

## Research Article

# Management of hepatic hydatidosis by open versus laparoscopic surgery

Ashutosh Darbari<sup>1</sup>, Abhinav Jauhari<sup>2\*</sup>, Ambuj Shrivastava<sup>3</sup>

<sup>1</sup>Department of Surgery, Chirayu Medical College, Bhopal, Madhya Pradesh, India

<sup>2</sup>Department of Surgery, J.N. Medical College, Sawangi (M), Wardha, Maharashtra, India

<sup>3</sup>Department of Radiodiagnosis, S.D.U. Medical College, Tamaka, Kolar, Karnataka, India

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### \*Correspondence:

Dr. Abhinav Jauhari,

E-mail: abhinavjauhari05@gmail.com

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## ABSTRACT

**Background:** Aim of current study was to compare between laparoscopic versus open management of the hydatid cyst of liver regarding complication rate, post-operative recovery course with different modality of treatment and hospital stay. This study shows our results of surgical treatment of liver hydatid cysts during a 2.5 years period.

**Methods:** A prospective study of 30 patients operated on in a 2.5 year period (April 2011 to October 2013) in department of general surgery of J.N. medical college, Sawangi (Meghe), Wardha, Maharashtra, with hepatic hydatid cyst. All patients were preoperatively treated with albendazole. 15 patients were tackled by laparoscopic technique (using Palanivelu hydatid system) and rest 15 underwent Open procedure as surgical approach.

**Results:** Patients operated by laparoscopic surgery shown a better post-operative recovery course, required less analgesia, mobilized and started on oral feed early, intra-abdominal drain was removed at a much earlier period as compared to open group patient, this not only reduced morbidity but also because of this patient could be discharged earlier.

**Conclusion:** Minimal invasive management, using Palanivelu hydatid system for aspiration and laparoscopic intervention, is an alternative to open surgery because of its ability to prevent spillage and thus minimize recurrences. It is better and safe to use laparoscopy in treatment of hydatid liver with less morbidity, mortality and recurrence rate in comparison with open technique.

**Keywords:** Laparoscopic treatment, Liver, Hydatid cyst, Palanivelu hydatid System, Abdominal approach

## INTRODUCTION

Echinococcal (Hydatid) disease has been known from the time of Hippocrates, who described patients with "liver full of water".<sup>1</sup>

Hydatid disease is still a major health problem in the infested areas of world, mainly in sheep-raising areas. But owing to increased travel and tourism all over the world, it can be found anywhere, even in developed

countries.<sup>2</sup> It can involve any organ and mimic almost any pathological condition.

Its clinical manifestations concern practically all the medical and surgical specialists but mainly the general surgeons because of the multiplicity and magnitude of the surgical problems so often associated with human echinococcosis.<sup>3</sup>

Hepatic hydatidosis is caused by the parasite, *Echinococcus granulosus*, which is a cestode that lives in

the small intestine of dogs and other canines. Eggs are eliminated in the feces and when ingested, liberate their larvae in the duodenum of an intermediate host. The intermediate host can be sheep/ goat. Humans are accidental intermediate hosts. The larvae cross the intestinal wall and via the portal system reach the hepatic sinusoids where they develop into cysts. Some larvae are not filtered in the liver, but remain in the blood to reach the next station, the lungs. In addition, some may pass through the pulmonary circulation and travel to other organs. Larva transported in the mesenteric lymphatics are carried to the cisterna chily, the thoracic duct, and into the general circulation, ending up in a variety of distant sites.<sup>4,5</sup>

The most common site of occurrence of hydatid cysts in humans is the liver (50% to 93%).<sup>4,6,7</sup> Left untreated, the cyst grows and follows one of several courses: forms fistulas into adjacent organs or the biliary system, ruptures into the peritoneal cavity causing seeding of multiple daughter cysts throughout the peritoneal cavity, developing daughter cysts within or rarely dying *de novo*. Older cysts have an increased risk of exogenous daughter cyst formation, which is an important factor for recurrence of disease after surgery.<sup>8,9</sup>

Despite advances in medical treatment and in interventional radiology, the surgical approach remains the gold standard.<sup>10,11</sup> Only medical treatment, without surgery of liver echinococcosis with albendazole or mebendazole remains controversial.<sup>12</sup> Laparoscopy, as minimally invasive surgery, has well known clinical advantages over traditional surgery. Several reports have confirmed the benefit of a laparoscopic approach to liver hydatid disease.<sup>13-15</sup>

Surgery remains the gold standard in terms of therapy for patients with hepatic hydatid cyst. Despite significant advances in medical treatment and interventional radiology, the conventional operative procedures of the hydatid cyst of the liver, like enucleation, cystectomy, evacuation, marsupialization, etc., which involve a significant morbidity especially in term of wound infection are used. Laparoscopic treatment of hepatic hydatid disease has been increasingly popular parallel to the progress in laparoscopic surgery.

