

Original Research Article

# Evaluation and comparison of the outcomes of open and laparoscopic surgery of liver hydatid cyst


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## Abstract

**Background:** Hydatid disease is the parasitic infestation which is endemic in many sheep and cattle raising area of India. Previously open surgical treatment with albendazole remains the mainstay for treatment. But in the recent era of minimal invasive surgery and its advantages give privilege to laparoscopic surgery to become one of better option for the treatment of the liver hydatid disease.

**Objectives:** The purpose of this study was to compare the difference of incidence of post-operative complications, operative duration, length of hospital stay, duration of return to work, and recurrence in patients undergoing laparoscopic or open surgery for the liver hydatid disease.

**Materials and methods:** The present study was a multicenter study which had been carried out at the tertiary care centre. Total numbers of 36 cases were studied and were followed up for the period of 6 months to 30 months (mean 15 months). All the patients were operated either by laparoscopy or open surgery by the same surgical team depending on below mentioned criteria. Inclusion criteria for laparoscopy surgery were cyst in the segments 1, 2, 3, 4, 5, 6 of liver, cyst over the anterior surface of liver, cyst more than 6 cm. Inclusion criteria for open surgery were cyst in communication with the biliary tree, intra parenchymal and posterior cyst, cyst in the segment 7, 8 of liver, cyst lying in relation to the vital structure, infected cyst, cyst with thick or calcified wall.

**Results:** Out of total 36 patients, 20 (55.55%) were male and the 16 (44.45%) were females. The predominant chief complain of presentation was abdominal pain in 14 (38.89%) patients followed by abdominal lump in the 13 (36.11%) patients followed by other complains. The right lobe of the liver

was involved in the 20 (55.55%) patients, left lobe in 14 (38.89%) patients and both lobes involved in the 2 (5.56%) patients. The single cyst were seen in 33 (91.66%) patients and the more than one in 3 (8.34%) patients. 16 patient underwent laparoscopic surgery while 20 patient underwent open surgery. The mean operating time for the laparoscopy group was 110.0 min compare to 137.5 min for the open group ( p value <0.0001 ,which was statistically significant). The post-operative analgesic requirement was much less in the laparoscopy group (mean 2.37 days) than in the open group (mean 6.85 days; p value <0.0001, which is statistically significant). The drain was removed in the laparoscopy on an average of 4.56 days compared to the average 4.75 days for the open group; (p value = 0.36, which was >0.05; was statistically insignificant). The mean hospital stay in the laparoscopy group was 5.87 days compared to 10.85 days in the open group (p value <0.0001, which was statistically significant). Patients in the laparoscopy group resumed routine activities earlier (11.56 days) than those in the open group (27.8 days; p value=0.0006, which was statistically significant). We found no statistical significant difference in post-operative complications in the two groups except perhaps slightly higher rate in the open group than the laparoscopy group.

**Conclusion:** Laparoscopy management of liver hydatid cyst is feasible, safe and effective provided that surgeon has good knowledge of basic laparoscopic surgery and proper selection of the patient is done.

## Key words

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Liver hydatid cyst, Laparoscopic treatment, Echinococcosis.

## Introduction

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Because of this Liver Hydatid disease was anciently considered as “Liver full of water” [1]. It is also known as Echinococcosis (term coined by Rodolphi in 19<sup>th</sup> Century) [2]. Hydatid disease is the parasitic infestation which is endemic in the many sheep and cattle raising area. Human Echinococcosis is a zoonotic infection caused by the tapeworm of genus Echinococcus. Genus Echinococcus consists of the four species of which three are medically important in human. They are E. granulosus, E. multilocularis, E. vogeli and E. Oligartus. The Incidence of the hydatid disease is 1-220 cases per 100,000 inhabitants [2]. In India, Hydatid disease is common in most of the states but predominant in Andhra Pradesh and Tamil Nadu [3]. Echinococcus can involve any organ of the body but the liver (55-75%) is the most commonly involved organ followed by lungs (18-35%). This is because of the fact that liver act as a first filter in the life cycle of the echinococcosis while lung act as a second filter. Traditionally open Surgery remains the main stay of treatment of liver hydatid. However with invention and

progression of laparoscopy it is possible to use it in treatment of liver hydatid.

