operative complications
5. Duration of hospital stay

All patient was treated with Albendazole (10 mg/kg) for 1 cycle of 28 days preoperatively and this medication was continued post operatively for 2 cycles of 28 days at an interval of 1 week in between 2 cycles.

Follow up period is 2 year to 6 years at interval of 6 months.

### Inclusion criteria

All the patients, diagnosed with liver Hydatid cyst, with or without co-morbidities like diabetes or hypertension, admitted in, surgical wards of our hospital.

### Exclusion criteria

a. Operated case of previous hepatobiliary surgery.
b. Manageable by percutaneous aspiration of cyst.
c. Cyst located in segment 1,7, near IVC, deeply located intraparenchymal cyst were excluded for laparoscopic surgery.

### Operative Steps for laparoscopic hydatid cyst deroofing and omentoplasty

Four ports were configured: umbilical 10 mm port with 30 degree telescope, 10/5 mm epigastric port, and additional two ports that were depending mainly on the cyst location for each patient. Pneumoperitoneum was set at 12 mmHg.

Savlon soaked gauze was placed around the puncture site to prevent intra peritoneal spillage.

The cyst was punctured and aspirated with 10 mm laparoscopic hydatid trocar. The 20% hypertonic saline was used as scolicidal agent and injected into cyst cavity. After 10 minutes, the cyst was aspirated. Cyst irrigation and surrounding tissue irrigation were done for 3-4 times with 20% hypertonic saline.

Cystotomy was performed via electrocautery and deroofing of the cavity with excision of majority of the thinned out wall of the cavity was done. Then cavity was carefully explored via telescope for biliary leakage from the inner side of cyst wall.

Any biliary communication in the cavity was secured with 3-0 PDS in figure of '8' stitch. Further saline wash of the cavity was given to ensure that no biliary staining of the saline occurs.

Excised wall of the cavity removed in locally made endobag and suction and irrigation of the operating field done with normal saline.

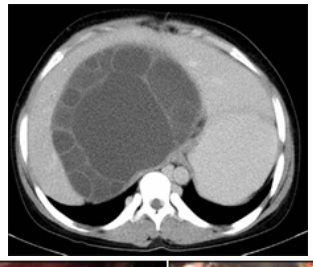
Omentum packed inside the cavity and few stitches taken between edge of the cavity and omentum, followed by Drain placement into the cyst cavity.

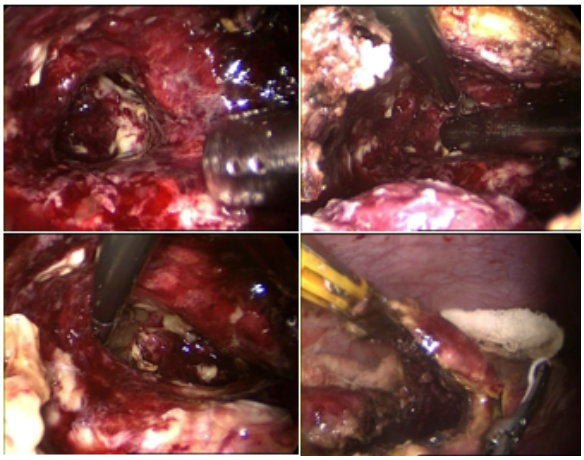
### Operative Steps for Conventional Open Hydatid Cyst Deroofing and Omentoplasty

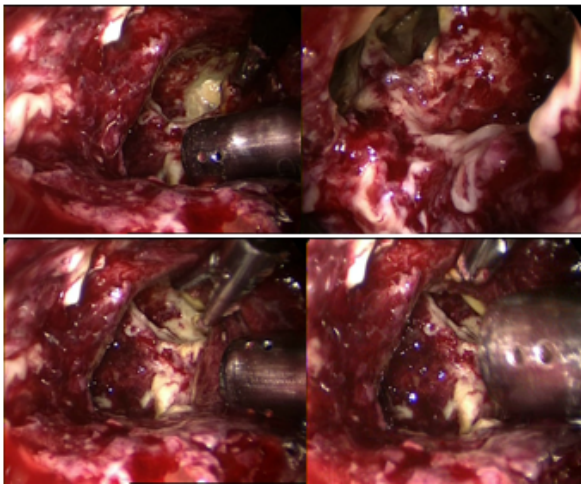
A right subcostal or upper midline incision was kept for open hydatid cyst excision. All other steps were similar to laparoscopic surgery.

Oral intake was started at the postoperative 6$^{th}$ hours in both the groups.

**Fig A: CT scan of hydatid cyst**







**Observation and Results**

Out of 16 cases, 8 were assigned to Group A (laparoscopic hydatid cyst deroofing and omentoplasty) and 8 cases were assigned to Group B (Conventional open hydatid cyst deroofing and omentoplasty).

