

CLINICAL CASE

HEPATIC HYDATID CYST OPERATED ROBOTICALLY

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Abstract

Based on a case operated in our clinic the paper discusses the various applications of robotic surgery in the surgical treatment of the hepatic hydatid cyst. We present the case of a 29-year-old patient who presented to our clinic with chronic abdominal pain (8 months) localized in the right upper quadrant, without irradiation and showing no other accompanying phenomena. The patient was hospitalized and after clinical and laboratory investigations we confirmed the diagnosis of hepatic multilocular hydatid cyst located in the V, VI and VIII segments. Surgery was performed under general anesthesia and with the help of the STANDARD da Vinci robotic system equipped with four arms. The parasite was inactivated, a partial pericystectomy was done and the remaining cavity was drained. The patient's postoperative evolution was favorable and she was discharged in the 8th postoperative day. The 8 month follow-up showed no complications or pathological changes. In conclusion, robotic surgery can be successfully used in the treatment of the hepatic hydatid cyst.

Keywords: robot, hydatid cyst, minimally invasive**Introduction**

Hydatidosis or the hydatid cyst is a zoonosis with great epidemiological importance especially through its long-term development, post-surgical complications and the economic and social implications that it can have. In recent years, new methods of treatment of the hepatic hydatid cyst have been proposed. Regardless of the approach, the surgical treatment of the hydatid cyst involves the following: eradication of the parasite, sterilizing the cavity by injecting a scolicidal agent and protection of the surrounding tissues from dissemination. Hepatic resections and total pericystectomy are radical procedures which have a much lower rate of recurrence, but some authors believe that these interventions are too

radical for such a benign disease. A meta-analysis describes the mortality and morbidity of these procedures to range from 2% to 23% [1,2]. Minimally invasive approach is a viable option in the treatment of hydatid cyst starting from the fact that the feasibility was confirmed by multiple studies. This technique has a short operative time, a reduced period of hospitalization and a faster postoperative recuperation. In Romania, laparoscopic results on the treatment of hepatic hydatid cyst were published by the Institute of Clinical Surgery Fundeni- General and Liver Transplant "Dan Setlacec" and the Surgery Clinic III Cluj, which provided a 10-year retrospective analysis concluding that the minimally invasive approach of hydatid cyst is a safe and effective method which can give similar results to those

of open surgery, including the cases when the cyst occupies the less accessible liver segments 7 and 8 [3,4,5]. These encouraging results are also found in the international literature which are created the prerequisites for the use of robotic surgery as part of the minimally invasive treatment of hydatid cyst [6,7,8,9]. Publications on the use of robotic surgery as a method of treatment for hydatid cyst are few if not absent in the literature. This is largely due to the fact that although robotic surgery is still a new and exciting field, so far the implementation of this new technology was dictated more by the market due to high costs and less by the patient's needs. The uniqueness of the case presented is that in Romanian literature there is still no published case of hepatic hydatid cyst treated by robotic surgery with the help of the da Vinci robot.

Material and methods

We used the Standard SI da Vinci surgical robot equipped with 4 arms and Endowrist instruments. The operation consisted of: pericystectomy, parasite inactivation and partial removal of the pericyst and the residual cavity and was externally drained (Lagrot technique). The patient received pre- and postoperative treatment with Albendazole.

Case Presentation

Patient C.M. aged 29 years who lived in a urban area and with no knowledge of past diseases was admitted in the General Surgery Clinic of the Emergency Clinical Hospital "Prof. Dr. Agrippa Ionescu" Bucharest with pain in the right abdominal flank and right upper quadrant which had begun eight months ago and lacked other accompanying phenomena. Clinical examination at admission revealed no signs of peritoneal irritation, but at palpation of the liver a formation could felt, which was painful and hard to the touch. Paraclinical explorations revealed an inflammatory syndrome identified by VSH = 55mm / h (n = 0-30mm / h) and Fibrinogen = 437 mg / dL (n = 169-398mg / dL), otherwise normal. Abdominal ultrasound identified a transonic formation, round-oval

with a diameter of about 10 cm with rear amplification, located in the right hepatic lobe. Abdominal CT scan confirmed in the segments VI, VII and VIII a cystic formation that had its own walls and contained numerous hyperdense vesicles (hydatid cyst).

