Video-assisted thoracoscopic removal of pulmonary hydatid cysts

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Abstract

OBJECTIVES: Pulmonary hydatid disease is a parasitic disease with a high prevalence in low-middle income countries. We report four patients who were treated surgically using video-assisted thoracoscopy (VATS).

METHODS: All patients were diagnosed with clinical and radiological findings on chest X-ray and computed tomography. Complete thoracoscopic removal by cystotomy and capitonnage was done in all four patients. The procedure included a standard thoracoscopic port incision and a 2–3 cm utility skin incision that was placed just superior to the cystic lesion. In the first case, a small-sized rib separator was used. The following three cases were operated without placing a rib separator on the utility incision. Conversion to open thoracotomy was not required.

RESULTS: The average duration of the procedure was 90 min, and the average length of hospital stay was 4 days. No complications were observed after the thoracoscopic removal. At mean follow-up of 4 months, all patients were asymptomatic.

CONCLUSIONS: VATS removal of the hydatid cysts can be done successfully in peripherally located cysts.

Keywords: Hydatid cyst • Lung • Video-assisted thoracoscopy

INTRODUCTION

Pulmonary hydatid disease is a preventable parasitic disease with a high prevalence in low-middle income countries. It is an endemic disease in many sheep- and cattle-raising regions of the world, especially Mediterranean countries, the Middle East, South America, Australia, India and the Balkans [1, 2]. Hydatidosis is caused by Echinococcus granulosus and less frequently by Echinococcus multilocularis [1, 2]. Hydatid disease is endemic in the eastern and southeastern regions of Turkey, with an incidence of ~20/1 000 000 [3].

As the thoracoscopic approach to hydatid disease is limited only to cases of children in the form of small case groups [4–8], with the advent of surgical experience in thoroscopic surgery, we decided to develop a minimally invasive surgical technique to treat the disease in the adult population. The minimally invasive technique of removing the cyst included all the principles of conventional hydatid disease surgery. We report a case series of pulmonary hydatid disease treated successfully using video-assisted thoracoscopy (VATS).

MATERIALS AND METHODS

All patients were diagnosed with clinical and radiological findings on chest X-ray and computed tomography. We performed complete thoracoscopic removal by cystotomy and capitonnage in four patients (Fig. 1).

The technique used for thoracoscopic removal of the pulmonary cysts is as follows:

The patient was intubated with a double lumen tube and placed in the lateral decubitus position. Two incisions were used to perform the procedure: the first incision was a 2 cm thoracoport incision for the 30° telescope and the second was a 2–3 cm long utility incision. We prefer using a rather longer thoracoport incision (app. 2 cm) for the ease of introducing a second instrument, apart from the telescope, through the same incision. The utility incision was placed just superior to the cystic lesion depending on the location of the cyst. After single lung ventilation, the first step was the placement of the povidone iodine-soaked gauzes around the cystic lesion. A closed circuit of suction (which works just like the pleurocan drainage) was prepared and the needle was inserted into the exocyst through the utility incision and the cystic fluid was aspirated (Fig. 2A). After the pressure was decreased by aspiration of the fluid, a scolicidal agent was injected into the cyst. We prefer using povidone iodine solution as the scolicidal agent and injecting nearly the same amount of the fluid aspirated. Scolicidal solution was not...
Figure 1: A 30-year-old male with left-sided cystic lesion. Radiological evaluation showed that the cyst was intact. Lower right, germinative membrane was taken out with ring forceps.

Figure 2: (A) Aspiration of the cyst. Note the contraction of the lesion. (B) Cyst was punctured by endoscissors while suction cannula was aspirating the content of the cyst. (C) Germinative membrane was placed inside an endobag. (D) Interior view of the cyst.
injected into those cysts that showed an air-fluid level on preoperative computed tomography of the thorax. After waiting for a brief period of time, the exocyst was punctured by endoscopic scissors while a suction cannula was kept in place to prevent spillage (Fig. 2B). An endobag was placed inside the thoracic cavity through the utility incision and the germinative membrane was carefully placed in it (Fig. 2C). The cystic cavity was checked for any remnants of the germinative membrane (Fig. 2D). The edges of the cyst were cut by using either bipolar tissue sealing devices or just by electrocautery to widen the entry of the cyst, so that capitonnage would be easier (Fig. 3A). To check for the bronchial communications, saline was poured inside the cyst. If bronchial communication was observed by the detection of the air leaks, these fistulas were sutured by absorbable sutures (Fig. 3B). After all the air leaks were sutured, capitonnage of the cystic cavity was performed using absorbable sutures (Fig. 3C). At the end of the procedure, the pleural cavity was lavaged by saline solution for a final air leak check. A single chest tube with a small caliber was inserted through the thoracoport incision (Fig. 3D). Pericostal sutures were not used to approximate the ribs. Instead, a tight closure of the resected muscle fibres was performed at the utility incision.

