Laparoscopic Management of Hydatid Cyst of Liver with Palanivelu Hydatid System over a Period of 3 Years: A Case Series of 32 Patients

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Abstract The aim of this article is to evaluate the role and safety of laparoscopic management of hydatid disease of liver using Palanivelu hydatid system (PHS)¹ with initial results. A prospective study of hepatic hydatid cyst underwent laparoscopic management using PHS, during the period from June 2008 to October 2010, in department of general surgery in a tertiary care institute. Selective patients were included in our study. Preoperatively 2 weeks and post operatively 6 weeks of Albendazole were given. All patients underwent surgery under general anesthesia. Hydatid cyst evacuation and omentoplasty were done with PHS system to prevent spillage. Cyst was irrigated with 2 % savlon. Drainage tube was kept near the cyst. There were 32 patients with 35 liver hydatid cysts operated. The mean operative time was 93.78 (70–180) min. Intraoperative complications were noted in two patients (6.2 %). Conversion was required in one patient (3.1 %). The mean duration of hospital stay was 3–10 days with an average of 5 days. There was no recurrence in mean follow-up of 3 years. There was no mortality with good subjective and objective cosmetic results. The laparoscopic cyst evacuation and omentoplasty using PHS are feasible and safe for treating the hydatid cyst of liver in selected patients. It aids early recovery with good cosmetic results.

Keywords Hydatid cyst · Palanivelu Hydatid System · Laparoscopic · Omentoplasty

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Introduction

Echinococcosis (Hydatid) disease has been known from the time of *Hippocrates*, who described this condition as "liver full of water" [1]. It has highest prevalence in developing countries; in India, highest cases were reported in Andhra Pradesh, Tamilnadu, and Vidarbha than other parts of the country [2]. Surgery is the mainstay of treatment for hydatid disease of the liver. In humans, cysts occur mainly in the liver (50–75 %) followed by lungs (25 %), and 5–10 % distribute along the arterial system to other organs of the body [3]. Laparoscopic treatment of hepatic hydatid disease has been increasingly popularized in the last decade due to various advantages over open surgery. There are various techniques described in literature to deal with hydatid cysts laparoscopically to prevent spillage and recurrences. We are presenting our experience of 32 patients with 35 hydatid cysts of the liver, treated laparoscopically with technique of Palanivelu hydatid system.

Methods and Materials

A prospective study of 32 patients of liver hydatid disease was treated laparoscopically in the Department of General Surgery, IGGMC, Nagpur, from June 2008 to October 2010. The study consists of 13 males and 19 females with age ranged from 8 to 58 years. The most common complaints were pain at the right hypochondrium or/and epigastrium, and palpable mass. All the cases were diagnosed clinically and confirmed by ultrasonography. Selection criteria of patients included in this study are shown in Table 1.

Preoperatively, all patients were given a tablet of Albendazole 10 mg/Kg body weight for 2 weeks, irrespective of the age. Preoperative prophylactic injectable antibiotic administered 1 h prior to surgery. Supine position was given after general anesthesia. All patients were operated with the

Table 1 Selection criteria

Inclusion criteria	Exclusion criteria
Patients presented with hydatid disease of the liver (documented hydatid disease on USG) with or without symptoms)	A deeply situated intraparenchymal cyst
Gharbi Type I, II, and III cysts	Inaccessible posterior cyst
Cysts that are peripherally situated	Cysts involving other organs
Cyst size between 5–15 cm	Gharbi Type IV and V

technique described by Palanivelu with Palanivelu hydatid system (PHS)¹ to prevent spillage of hydatid fluid.

For hydatid cyst in the right lobe of the liver, the patient was positioned in left lateral position with a 45° tilt, and surgeon stands 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. One camera port with two working ports was placed and 12 mm port exactly over the hydatid cyst for PHS.

After the creation of pneumoperitoneum, the hydatid cyst was identified on the surface of the liver. Adhesions were gently separated if any and the cyst surface was exposed. Two percent savlon soaked gauze was inserted and spread over the surface of the liver lesion to prevent peritoneal contamination of hydatid fluid spillage if occurs. 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 is within the cannula. The cannula advanced till its tip 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 was introduced into the cannula and, by steady pressure, pushed into the cyst along with the cannula. Once the PHS enters into the hydatid cyst, the trocar was removed and the cavity irrigated through the main channel while maintaining continuous suction all the time simultaneously.

The deroofing of deflated cystic wall was done with the help of a hook by using monopolar diathermy. The laminated membrane and daughter cysts were carefully removed and were put into the endobag. Then telescope was introduced into the cavity to visualize the interior for any overt cyst–biliary communication, confirmed by the absence of bile staining gauze inserted into the cystic cavity. Cyst was irrigated with 2 % savlon which was sucked out after 10 min. Omentoplasty was done for all cases. Drainage tube was kept near the cyst.

