Chapter 1

Laparoscopic Treatment of Hydatid Hepatic Cyst

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Abstract

The treatment of hydatid cyst includes various forms: from open surgery to laparoscopic and endoscopic therapies, all enhanced by specific antiparasitic drugs. In this chapter are summarized the main techniques of laparoscopic treatment of hydatid cyst and its major postoperative complications. Surgical techniques described vary depending on the topographic location, expression on the surface of the liver, presence of complications, type of bilo-cystic fistula and experience of the surgical team. Also a series of specific devices meant to treat this disease are noted. PAIR method was not detailed in this chapter because is a percutaneous method. Laparoscopic approach of hepatic hydatid cyst is used increasingly in the treatment of this condition and for experienced teams this can become the most effective method of treatment, in combination with antiparasitic medication.

Introduction

Liver hydatid cyst is an endemic disease in developing countries, therefore the experience with this pathology is not uniform. However, because of population migration, this disease became a worldwide problem. The main treatment of the disease is surgery, no matter how much anti-parasitic drugs and interventional procedures have evolved.

The first laparoscopic treatment attempts were made in 1992 and were initially reported as case presentations and subsequent series of cases with increasing number of patients.
The techniques used in the treatment of hepatic hydatid cyst vary and minimal invasive methods were taken and adapted from open surgery. In addition many other specific techniques of laparoscopic surgery emerged that uses standard minimal invasive surgery tools or adapted devices.

This wide variety of techniques and devices shows that there is still no unified view of treatment for hepatic hydatid cyst and that surgeons still seek an ideal therapeutic method.

Additionally in cases where the laparoscopic technique cannot be applied a conversion to open surgery is used, as a last resort of surgical therapy. This is not considered a minimal invasive surgery failure but in some cases may be a limitation of the technique (especially for posterior segments of liver or for complications of this disease) or lack of experience of the surgical team.

There are methods of percutaneous treatment (PAIR - puncture, aspiration, injection, reaspiration) but have very limited indications and risk for anaphylaxis or secondary dissemination when not properly done.

Robotic surgery can be used in the treatment of hepatic hydatid cyst with the same indications as the laparoscopic approach, taking advantage of easy access in difficult areas, reduce surgeon fatigue and tremor.

Anterior and lateral liver segments 2, 3, 4, 5, 6 are considered available for minimal invasive techniques. In some particular cases cysts of the posterior segment can be treated laparoscopically: expression on the surface of liver, experienced teams.

**Indications and Contraindications**

Indications for laparoscopic treatment of hydatid liver hydatid cysts are represented by all segments located in laparoscopically accessible liver segments, preferably without internal vesicles and without biliary-cystic fistulae. In the last decades, with the evolution of laparoscopic techniques and experience of surgical teams, increasingly varied forms of hepatic hydatid cysts with different evolutionary complications of the disease were approached, therefore currently there are few contraindications for laparoscopic treatment. The contraindications of laparoscopic treatment are mainly related to contraindications to surgery in general (very ill patients which cannot be submitted to open or laparoscopic surgery), or particularly to laparoscopic interventions (abdomen with multiple interventions or adherential syndrome). There are contraindications strictly related to the underlying disease, but they are often linked to available devices or surgical team experience: hydatid cysts located in the posterior segments, cysts located deep in the liver, communications with bile ducts, no expression on the surface of liver.

**Preoperative Treatment**

A treatment for 10 days with albendazole 10 mg/kg is orally administered and preoperative dose of antibiotic is
administered prophylactically (Cefuroxime 1-1.5 g) in the
day of the intervention.

**Operatory Field Preparation**

The patient is placed in supine position with arms at 90
degrees abduction, and general anesthesia is settled with
oro-tracheal intubation. Pneumoperitoneum is achieved
by introducing carbon dioxide into the peritoneum using
Veres needle inserted through an incision in the navel. In-
sufflation pressure remains around 12 mm Hg. In patients
with previous abdominal surgery with risk of visceral ad-
hesions, the access into the peritoneal cavity is performed
either by open (mini-laparotomy) or with the Hasson tro-
car. Scopic trocar is inserted through the 10 mm umbilical
incision and the peritoneal cavity is inspected using a 30
degrees laparoscope for evidence of preoperatively undi-
agnosed lesions. Subsequently 1 or 2 5mm trocars could
be placed depending on the location of cystic lesions. An
intraoperative laparoscopic ultrasonography is very useful
to identify intra-parenchymal located hydatid cysts with-
out free expression on the surface of liver.