## Material and methods

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This multicenter study was carried out on the 36 patients with the liver hydatid cyst who were admitted to tertiary care centre. After taking detail history, all the patients were thoroughly investigated in the form of biochemical investigations, X-ray abdomen and chest and Ultrasonography. CT scan of abdomen was done in all cases for perfect localization of the cyst, to know the exact size and number of cyst and to delineate biliary communication. Patients suspected of having cysto biliary communication were subjected to MRCP. After thorough investigation, informed consent of the patients was obtained and they were subjected to laparoscopy or open surgery based on the following criteria.

### Inclusion criteria for laparoscopy

- Cyst in the segments 1,2,3,4,5,6 of liver
- Cyst over the anterior surface of liver
- Cyst more than 6 cm

#### Inclusion criteria for open surgery

- Cyst in communication with the biliary tree
- Intra parenchymal and posterior cyst
- Cyst in the segment 7,8 of liver
- Cyst lying in relation of the vital structure
- Infected cyst
- Cyst with the thick or calcified wall

All the patients were given Tab. albendazole in 10 mg/kg dose for 2 weeks before surgery.

#### Open surgical procedure

It was done under general anesthesia by right paramedian, midline or subcostal incision depending on the site and size of the cyst. 10% povidone iodine soaked gauze were kept surrounding the hydatid cyst to prevent the seedling of the daughter cyst. Then hydatid fluid was aspirated by wide bore needle and if it found clear, the scolicalid agent (10% povidone iodine) was injected in the cyst which was reaspirated after 10 min. Cystotomy was done and the laminated membrane, daughter cyst and hydatid fluid was evacuated. Saline soaked gauze is kept inside the cyst cavity for 5 min and inspected for any biliary staining suggestive of the cysto biliary communication. If the cysto biliary communication was present then it was closed with the 2-0 polygalactin (vicryl). Then the residual cavity was thoroughly lavaged with 10% povidone iodine solution and omentum was pushed in the cavity to obliterate the cyst. Finally the drain was kept in the sub hepatic region and the operation was concluded by closure of the laparotomy wound.

#### Laparoscopic liver hydatid cyst removal

All the laparoscopic procedure was done under general anesthesia. We had used the special instrument called Palanivelu Hydatid System (PHS) to conduct laparoscopy. For hydatid cyst in the right lobe of the liver, the patient was positioned in left lateral position with a 45° tilt. The surgeon was standing on the left side of the patient. In case of a hydatid cyst in the left lobe

of the liver, the patient was placed in a modified lithotomy reverse Trendelenburg position with the surgeon standing between the legs of the patient.

#### Port placement

**For right hepatic cysts:** The camera port was placed supra-umbilically and slightly to the right of midline. One 10 mm port for the right hand in the epigastrium and one 5mm port for the left hand in the right hypochondrium were inserted just below the liver edge, the exact location being determined by the site of the cyst. The fourth port was a 12mm port exactly over the hydatid cyst for the PHS trocar.

**For left hepatic cysts:** The camera port was placed supra-umbilically in the midline or just to the left of the midline. The right hand working port (10 mm) was in the left hypochondrium while the left hand working port (5 mm) was in the epigastric region. The 12 mm port for PHS is inserted over the location of the cyst.

#### Technique

After introducing the camera port through the umbilicus following creation of pneumoperitoneum the hydatid cyst was identified on the surface of the liver. Any adhesions present were gently separated and the cyst surface was exposed. The PHS trocar with cannula was introduced into the peritoneal cavity directly over the hydatid cyst. Once inside the peritoneal cavity, the trocar was withdrawn so that its tip was within the cannula. The cannula was advanced till its tip was in total contact with the hydatid cyst surface. Strong suction was applied through the side channel to create a strong negative pressure and maintain airtight contact between the cyst and the rim of the cannula. Thereafter, the trocar with a 5 mm. suction nozzle inside it (connected to another suction machine) was introduced into the cannula and, by steady pressure, was pushed into the cyst along with the cannula. Any fluid spillage on puncture of the cyst wall was immediately suctioned either into the body of the hollow trocar through its fenestrated tip and then into the suction cannula or into the outer cannula and