**METHODS**

From April 2011 to October 2013, 15 patients were tackled by laparoscopic technique (using Palanivelu hydatid system) and rest 15 underwent open procedure as surgical approach. The study group consisted of 9 men and 21 women. Ages ranged from 13 to 70 years, the highest incidence was found in 4<sup>th</sup> decade (43.33%) i.e. 13 patients were there in this group. The most common complaints were dull pain in the upper abdomen. Patients were diagnosed by ultrasonography (US) and Computed Tomography (CT). We excluded cases with multiple liver hydatid cysts having more than two or cysts located in

blind area for laparoscopic procedures, like segments 1, 2 and 7. Our exclusion criteria also included intraparenchymal location of the cyst or cysts with thick and calcified walls. All procedures were performed under general anesthesia and in the supine position. Prophylactic antibiotics were administered for 30 minutes before the operation.

**Surgical procedures**

*1) Laparoscopic procedure*

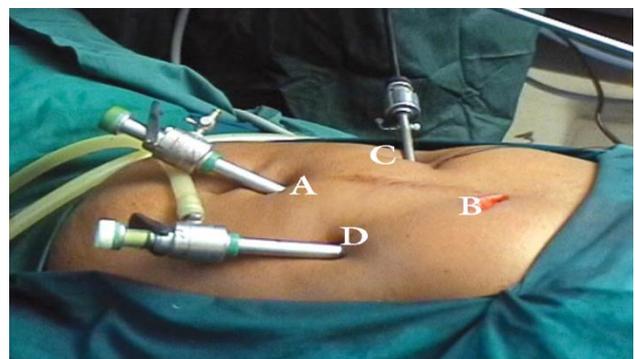
All patients were administered general anesthesia in supine position.

A prophylactic dose of antibiotics (ceftriaxone-sulbactam 1.5 g intravenously) given at induction.

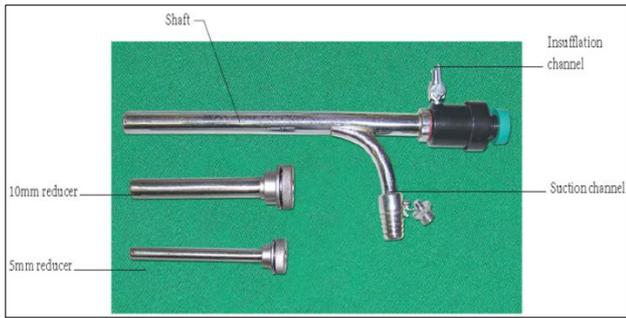
A transumbilical incision taken of 1-1.5 cm. Incision deepened and peritoneum opened under direct vision (hassons technique). A 10 mm blunt trocar is introduced. CO2 insufflation done and pneumoperitoneum is created. Intra-abdominal pressure maintained at 12 mmHg.



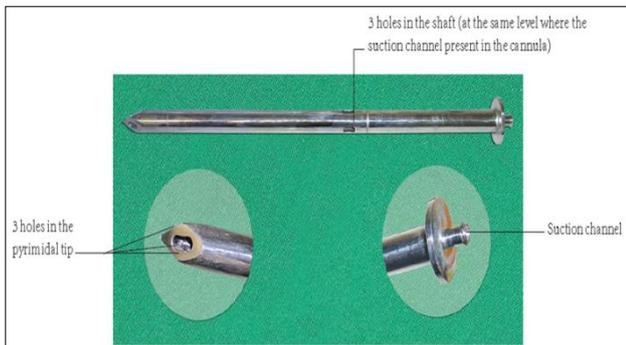
**Figure 1: Port position for right lobe hydatid cyst liver. A - Umbilical camera port 10 mm, B - Epigastric PHS port 12 mm, C - Right mid clavicular working port 5 mm.**



**Figure 2: Port position for left lobe hydatid cyst liver. A - Supraumbilical camera port 10 mm, B - Epigastric PHS port 12 mm, C - Right mid clavicular working port 5 mm, D - Left mid clavicular working port 10 mm.**



**Figure 3: Palanivelu hydatid trocar system - cannula and reducer.**



**Figure 4: Palanivelu hydatid trocar system - trocar.**

Abdominal cavity inspected. Position of the cyst confirmed. 10 mm sharp trocar introduced commonly in epigastric region. Isolation done with hypertonic saline soaked gauze pieces kept around cyst cavity. Another one or two 5 mm working ports introduced depending upon the position of cyst. Adhesions if any separated.