The postoperative period was uneventful in all the cases, oral fluid intake was allowed on the next day of operation, and

drain was removed 72 h after the operation if no apparent bile leak. Patients were discharged and were advised for follow-up at 2 weeks, 1, 3, and 6 months for USG monitoring. All patients were given a tablet of Albendazole at a dose of 10 mg/Kg body weight for 6 weeks in the postoperative period.

Results

The present study of laparoscopic management of hydatid disease of liver using PHS was carried from June 2008 to October 2010 at tertiary care institute. Total 32 patients having liver hydatid cyst diagnosed by ultrasound were included in this study.

The most common presenting symptom was pain in the abdomen in 22 patients (68.75 %) followed by lump in the abdomen in 15 patients (46.87 %), jaundice in 6 patients (18.75 %), fever in 6 patients (18.75 %), and asymptomatic in 3 patients (9.38 %). An abdominal ultrasound and abdominal CT scan were done to confirm the diagnosis of hepatic hydatid cyst in all patients. Most of the cysts on USG were Gharbi type III (18 cysts), 9 of Type II, and 8 of Type I (Fig. 1). Single hydatid cyst was found in 30 patients, and 2 patients had multiple cysts thus a total of 35 cysts were operated. Right lobe was involved in 24 patients (75 %), left lobe in 6 patients (18.75 %) with both lobes in 2 patients (6.25 %). The size of cysts ranges from 5–15 cm with seven cysts measuring more than 10 cm.

The mean operative time was 93.78 (70–180)min. Of which, two patients required more than 110 min due to intraoperative complications (6.24 %), one due to intraoperative bleeding and other due to intraoperative spillage. One patient (3.12 %) was converted to open procedure due to extensive

Fig. 1 Ultrasonography of the abdomen showing right lobe of liver hydatid cyst multiple with daughter cysts

Fig. 2 Steep learning curve

bowel and omental adhesions to cyst wall which were inseparable laparoscopically. As the experience increases, the time taken for surgery decreases, which was shown as steep learning curve as shown in Fig. 2. One patient (3.12 %) had minor bile leak postoperatively which stopped on day fifth spontaneously. There was no major wound related complication except of the two patients who had minor wound infection. Mean duration of hospital stay was 5.22 (3–10) days. There was steep learning curve. There was no recurrence in mean follow-up of 3 years. There was no mortality with good subjective and objective cosmetic results.

Discussion

Hepatic hydatid disease is caused by *Echinococcus granulosus*. In humans, 50–75 % of cysts occur in the liver; 25 % are located in the lungs; and 5–10 % distribute along the arterial system [3]. Hydatid cyst disease of the liver is widespread in India. The commonly affected age group is the third and fourth decades. In non-endemic areas, it can affect all age groups. Both sexes are affected by this disease [4]. Liver hydatid disease may be asymptomatic or patients can present with hepatomegaly, jaundice, urticaria, malaise, abdominal pain, abdominal mass, fever, anorexia, and/or cough. Abdominal pain and mass are the common forms of presentation [5]. In our series, most common presenting symptom was pain in the abdomen in 22 patients (68.75 %) followed by lump in the abdomen in 15 patients (46.87 %). In our series, single hydatid cyst was found in 30 patients and multiple in 2 patients, and right lobe was involved in 24 patients, and left lobe in 6 patients with both lobes in 2 patients, which is comparable to Niścigorska et al. who reported that most common pathology is a single cyst in the right lobe of the liver [4].

Ultrasonography (USG) and Computed tomography (CT) are both valuable imaging methods for the diagnosis of liver hydatid disease. Gharbi et al. [6] gave ultrasonographic classification of hepatic hydatid disease, as shown in Table 2. In our series, we included 18 cysts of Gharbi type III, 9 of Type II, and 8 of Type I. The World Health Organization (WHO) Informal Working Group on Echinococcosis [7] modified their International Classification System, which was based on Gharbi's ultrasonographic classification system, to identify the functional state of parasites to define the treatment.

The roles of preoperative drug therapy are to decrease the size of a cyst and to reduce the risk of intraoperative spillage-induced spread. In our series, all patients were received a tablet of Albendazole at a dose of 10 mg/Kg body weight for 2 weeks, preoperatively. Surgery is the gold standard in terms of treatment for patients with hydatid disease of the liver. The first report of laparoscopic treatment of hydatid cyst of the liver was published by Bickel A et al. (1994) [8] and was followed soon thereafter by the first report of anaphylactic shock complicating laparoscopic treatment of hydatid cysts of the liver by Khoury G et al. (1998) [9]. In fact, an exaggerated fear of anaphylaxis seemed to discourage surgeons from more

Table 2 Gharbi classification of hydatid cysts [6]

Type I	Pure fluid collection - univesicular cyst
Type II	Fluid collection with a split wall—detached laminated membrane—“water lily” sign
Type III	Fluid collection with septa—daughter cysts
Type IV	Heterogenous appearance—presence of matrix—mimics a solid mass
Type V	Reflecting thick walls—calcifications

widely adopting minimal access techniques for the treatment of hydatid cysts [10].