thence, into the suction side-channel. Once the PHS entered into the hydatid cyst, the trocar was removed and the cavity was irrigated with 10% povidone iodine through the main channel while maintaining continuous suction all the time simultaneously. The suction cannula connected to the separate suction machine was introduced through the right hand working port for suctioning the minimal leak if it occurs. In this way, fragments of laminated membrane, daughter cysts and debris were easily removed. Once the returning fluid was clear, CO<sub>2</sub> was insufflated at low pressure (3-4 mmHg) and telescope was introduced into the cavity through the cannula to visualize the interior for any overt cysto-biliary communication. It was thoroughly cleaned before introduction into the peritoneal cavity to avoid any anaphylactic reaction. In absence of overt cyst-biliary communication (verified by absence of bile staining in the suctioned fluid and nonvisualization of opening within the cyst cavity), 10% povidone iodine was instilled into the cyst cavity as a scolicedal agent. After 10 minutes, the scolicedal agent was sucked out then PHS is withdrawn and opening in the cyst was widened. Omentoplasty was done in all cases. In case of overt signs of cyst-biliary communication, use of scolicedal agent was avoided. Drainage tube was kept near the cyst.

#### **Post-operative care**

All patients were closely observed in the ward where the supportive treatment like antibiotics, analgesics, IV fluids, etc. was given. Diclofenac sodium was given every 8 hourly intramuscular or orally depending on the severity of the pain and whether the patient has been started orally. Tramadol hydrochloride was added only if the patient felt pain despite the adequate dose of diclofenac. Diclofenac was given round the clock until patients got substantial relief of the pain (calculation of post-operative analgesic requirement was done up to this stage in the present study). Drain was removed when it stops functioning. All patients were given oral albendazole post operatively for 4 weeks. Both the groups of patient were closely observed with regard to duration and ease of operation, post-

operative analgesic requirement, hospital stay and return to daily activity, complication and recurrence.

#### **Follow up**

In all the patients follow up was maintained for 6 months to 30 months (mean 15 months) to determine late complications and recurrence.

#### **Statistical analysis**

Statistical analysis was performed using the Epi Info 2002. The conclusion was drawn using an unpaired Student's t test and the chi square test. P<0.05 was considered statistically significant.

#### **Results**

In our study, out of total 36 patients, 20 (55.55%) were male and the 16 (44.45%) were females. The predominant chief complain of presentation was abdominal pain in 14 (38.89%) patients followed by abdominal lump in the 13 (36.11%) patients followed by other complains. The right lobe of the liver was involved in the 20 (55.55%) patients, left lobe in 14 (38.89%) patients and both lobes involved in the 2 (5.56%) patients. The single cyst was seen in 33 (91.66%) patients and the more than one in 3 (8.34%) patients. Out of 36 patients 16 underwent laparoscopic surgery and 20 patients underwent open surgery depending on inclusion criteria. All the laparoscopic procedure was concluded successfully and no open conversion was required. There was no operative mortality in either group. The mean age and sex of the patients and size of the cyst were not significantly different in the two groups.

The mean operating time for the laparoscopy group was 110.0 min compare to 137.5 min for the open group ( p value <0.0001 ,which was statistically significant). The difference in time can be attributed to more time needed for the opening and closure of the long wounds in the open group. Securing reasonable hemostasis also affects the time needed for completion. The post-operative analgesic requirement was much less in the laparoscopy group (mean 2.37 days) than in

the open group (mean 6.85 days; p value <0.0001, which was statistically significant). Long incision, cutting of the muscles, retraction of wound for proper exposure and stretching of the peritoneum during closure are the main reasons for pain. The drain was removed in the laparoscopy on an average of 4.56 days compared to the average 4.75 days for the open group;(p value = 0.36, which is >0.05; was statistically insignificant).The duration of the hospital stay gives us an indirect indication of the degree of morbidity. The mean hospital stay in

the laparoscopy group was 5.87 days compared to 10.85 days in the open group (p value <0.0001, which was statistically significant). Moreover, patients in the laparoscopy group resumed routine activities earlier (11.56 days) than those in the open group (27.8 days; p value=0.0006, which was statistically significant) as per **Table - 1**. We found no statistical significant difference in post-operative complications in the two groups except perhaps slightly higher rate in the open group than the laparoscopy group (**Table – 2**).