Palanivelu hydatid trocar system introduced directly trans-abdominally over the cyst. Once inside the peritoneal cavity, the trocar is removed and the cannula alone is advanced till its tip is in total contact with the hydatid cyst surface. Suction is applied through the side channel to maintain the contact between the cyst and the cannula opening.

The trocar with 5 mm suction nozzle inside connected to another suction machine is introduced into the cannula and by steady pressure, is pushed into the cyst along with the cannula. Any fluid spillage on puncture of the cyst wall is immediately suctioned either into the body of the hollow trocar through its fenestrated tip and then into suction cannula or into the outer cannula and thence, into the suction side channel.

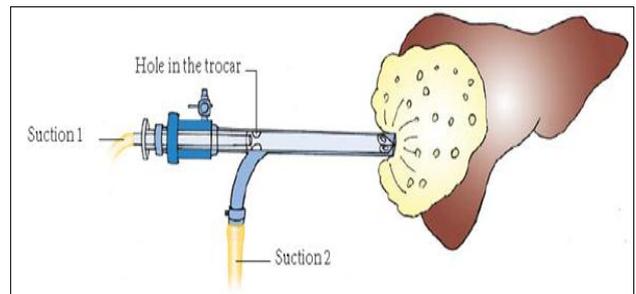
Once the PHS enters into the hydatid cyst, the trocar is removed and the cavity is irrigated through the main channel while continuous suction is simultaneously maintained all the time. In this way, fragments of laminated membrane, daughter cysts and debris are easily removed.

Cyst evacuation completed.

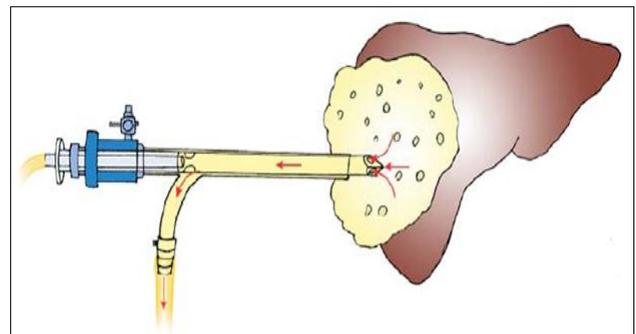
Telescope introduced through trocar into the cavity to look for any residual daughter cyst or hydatid sand and to look for any cysto-biliary communication in liver hydatid cyst.

Cavity irrigated with scolicidal agent hypertonic saline. After holding period of 10 minutes contents re-aspirated. Procedure continued till returning fluid was clear of debris.

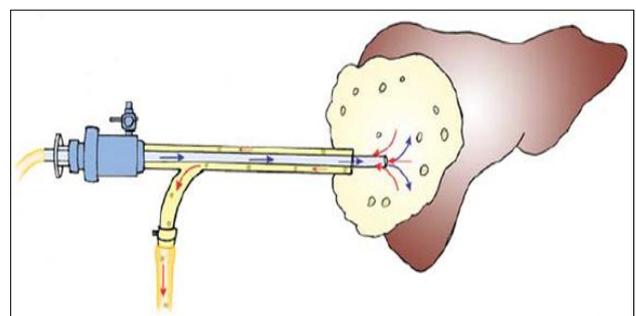
Complete evacuation confirmed.



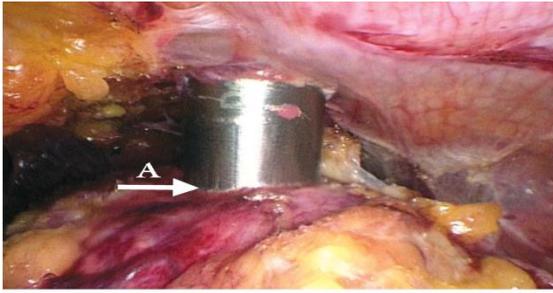
**Figure 5: Step 1 - Pressing the cyst wall with PHS cannula, by keeping the two separate suction one in cannula and another in trocar.**



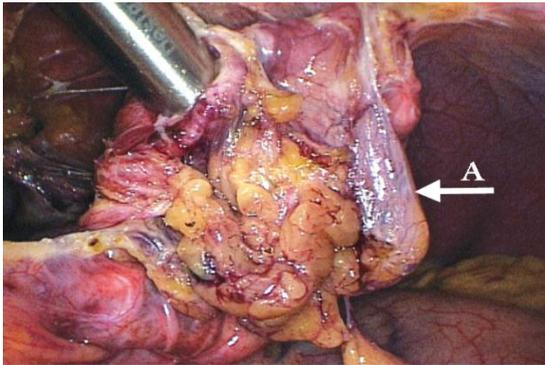
**Figure 6: Step 2 - Penetration of cyst wall with the trocar and aspiration of cyst content.**