In cases where the opening of hydatid cyst is foreseen
(except liver resection and ideal cystectomy) peritoneal
cavity is isolated with drapes soaked with scolicidal solu-
tions to prevent dissemination of the parasite in the rest of
the peritoneum.

**Partial Laparoscopic Pericystectomy**

After peritoneal cavity insulation with compresses
with scolicidal substances, hydatid cyst puncture is per-
formed in an area, where it has expression on the liver sur-
face, where the incision will be realized later. The place of
this puncture is chosen so as to be in the lowest portion
of the cyst to ensure postoperative gravitational drainage,
but at the same time be situated as above in the chosen
region to avoid leaking of hydatid cyst immediately after
opening. Puncture is performed using a syringe with 50-
60 ml scolicidal solution (Figure 1). Then the cyst content
is aspirated when the needle penetrates into its cavity. The
fluid is aspirated as much as possible to avoid its spilling
into the peritoneum. Then scolicidal solution is injected
in the cyst and a specific time is expected to inactivate the
cyst, depending on the type of substance. The cyst content
is now aspirated again and then at the site of puncture a
2-3 cm incision is made through which a suction cannula
is inserted. Whole cyst content is aspirated, including in-
ternal vesicles and germinal membrane (Figure 2). In situ-
ations where this approach is not feasible an EndoBag or
other sealed systems are used to transfer the internal ves-
icles and germinal membrane into the bag without spill-
ing the content into the peritoneal cavity. Then the Cyst
is washed again with scolicidal solution and, depending on
the particular situation, the surgeon decides the further
treatment. Thus, if the cyst fluid is green and there is a
suspicion of bilio-cystic fistula the surgeon will insert one or two drains into the cavity and another drain under the liver (Figure 3). If there is suspicion of a bilio-cystic fistula, either the closure should be tempted (by suture thread in X or sealing devices - Ligasure, Habib 4x), or if the fistula is important then a cysto-digestive anastomosis is recommended (cysto-gastric or cysto-jejunal on a Roux-en-Y loop). Some surgeons perform omentoplasty into the cyst cavity [1,2].

Figure 1: Puncture of hydatid hepatic cyst.

Figure 2: Aspiration of the content of the hydatid hepatic cyst.

Figure 3: Drainage of the cyst.
Laparoscopic Cysto-Jejunal Anastomosis

Cysto-jejunal on a Roux-en-Y loop anastomosis is preferable if hydatid cyst is complicated with important bilio-cystic fistulas, for which fistula closure or hepatic resection cannot be performed.

To achieve this procedure jejunum is sectioned about 40-60 cm from duodenal-jejunal Treitz angle with an EndoGIA laparoscopic stapler. The distal stump will be raised to the pericyst for anastomosis and the proximal stump will be anastomosed to restore digestive transit at about 40-60 cm from distal stump in a latero-lateral (L-L) manner with an EndoGIA laparoscopic stapler. The remaining opening after the stapler is closed with a 3-0 resorbable suture. The raised loop will be anastomosed laterally to the pericyst opening with a 2-0 or 3-0 resorbable running suture. The surgery is completed with the insertion of drains.

Laparoscopic Ideal Pericystectomy

Pericystectomy can be performed without opening of the cyst, if the intra-parenchymal located region is reduced in surface. This process requires skills of laparoscopic liver resection and a properly equipped service with devices used for liver resection. Risks related to this process are dissection into the liver parenchyma, important blood and biliary vessels interception that results in intraoperative bleeding or postoperative biliary fistula.

However, the benefits of this technique are superior to partial laparoscopic pericystectomy because of the absence of risk of peritoneal dissemination of hepatic hydatid cyst content.

Pericystectomy is done with bipolar forceps, with LigaSure forceps or ultrasound dissector or aspirator, and in some cases stapler can be used for parenchymal transection. Bilistasis and hemostasis are completed with bipolar forceps, suture on the raw liver surface or Argon beam.

Whole hydatid cyst is inserted into an Endobag, punctured, inactivated and drawn, without contaminating the peritoneal cavity or trocar orifice.

Subhepatic drainage tubes can be placed, if deemed necessary.

Laparoscopic Liver Resection

Laparoscopic liver resection for hepatic hydatid cyst is reserved for centers with experience in this technique and is used when the cyst is located inside the liver parenchyma without expression on the liver surface, or when the cyst completely destroys a liver sector.