After an appropriate preoperative preparation which consisted of administration for 4 days of Albendazole in a dose of 800mg, surgery was undertaken by minimally invasive approach using the da Vinci robot equipped with 4 arms, under general anesthesia and with endotracheal intubation. The patient was positioned on the operating table in a supine position. A supraumbilical minimal incision was performed for the optical trocar (10 mm), the pneumoperitoneum was made at a pressure of 12 mmHg. Subsequently three other trocars were introduced: one on the medioclavicular line 2 finger below the right costal margin, one on the left medioclavicular line just below the costal margin and another trocar for the assistant on the right anterior axillary line (below the costal margin). An additional cannula was introduced later which was used to puncture and safely aspire the hydatid cyst contents. The robot was positioned towards the patient head at 11 o'clock direction. After the trocars and the laparoscope were introduced a macroscopic exploration of the whole abdominal cavity was performed. After the cyst was isolated with sterile fields soaked in 95% ethyl alcohol to prevent dissemination of the parasite in the peritoneal cavity the hydatid cyst was punctured using a Veress needle inserted through a separate cannula to avoid parietal dissemination. The cyst was drained partially and inactivated by injecting 95% ethyl alcohol (Figure 1).



Figure 1 - Inactivation of the parasite and the evacuation of the cyst contents

After waiting 5 minutes after the injection of the scolicidal agent the evacuation of the cyst content continued. The pericyst was sectioned and the cuticle was extracted and placed in an Endobag (Figure 2).

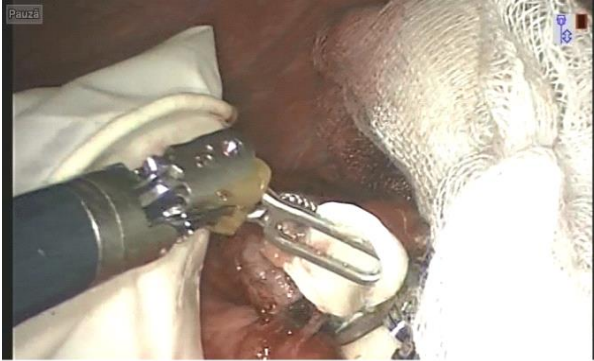


Figure 2 – Extraction of the cuticle through the incision made in the pericyst

The remaining cavity was inspected and its contents completely extracted. After the operative field was cleaned thoroughly with saline and the protective compresses soaked in alcohol were extracted, a partial pericystectomy after the Lagrot technique was performed (Figure 3).

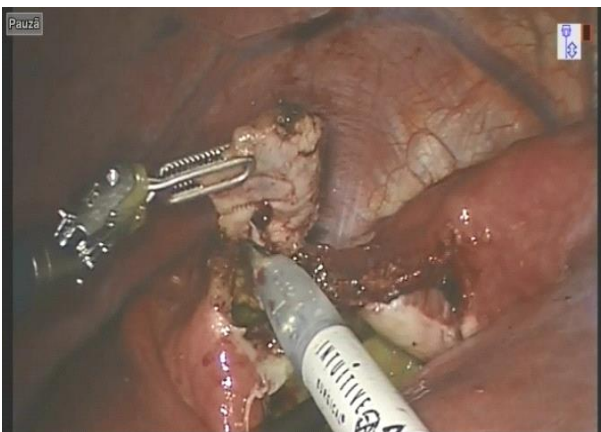


Figure 3 - Partial pericystectomy

The remaining cavity was explored to see if a biliary fistula existed. The cavity was then drained with a silicone tube exteriorized through the abdominal right flank. Because the tube could slip out of position, the remnant cavity was sutured around it with separated threads. (Figure 4).

Patient's postoperative course was favorable. Early mobilization was performed on day 2, bowel transit was regained on day 3, and the patient was discharged on day 8. The patient

subsequently received treatment with Albendazole 800 mg / day for 21 days. Tube drainage was suppressed 1 month after surgery. Reassessment at 8 months found no complications or other pathological changes.



Figure 4 - The external drainage of the cavity and its suture

Discussion

Surgery remains the gold-standard treatment currently for echinococcosis despite the high costs of this intervention [11, 12]. For the last 10 years the laparoscopic treatment of hepatic hydatid cyst has grown in popularity and has evolved constantly in relation to the advances in minimally invasive surgery.

Management of hepatic hydatid cyst by open surgery is associated with a high postoperative morbidity [13]. Regarding the antihelminthic medication, this only works if the cysts have a diameter less than 4 cm, are unilocular and even under these conditions it only has a success rate of 30% with Mebendazole and 40% with Albendazole [14, 15]. However in the international literature, publications on the subject are scarce.

Regarding the minimally invasive approach, an important element is the careful selection of hydatid cyst that will be operated which must be medium-sized, uncomplicated and preferably located in the anterior segments of the liver to facilitate the access. Laparoscopic surgery offers the advantages of minimally invasive approach: reduced postoperative morbidity, reduced patient recovery time and reduced costs of the intervention. There are some limitations: the range of movement is limited to 5 degrees (compared to human hand that has 7 degrees of movement) and the physiological tremor of the

surgeon is easily transmitted through the long working instruments. The long duration interventions become very tiring for the surgeon due to the position that he must adopt in order to manipulate the instruments. To overcome these inconveniences robotic surgery has been developed.