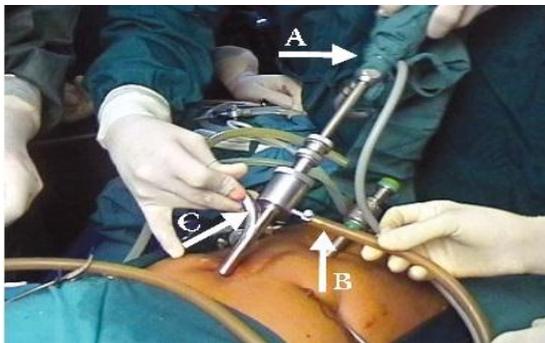
**Figure 7: Step 3 - washing the cyst cavity with the normal saline. It will clear the remnant daughter cyst and germinal layer.**



**Figure 8: Puncturing the cyst wall with PHS. A - Hydatid trocar is entered into the cyst without any spillage.**



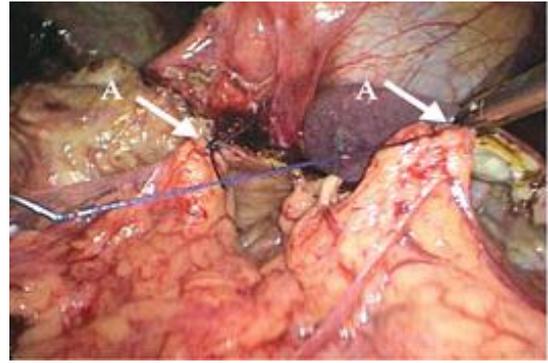
**Figure 9: Contents of the hydatid cyst was sucked out. A - Collapsed hydatid cyst.**



**Figure 10: Camera is introduced into the PHS to view the cyst cavity. A - Laparoscopic Camera, B - Insufflation tube, C - Suction channel.**



**Figure 11: Cyst was collapsed after aspiration. A - Inferior surface of left lobe, B - Stomach.**



**Figure 12: After deroofing the cyst, omentum was placed and fixed to the side wall. A - Suture to the omentum and cyst wall.**

For overt (more than 5 mm) cysto-biliary communication the opening sutured with vicryl, followed by omental packing of the cavity.

In absence of any obvious (less than 5mm) cysto-biliary communication omental packing of the cavity done & intra-abdominal drain kept *in situ*. Drain fixed to abdominal wall with silk 1-0.

Similar procedure repeated for another cyst.

Gauze pieces used for isolation are removed.

Ports are removed under vision.

10 mm port site is closed with vicryl 2-0.

Skin is closed with nylon 3-0.

Cleaning & dressing of port sites done.

## 2) Open surgical procedure

All patients were administered general anesthesia in supine position.

A prophylactic dose of antibiotics (ceftriaxone-sulbactam 1.5 g intravenously) given at induction.

Choice of incision (Right Kocher's/Midline) was made with reference to the location of cyst to be removed.

Incision deepened and peritoneum opened under direct vision.

Abdominal cavity inspected. Position of the cyst confirmed.

Isolation done with hypertonic saline soaked gauze pieces kept around cyst cavity.

The cyst is punctured with a wide bore needle and is then aspirated using 50 ml syringe.



**Figure 13: Irrigation of cavity with scolicedal agent in open surgery.**



**Figure 14: Daughter cysts being taken out with the help of scoop in open surgery.**

The amount of hydatid fluid is then replaced by equal quantity of hypertonic saline; these steps are repeated 2-3 times.

The cyst is then opened, and the contents are aspirated with a suction device that is capable of generating high negative pressures.

Incision over the cyst is then enlarged, and remaining endocysts are meticulously cleared.

The cavity is irrigated again with hypertonic saline.

The excess wall margin is resected, residual cavity is packed with omentum and the bleeding at the cut edges of the residual cavity is dealt with continuous interlocking Vicryl sutures.

For overt (more than 5mm) cysto-biliary communication the opening sutured with vicryl, followed by omental packing of the cavity.

Intra-abdominal drain kept *in situ* and fixed to abdominal wall with silk 1-0.

Abdominal closure done by using vicryl 1.0 sutures

Skin closed with nylon 2-0.

Cleaning & dressing done.

Patients are allowed orally when bowel sounds appeared & early mobilization was encouraged.