The resections are differentiated in minor or major, as they were defined by the consensus in Morioka, Japan in 2014: minor resections include 2 or fewer segments (including wedge resections) – become the standard practice, and major resections include hemihepatectomies, trisectionectomies - are still at the beginning phase.
There are four approaches of the important elements intrahepatic: vascular primary approach (Lortat-Jacob), extraglissonian approach (Launois), transparenchymal (Ton That Tung) and mixed approach of Bismuth and Couinaud with dissection and clamping of the afferent and efferent pedicles followed by transection of the parenchyma and pedicles ligature at the end. Pringle maneuver can be prepared at the beginning of the procedure. In the case of an extraglissonian approach Pringle maneuver may be dispensed, with clamping or sectioning the pedicle of the affected parenchyma and maintaining blood flow in the remaining territory. Transection of the parenchyma is performed with bipolar forceps, with ultrasound disector, LigaSure, or stapler.

The specimen is extracted in an Endobag and optional a subhepatic drainage tube is placed.

**Devices for Hepatic Hydatid Cyst**

In literature there are a number of devices used for the laparoscopic treatment of hydatid liver cyst which essentially performs the peritoneal cavity insulation and extracts the content of hydatid hepatic cyst without contamination.

Bickel et al. used a transparent trocar to be able to track the extraction of the content of the cyst[3]. Sanglam et al. described vacuum puncher with a specific design for cystic content extraction[4]. Palanivelu also developed the “Palanivelu Hydatid System” (PHS) which prevents scattering of cystic contents into the peritoneal cavity and allows visualization of the bilio-cystic fistulas[5].

Al-Shareef et al. adapted a device for liposuction for the treatment of hydatid cyst in the liver[6] and Jani K. uses a different model of trocar for extracting the content of hepatic hydatid cyst[7].

**Biliary-Cystic Fistula Treatment**

Bilio-cystic fistulas are treated in different ways depending on the location of the cyst, the size and the debit of fistula or of the rank of the affected bile duct. If bilio-cystic fistula is located in the periphery, and it is a low flow one, a laparoscopic suture of the fistulous orifice located in the cyst cavity could be performed. An X shaped stitch is anchored around the fistulous orifice. If the fistula is situated in a marginal region of the cyst the surgeon can try placing a laparoscopic clip. In the cases with large bilio-cystic fistulas or with important bile ducts, cysto-jejunal anastomosis on Roux-en-Y loop or laparoscopic liver resection is performed.

For the treatment of hydatid cholangitis with jaundice and hydatid material present inside the main bile duct, ERCP (endoscopic retrograde cholangiopancreatography) is tempted as first intention, followed by a subsequent laparoscopic treatment of hydatid cyst, bilio-cystic fistula and the laparoscopic cholecystectomy. If ERCP cannot be performed for hydatid material extraction from main biliary duct, the surgeon could try a single time laparoscopic treatment by solving the hydatid cyst and bilio-
cystic fistula, cholecystectomy and choledocotomy with the extraction of hydatid material using a Dormia probe (basket probe) or Fogarty probe, followed by the control of emptiness of main biliary duct by choledoscopy or intraoperative cholangiography. Finally, a Kehr drainage (T-tube) could be placed into the main biliary duct as well as a subhepatic drain.

**Postoperative Treatment**

Oral Albendazole will be administered 10 mg/kg postoperatively in three cycles of 28 days with 14 days pause. During this treatment transaminases should be monitored because it can have hepatotoxic effect.

**Postoperative Complications**

The most important postoperative complications are: bile leak and recurrence.

Bile leak is treated according to its flow. In the early days of postoperative bile flow may be higher, and in the coming days, it can decline gradually as the patient resumes bowel movements. If biliary fistula flow is not reduced in 1-2 weeks an ERCP with sphincterotomy is recommended to reduce the pressure in the bile duct. The patient should be watched in the first days after surgery to rule out the emergence of a choleperitoneum, which needs to be treated urgently.

Relapse can occur both in the proximity of previous hydatid hepatic cyst or in other sectors and is due to incomplete disease therapies or new insemination. There is possibility of hydatid cysts presence in the peritoneal cavity suggesting hydatid intraperitoneal dissemination during the previous surgery. They are solved the same manner as any hydatid cyst, including more frequently organ resections.

**Conclusion**

Hepatic hydatid cyst is an endemic disease in some areas less developed which are based mainly on farming as sustenance. Treatment of this condition is achieved either by classical or laparoscopic, the last way with clear advantages over socio-professional reintegration of patients. Evolution of laparoscopic technique and skills of the surgeons pushed the boundaries of a simple treatment (such as partial cystectomy) to treat more complex cases or complications of the disease. Also ingenuity of surgeons led to the development of specialized devices for treating hepatic hydatid cyst in order to avoid peritoneal dissemination of the content and emphasizing the eventual biliocystic fistulas.

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