Laparoscopy is ideal in patients with superficial and fluid-filled cysts [11]. Laparoscopic pericystectomy can be regarded as the gold standard for the management of small, peripherally located hydatid cysts lying away from major vessels [12]. Therefore, we included only the peripherally situated and Gharbi type I to III cysts. Morbidity associated with open surgery can be reduced by using the laparoscopy technique [13]. Laparoscopy has many advantages over traditional open surgery. Several reports have confirmed the advantage of a laparoscopic procedure for the treatment of a hydatid cyst of the liver, as incidences of anaphylaxis and spillage are minimal with laparoscopy [14].

A laparoscopic procedure involves aspiration, instillation of scolicalid agent, deroofing, removal of all contents, and converting the cyst into a big size non-dependent cavity. Various surgeons have used different aspiration/suction devices, like simple needle aspiration [15], suction with liposuction device [16], large-diameter transparent cannula [17], Palanivelu hydatid system [18], special trocar used to suspend the cyst against the abdominal wall [19], and an aspirator-grinder apparatus [20].

The vacuum seal created using PHS (Palanivelu hydatid system) described by Palanivelu et al. (2006) [18] helps maintain the negative pressure inside the system and segregates the high intraabdominal pressure (due to pneumoperitoneum) for the low-pressure zone of PHS. 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. Thus, laparoscopic management of liver hydatid cysts consists of aspiration and instillation of a scolicalid agent in the cyst and aspiration of contents, either alone or deroofing with pericystectomy or liver resection [21]. The cyst wall can be excised with the help of electrical diathermy or with a harmonic scalpel and endo-GIA stapler [22]. The cavity can be obliterated with the greater omentum to decrease the chances of collection and of recurrence [23, 24]. We have performed all the cases using Palanivelu hydatid system.

Mean operative time in our study was 93.78 (70–180) min which is comparable to literature showing mean operative time ranging 52–102 min [18, 25–28]. Baskaran V et al. [28] had five intraoperative spillage, and Chowbey PK et al. [25] had one trocar-induced bowel perforation where as we had only two (6.2 %) intraoperative complications, one bleeding, and one spillage. Conversion rate ranges from 4–23 % in the literature studied; in our study, we need to convert just one case (3.12 %) to open procedure [18, 25–28]. In our series, we had 9.37 % postoperative complication rate which is comparable to literature studied [18, 25–28]. We had no recurrences in our series as compared to Seven R et al. [19] who had one and Baskaran V et al. [28] who had two recurrences (Table 3).

Table 3 Comparative study

	Chowbey PK et al. [25]	Ertem M et al. [26]	Saglam et al. [27]	Palanivelu et al. [18]	Seven R et al. [19]	Baskaran V et al. [28]	Present study
No. of patients	16	48	24	75	30	18	32
Mean operative time (min)	84±6 (60–125)	82 (45–170)	70	52	78±8 (30–120)	102 (45–160)	93.78 (70–180)
Intraoperative complication	One (trocar-induced bowel perforation)	–	–	Nil	1 (4 %)	5 (Spillage)	2 (6.2 %)
Conversions to open	Nil	4 %	6 (25 %)	Nil	7 (23 %)	2 (11 %)	1 (3.12 %)
Postoperative complication	Nil	–	Biliary fistulas (four cases) 6 days	11	4 (17 %)	3-Persistent drainage 1-Bile leak	3 (9.37 %)
Mean duration of hospital stay	2.3 days (1–6 days)	4.2 days	6 days	–	6±1 (1–14 days)	–	5.22 (3–10 days)
Recurrence (Follow-up)	Nil (3 to 44 months)	Nil (34.2 months)	–	Nil (5.9 years)	one recurrence (9 %) (17 months)	2 (11 %) (6 months)	Nil (3 year)

In our study, we had less intraoperative and postoperative complications and required lesser operative time. Learning curve was found to be steep. Laparoscopy with PHS avoids spillage of hydatid fluid with no anaphylaxis. Early ambulation and minimally invasive procedure reduces hospital stay. No recurrence was found in our series.

Conclusion

The laparoscopic cyst evacuation and omentoplasty using PHS is feasible and safe for treating the hydatid cyst of the liver in the selected patients, while addressing all the conventional surgical principles of treating the hydatid cysts, like aspiration, prevention of spillage, sterilization of cysts, and partial deroofing. It aids early recovery with good cosmetic results. PHS is an ideal method for single or multiple Gharbi type I to III hydatid cyst of the liver with minimal spillage rate, minimal complications, and morbidity.

Conflicts of Interest None

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