Drain removal was done when drainage was less than 10 ml over 24 hours and patients were discharged after drain removal. Suture removal was done on post-operative day 7.

Patients were asked to come for follow up at 1 month, 6 months and yearly after discharge. On follow up visits patient evaluated with complete clinical examination and X-ray chest and US abdomen.

#### ***Inclusion criteria***

- Patients with hydatid cyst(s) of liver

#### ***Exclusion criteria***

- Patients unfit for general anesthesia.
- Deep intraparenchymal cyst
- More than 3 cysts
- Cyst less than 3 cm
- Coagulation abnormalities
- Children less than 12 years of age
- Hydatid cyst elsewhere apart from liver e.g. lungs, kidney etc.

#### **RESULTS**

The present study titled “Management of hepatic hydatidosis by open vs. laparoscopic surgery” was carried in the department of general surgery of J.N. Medical college, Sawangi (Meghe), Wardha, Maharashtra from Apr 2011 to October 2013.

The study comprises of 30 cases of liver hydatid cysts (Laparoscopic surgery - 15 cases, open surgery - 15 cases) which underwent evacuation of cyst(s) either by laparoscopic or open surgery.

During our study we noticed the female preponderance with maximum number of patients in fourth decade of life; the youngest was a 13 year female and the oldest being a 70 year female.

The commonest presenting symptom being pain in abdomen which was followed by lump in abdomen. Majority of the patients presented with single Hydatid

cyst with most of them in 6-10 cm size range with involvement of the right lobe of liver being the most common.

Only one patient suffered intra operative complication in the form of spillage followed by anaphylaxis. It was managed by intravenous hydrocortisone and with inotropic support. The Patient recovered well from the episode post operatively.

Patients operated by laparoscopic surgery shown a better post-operative recovery course, required less analgesia (none of the laparoscopic patient demanded analgesic after post-operative day 3), while patients who underwent laparotomy required analgesics for an average period of 5.5 days. Laparoscopy group patients were mobilized and started on oral feed early as compared to open group patients. The intra-abdominal drain was removed at a much earlier period as compared to open group patient; this not only reduced morbidity but also because of this patient could be discharged earlier.

Biliary fistula was found in 13.3% of patients as post-operative complication followed by surgical site infection in 6.6% patients.

During the follow up period the patients were called at intervals of 1 month, 6 months and 1year. During the follow up period none of the operated patients had recurrence.

Consequently, early recovery, reduced hospitalization and minimum morbidity are the hallmarks of laparoscopic management which is worth pursuing.

## DISCUSSION

The youngest patient in the study was 13 years old though the average age of 43.5 years was in keeping with the average age of presentation in endemic areas.<sup>17</sup> However in nonendemic areas, all the age groups are usually equally affected with the average age of presentation being older.<sup>17,18</sup> Females were predominantly affected in the study other published studies have also reported female preponderance.<sup>18,19</sup> Abdominal pain was the most common mode of presentation (86.6% of cases) in this study, which has also been reported by other authors.<sup>18,19</sup>

The most common pathology was a single cyst in the right lobe of the liver. Similar findings have also been reported by other authors.<sup>17,18</sup> Ultrasonography and CT are both effective imaging modalities for the detection of liver hydatid disease. US is particularly useful for the detection of fragments of endocyst membranes, septa, and hydatid sand, while CT best demonstrates cyst wall calcification and cyst infection.<sup>20</sup>

Surgery remains the mainstay of treatment for hepatic echinococcosis.<sup>10,11</sup> Several nonsurgical options have

been explored. The first report of laparoscopic treatment of hydatid cyst of the liver was published in 1994<sup>21</sup> followed soon thereafter by the first report of anaphylactic shock complicating laparoscopic treatment of hydatid cysts of the liver.<sup>22</sup> In fact, an exaggerated fear of anaphylaxis seemed to discourage surgeons from more widely adopting minimal access techniques for the treatment of hydatid cysts.<sup>23</sup> However, gradually reports started appearing in the world literature detailing laparoscopic management of liver hydatid disease.<sup>24</sup> The indications, contraindications, advantages, and disadvantages of this technique have been elucidated.<sup>25</sup>

## CONCLUSION

Minimal invasive management, using Palanivelu hydatid system for aspiration and laparoscopic intervention, is an alternative to open surgery because of its ability to prevent spillage and thus minimize recurrences. It is better and safe to use laparoscopy in treatment of hydatid liver with less morbidity, mortality and recurrence rate in comparison with open technique.

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*Conflict of interest: None declared*

*Ethical approval: The study was approved by the institutional ethics committee*

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