RESULTS

In all of the cases, thoracoscopic removal of the germinative membrane and cystotomy were accomplished. Patient characteristics are described in Table 1. In the first case, a small-sized rib separator was used. The following three cases were operated without placing a rib separator on the utility incision, which was 2–3 cm long. Conversion to open thoracotomy was not required. The cysts were intact in three patients. Radiological evaluation showed an air fluid level in the second patient, and thus scolical solution was not directly injected into the cyst to prevent aspiration (Fig. 4). Instead, povidone iodine embedded gauze was used to rub the surfaces of the cyst gently after removal of the

![Figure 3](image_url)

**Figure 3:** (A) Bipolar tissue sealing device was used to cut the open edges to widen the entry of the cyst. (B) Interior view of the cystic cavity. Note the air leak detected during the ventilation test done by saline injection into the cavity. Air leak was sutured by absorbable sutures. (C) Cystic cavity was capitonnaged. (D) Bedside view of the two incisions used to perform video-assisted cystotomy and capitonnage.

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<th>Table 1: Patient characteristics</th>
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M: male; F: female; f: fever; SOB: shortness of breath; RCA: recurrent attacks of cough; LLL: left lower lobe; POD: postoperative day.
Germinative membrane. Bronchial communication was sutured by an absorbable suture.

The average duration of the procedure was 90 min and the average length of hospital stay was 4 days. No complications were observed after the procedure. At mean follow-up of 4 months, all patients were asymptomatic.

**DISCUSSION**

Hydatid disease has been known since the description by Hippocrates as a ‘liver full of water’ in 400 BC [3, 4]. Since then the epidemiology, clinical features and the treatment of the disease have been well described [3]. The aim of surgery, which is the primary treatment for most patients with pulmonary hydatid disease, is evacuation of the cyst, removal of the germinative membrane and management of the residual cavity. The surgical aim of resection in hydatid disease should be to preserve the lung tissue. Hydatid disease surgery should be uncomplicated, and is associated with very low mortality and morbidity [9–11].

Pulmonary hydatid cysts can be located in any pulmonary lobe, however lower lobes predominate [2]. In our series, all of the patients had lower lobe disease.

With the increasing experience in VATS [12], few case series of the treatment of pulmonary hydatid disease by VATS were introduced to the literature [4–8]. The thoracoscopic approach follows the same principles as the open technique, which includes aspiration of the cystic fluid, instillation of scolicidal agents, removal of the germinative membrane, closure of the bronchial communications and management of the cavity. Some authors emphasize the fact that while using minimally invasive techniques, the consequence of cyst rupture would cause serious complications, and for this reason thoracoscopic techniques should be reserved for dead cysts [2, 5]. Although Paterson and Blyth recommended thoracoscopic management only for dead cysts and stated that thoracoscopic removal of live or uncomplicated hydatid cysts does not afford the advantage of capitonnage for control of bronchial air leaks and may lead to spillage and pleural recurrence, they also commented that with the increasing expertise and better instrumentation of video-assisted thoracoscopic surgery, this minimally invasive approach may be preferred for live hydatid cysts [5]. Using our technique, no spillage and contamination of the pleural cavity occurred, as all the suctioning and injection were done by a close circuit instrument and the removal of the germinative membranes was done by a standard endobag used in video-assisted removal of the lung lobes.

Single lung ventilation was a prerequisite for video-assisted removal of the hydatid disease.

VATS performed by only two incisions allowed the visualization of the entire thoracic cavity, easy access to the diseased part and adequate space for dissection [13]. The first incision was a 2 cm thoracoport incision for the 30° telescope. This incision was wide enough for a second instrument to pass into the thoracic cavity. The utility incision was placed just superior to the cystic lesion depending on the location of the cyst and was only 3 cm long. This minimally invasive technique allowed the reduction of postoperative pain, early removal of the chest tubes and a short hospital stay.

All cysts were peripherally located. The peripheral localization of the cysts made it easier to detect the cysts and manage them.

In this series of video-assisted thoracoscopic removal of hydatid cysts, we did not experience any complications during the procedure and morbidity in the follow-up of 4 months. No conversion to open thoracotomy was required, however, in the first case, a small-sized rib separator was used. The other three patients were operated without placing a rib separator. The average duration of the procedure was 90 min. The most challenging and time-consuming part of the procedure was the capitonnage. With increasing experience, the time spent on capitonnage decreased.

Mehta et al. [14] reported a comparative evaluation of thoracoscopy versus thoracotomy in the management of lung hydatid disease. Although postoperative hospital stay in the thoracoscopic group was significantly shorter than in the thoracotomy group (8.35 vs 18.77 days), the duration of hospital stay was still higher than our small group of patients. In their series, in the thoracoscopic group, postoperative analgesia requirement was less and the intercostal drain was removed earlier than in the thoracotomy group.

Our small group shows that video-assisted thoracoscopic removal of superficial and small to moderate hydatid cysts is a safe and reliable option. This minimally invasive method offers the advantages of less pain, less morbidity, short hospital stay and better aesthetic consequences when compared with the classical open procedure.

**Conflict of interest:** none declared.
REFERENCES