**Table - 1:** Comparison of various parameters in two groups using the unpaired student’s t test. (Mean ± SD)

Comparison criteria	Lap (n = 16)	Open (n = 20)	T value	p value	Significant
Operating duration (min)	110.0±14.14	137.5±20.22	4.606	<0.0001	Yes
Postoperative analgesic requirement (days)	2.37±0.619	6.85±3.82	4.614	<0.0001	Yes
Drain Removal (days)	4.56±0.89	4.75±1.25	0.505	>0.05	No
Postoperative hospital stay (days)	5.87±1.4	10.85±4.47	4.270	<0.0001	Yes
Return to routine activity (days)	11.56±1.75	27.8±17.11	3.768	<0.001	Yes

**Table - 2:** Comparison of complication incidence between laparoscopy and open group using the chi square(x<sup>2</sup>) test.

Complication	Laparoscopy	Open	x <sup>2</sup>	p value	Significant
Yes	1 (biliary leakage)	4 (wound infection)	0.491	0.4836	No
No	15	16			

## Discussion

Surgery remains the mainstay of treatment for hepatic echinococcosis. Drug therapy has a limited curative role and is used more often as an adjunct to surgery.

Open surgical procedures done for hydatid cysts of the liver, which are tailored to suit each individual case include marsupialization, closed total cystectomy, partial pericystectomy, partial pericystectomy with capitonnage, modified capitonnage, partial pericystectomy with omentoplasty, typical and atypical liver resections. Various laparoscopic techniques described are total pericystectomy, puncture and aspiration of contents followed by marsupialization, unroofing and drainage,

unroofing and omentoplasty, and omentoplasty using helical fasteners, pericystectomy and liver resection. One of the problems faced in laparoscopic treatment of liver hydatid cysts is the difficulty in evacuating the particulate contents of the cyst, the daughter cysts and laminated membrane. Various instruments have been described to evacuate the contents of hydatid cysts. Bickel et al initially advocated the use of a large transparent beveled cannula [4]. Later on, they modified the technique somewhat by creating a continuous vacuum inside the cannula while its tip was firmly adhered to the cyst wall. An aspirator-grinder apparatus was developed by Acarli, et al. [5]. Saglam described a perforator-grinder-aspirator apparatus designed specifically for the evacuation of hydatid cysts [6]. A similar aspirator-grinder apparatus was

described by Alper, et al. [7]. Kayaalp directly inserted a laparoscopic trocar into the hydatid cyst but reported greater success for anterior and unilocular cysts than for posterior and multilocular cysts [8]. A liposuction cannula was used by Al-Shareef, et al. to evacuate hydatid cysts [9]. Another perforator and aspirator called the “perfore-aspirator” have been used by Zengin, et al. [10]. Of all these, the isolated hypobaric technique described by Bickel, et al. [11] is the only one which has attempted to deal with the problem of spillage. Palanivelu [12] devised a special trocar called palanivelu hydatid system (PHS) which we had used in our study because it is easily available and cheap. The PHS not only prevents any spillage of hydatid fluid but also assists complete evacuation of the cyst content and allows intracystic magnified visualization for cyst-biliary communication.

Conservative surgery consists of simple drainage, unroofing, introflexion and omentopexy while radical surgery includes partial cystectomy, pericystectomy and hepatic resections. A tailored approach is required in each patient due to variations in size, multiplicity, location and associated complications. Many authors recommend pericystectomy for hepatic hydatid disease [13, 14]. The main advantage of pericystectomy is that it can be performed without opening the cyst cavity, thus avoiding the problems of spillage and cavity management. The disadvantage is that it is associated with more blood loss and can be done only in peripherally located small cysts. Manterola et al have reported laparoscopic pericystectomies after evacuating the cyst [13]. However, we feel that this approach neutralizes the main advantage of pericystectomy and, hence do not recommend it.

The largest series in literature by Zaharie, et al. [15] shows mean hospital stay was 6.42 (1-21days) days in laparoscopic group and 11.7 days (4-80 days) in open group. The stay was significantly longer for second group ( $p < 0.001$ , significant) which almost same as our study.

With an average follow-up of 15 months, we have not had any recurrences. Various reports in literature reveal a recurrence rate varying from 0.9% to 22% for open surgery [3, 16].

## Conclusion

In our series, we found many advantages of laparoscopy compared to open surgery like decreased operative time, decreased analgesic requirement, decreased hospital stay and early return to activity with statistically significant  $p$  value. Cosmetically, laparoscopy is far superior than open surgery. However based on our experience, we would like to recommend that surgeon should have good knowledge of basic laparoscopy and long learning curve before applying it in management of liver hydatid diseases.

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