Robotic surgery has a proven track record in urologic surgery, gynecologic, and digestive surgery, and in some fields it has become the gold standard treatment. This technique uses the same principles as conventional laparoscopy, but with a more advanced technology so it is natural that everything that could be operated laparoscopically should and could be operated by robotic approach [16].

Robotic surgery respects the main operative steps for the resection of the liver hydatid cyst as open or laparoscopic surgery: inactivation of the parasite and its extraction and the treatment of the remaining cavity. Among the advantages of robotic surgery we can mention the 3D HD view that coupled with the possibility of the operator to simultaneously manipulate the camera and the instruments can explore the remaining cavity with great ease for the existence of biliary fistula and if one is discovered it can easily be sutured with the help of the 7 grades of mobility offered by the Intuitive instruments.

Some of the advantages of the robotic surgery are common with those of conventional laparoscopy such as: reduced length of hospital stay; small incisions, less pain, reduced recovery time and a much lower quantity of blood loss. The advantages of robotic surgery include in addition to those listed above the higher dexterity and precision, the reduced physiological tremor that is identified by the robot and reduced through various filters.

Compared to conventional laparoscopic surgery, the surgeon's hand-eye coordination is regained, the instruments move according to the movement of the hand and the discomfort is reduced significantly because the surgeon sits in an ergonomic position at the console. The disadvantages of this surgery are: high cost and longer operating time. However, it conveys that once the experience of using these systems and technology improves, their costs will decrease. Also as the surgical team accumulates experience during surgery the operative time reduces gradually approaching that of

conventional laparoscopy. We must not forget that a large amount of operative time is lost during the installation of the robot.

As mentioned in this case, we performed a partial robotic pericystectomy by the Lagrot technique and to prevent the dissemination of the parasite in the peritoneal cavity the operative field was surrounded by compresses soaked in 95% ethyl alcohol. Inactivation of the parasite was done also with 95% ethyl alcohol and because of this, special attention needs to be awarded to electric surgery which can only be used after an abundant lavage of the work field with saline solution. Other scolicidal substances can be used successfully: formalin, hypertonic saline (3-20% concentration), Cetrimide hydrogen peroxide or silver nitrate [17].

After the scolicidal agent was injected we waited for 5 minutes to inactivate the parasite, period that was followed by cyst aspiration. Bickel recommends using a large transparent cannula with a beveled tip, to avoid leakage of the cyst content. It is recognized that in these type of minimally interventions the chance of the parasite to disseminate is higher than in open surgery therefore the preventive measures must be strictly followed and for the same reason the candidates for surgery must be selected with great care [18,19].

After the contents of the cyst were extracted a partial pericystectomy was performed following the same steps as conventional laparoscopy, and the remnant cavity was verified to see if there was a biliary fistula. At this moment the robot proved to be very helpful thanks to the 3D view and the Endowrist instruments which offered an increased ability to manipulate the tools which could be easily used to suture an occult biliary fistula, but there was no need in this case. The cuticle membrane, the pericyst and compresses used to limit the operation field were extracted via a Endobag to avoid dissemination.

Finally we chose to externally drain the remnant cavity. Due to the difficulty of maintaining the drainage tube into the cavity it was necessary to suture it around the tube. Management options of the remnant cavity are multiple: simple drainage, drainage and omentoplasty, abandoning the cavity after pericystectomy or suturing it after the pericystectomy [20, 21, 22].

To completely remove the parasite and to minimize the incidence of relapse one may tempt to achieve an ideal pericystectomy. This intervention may be associated with a number of postoperative complications sometimes more important than the initial pathology such as biliary fistula with secondary coleperitoneum or a massive bleeding from the liver parenchyma. A safer approach for this intervention is to use radiofrequency tools to dissect and sever the liver parenchyma, thus reducing the incidence of complications. This technology has been adapted to hydatid cyst resection, but it was originally created to resect various liver tumors [23, 24].

Conclusions

Robotic surgery is a modern and safe alternative method to laparoscopy in the treatment of the hepatic hydatid cyst.

Patients undergoing this intervention should be selected to prevent possible accidents such as dissemination of the parasite.

Intraoperative attention should be paid to limit the spread of the parasite and limit it to the work field.

Electric surgery should be used only after the surgical field has been thoroughly cleaned with serum if 95% ethyl alcohol was used as a scolicidal agent.

Further studies are needed to objectively assess the utility of this new technology in the treatment of hepatic hydatid cyst, given the high cost of purchasing and using it.

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