**Table 1: comparison of cyst size**

| Size(cm) | 5-14 cm | >14 cm |
|---|---|---|
| Group B | 6 | 2 |
| Group B | 3 | 5 |

**Table 2: comparison of duration of surgery**

| Duration of Surgery(minutes) | |
|---|---|
| Group A | 92.24±20.90 |
| Group B | 74.75±18.67 |

**Table 3: comparison of post-operative pain score**

| Post operative pain (VAS) | |
|---|---|
| Group A | 2 ± 1 |
| Group B | 4 ± 1 |

**Table 4: duration of hospital stays**

| Hospital Stay ( days ) | |
|---|---|
| Group A | 6 ± 1 day |
| Group B | 14 ± 2 day |

**Table 5: other postoperative complications**

| Other complications | | |
|---|---|---|
| | Group A | Group B |
| Biliary Leakage | 0 | 0 |
| Collections | 0 | 0 |
| Wound infections | 0 | 1 |
| Recurrence | 0 | 0 |

**Table 6: blood loss**

| BLOOD LOSS (gms) | |
|---|---|
| Group A | 48.5±5.9 |
| Group B | 108.9±16.4 |

**Table 7: duration of drain**

| DURATION OF DRAIN (days) | |
|---|---|
| Group A | 4±1 |
| Group B | 9±2 |

## DISCUSSION

Length of hospital stay may vary according to the preferred surgical modality. Shortened hospital stay has been reported in laparoscopic liver hydatidosis surgery when compared to open techniques in the literature.[8,9,10,12]

In a retrospective analysis of 83 patients in which 14 of them treated laparoscopically, Bostanci et al.[13] reported the mean length of hospital stay was 5.4 day which was shorter in laparoscopic group (3.4 versus 8.8 days).

Ertem et al.[11] reported the length of hospital stay as 4.2 days for 48 laparoscopically treated patients.

In our study, as compatible with the previous reports, the length of hospital stay has been found to be significantly shorter in the laparoscopy group than that of the open group (6 versus 14 days). Therefore, length of hospital stay favors laparoscopic approach for the surgical treatment of liver hydatid cyst.

Another intraoperative complication of liver hydatid cyst is the development of biliary fistulous tract between the cyst cavity and the biliary system that has been reported as 3-17% in the literature.[21] Therefore, detection of bile staining in the cyst cavity and cessation of bile leakage has a prominent importance to avoid increased risk of postoperative complications.

Tuxun et al.[14] reported postoperative bile leakage as 6.24% among 914 patients with liver hydatid cyst treated laparoscopically. A careful exploration of cyst cavity via optic camera as an advantage of laparoscopy may help physicians to detect biliary leakage. Although we could not evaluate the possible association between laparoscopic exploration of the cyst cavity and the detection rate of biliary leakage, it may be recommended to do several attempts to explore cyst cavity.

In our study, we have not found any bile leak or fistula in either of the two groups i.e. open and laparoscopic surgery.

Recurrence is one of the major problems in liver hydatid cyst surgery and has been reported around 10% in the literature.[15] However cumulative recurrence rate of laparoscopic has been reported to be 1.1%.

In our study, there was no recurrence observed as we had taken precaution preoperatively, intra operatively and perioperatively.

Common causes of the recurrences have been reported as remnant daughter vesicles and intraoperative spillage.[8,16]

Therefore, some authors suggest that open approach should be performed for posteriorly located cysts due to difficulty of intraoperative exposure.[8,17]

Khoury et al.[18] reported three recurrences among 83 laparoscopically treated patients and Seven et al.[19] reported one recurrence among 33 patients.

Although the mean operative time was slightly longer with the laparoscopic approach (without statistical significance), we believe that this obstacle can easily be overcome by increased experience of the surgical team.

Zaharie at el reported that the mean operative time was 72 min (range, 45–140 min) in group 1 and 65 min (range, 35–120 min) in group 2 ($p < 0.001$) which was comparable to our study where mean operative time was 92 minutes in group A and 74 minutes in group B.[20]

In our study, mean blood loss is less laparoscopic surgery as compared to open surgery (48 vs 108 gms) as laparoscopic surgery is less invasive approach. Bayrak at el also reported similar results in this variable (60 vs 74 gms).[21]

A drain is usually placed to prevent abscess, biloma, or biliary peritonitis. If bile drainage lasts >10 days, it should be considered as a biliary fistula. ERCP may be used successfully to manage these patients with a low output, that is, <100 ml/day.[21,12,23]

Biliary fistulas were treated by nonsurgical methods. A nasobiliary catheter can be used. A biliary stent can also be placed by ERCP and after the fistula closed, stent should be removed.[16]

Kayaalp and co-workers described 14 (26%) biliary leakages in 54 patients that they have treated. The leakage in nine of the patients ceased in 7 days, whereas biliary fistulas occurred in the other five patients. A nasobiliary catheter was used by ERCP for only two patients, and these fistulas closed in 2 weeks.[24]

In our study, no any incidence of biliary fistula noted.

The advantages of laparoscopic approach compared to open surgery include a shorter hospital stay, which we also encountered in our study, lower incidence of wound complications, less perioperative time,

cosmetically better, less perioperative pain and early ambulation as it improves quality of life.[7-11]

Besides, the disadvantages are an increased risk of cyst fluid spillage, and difficulty in aspirating cyst contents. Additionally, for laparoscopic approach, it is believed that location is important factor to select the patients. Particularly anteriorly located ones are more appropriate for laparoscopic treatment.[12-16]

Postoperative pain was less in laparoscopic method then in open method according to VAS score (2 vs 4).

## CONCLUSION

From our study, we concluded that both the approaches are good for management of liver hydatid cyst but laparoscopic deroofing & omentoplasty is a better method of doing hydatid cyst management in terms of-

- Duration of hospital stay
- Less blood loss
- Less postoperative pain

### Limitations

Main limitations of this study were retrospective design, relatively small number of the cases.

**Declarations:-**
**Funding:** None
**Conflict of interest:** None declared
**Ethical approval:** Not required

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