



Minimally invasive approach for pulmonary hydatid cyst

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Abstract: Hydatid diseases still remain an important health problem in some countries. The primary choice of treatment has been long accepted as surgical treatment including cystectomy/cystotomy with or without capitonnage performed for every cyst. The most important principal for pulmonary hydatid surgery is to preserve as much parenchyma as possible. Anatomical resection is needed in very small fraction of patients. With parallel of improvements in minimally invasive surgery in thoracic surgery, video-assisted thoracoscopic surgical treatment has been reported to be utilized in the management of pulmonary hydatid cyst. The main advantages of minimally invasive techniques is their milder perioperative trauma and less pain as avoiding spreading the intercostal areas. That resulted in lower postsurgical pain, shorter hospital stay, fewer complications and faster recovery after the surgery, better quality of life. Minimally invasive management to the management of lung hydatid cyst including uniportal approach has been proven to be safe and effective and seems to serve better outcomes. The optimal procedures performed should be determined on an individualized basis and requires a careful preoperative evaluation.

Keywords: Hydatid disease; video-assisted thoracoscopic surgery (VATS); uniportal VATS; pulmonary hydatid disease; capitonnage

Received: 23 October 2018; Accepted: 16 December 2018; Published: 18 February 2019.

doi: 10.21037/jovs.2019.01.09

View this article at: <http://dx.doi.org/10.21037/jovs.2019.01.09>

Hydatid disease, that is caused by *Echinococcus granulosus* and *Echinococcus multilocularis*, is also known as echinococcosis or hydatidosis (1). The disease is endemic in a number of sheep- and cattle-raising countries, including Middle East and Mediterranean countries, New Zealand, Australia and India (1,2). Humans take part as accidental intermediate hosts and harbor cysts, which are most commonly found in the liver and lung but can be discovered in any organ (3). Pulmonary hydatid cysts rarely heal by spontaneous discharge into the bronchus. However, rupture into bronchial system, anaphylactic reaction, suffocation caused by cystic fluid are serious and possibly fatal complications (2,3). Surgical methods for treatment of pulmonary cysts include enucleation of intact cysts, and cystotomy, with or without capitonnage, for complicated or intact cysts (4). Capitonnage may shorten hospitalization time 1 day; however, the real benefit of this method remains unsolved (4). The standard management of pulmonary hydatid disease is surgical removal of cysts

with or without capitonnage via thoracotomy or sternotomy in patients with bilateral disease (5,6). Preoperative evaluation of a patient with hydatid cyst of the lung should start with identifying the number and localization of the cysts. Surgical treatment for pulmonary hydatid cyst disease should include evacuation of the intact or ruptured cyst, removal of the germinative membrane, and capitonnage of the residual space (i.e., pericyclic cavity) whereas preserving as much lung parenchyma as possible. The hydatid cyst disease of the lung surgery is associated with low complication and very low mortality rates (4-6).

It is fair to speculate that the greatest advance in thoracic surgery of the last 30 years has been the advent of video-assisted thoracoscopic surgery (VATS) (7). VATS has been shown to significantly reduce pain, quicken recovery, decrease complications, and improve post-operative quality of life of patients when compared to open thoracotomy (8,9). For this reason, VATS has now become a new standard of thoracic surgery. When VATS was first introduced 25 years

Table 1 Publications reporting video-assisted thoracoscopic treatment of pulmonary hydatid disease

Author	Year	Number of cases
Becmeur <i>et al.</i> (13)	1994	10
Paterson <i>et al.</i> (14)	1996	1
Mallick <i>et al.</i> (20)	2005	1
Parelkar <i>et al.</i> (15)	2009	5
Findikcioglu <i>et al.</i> (18)	2012	12
Alpay <i>et al.</i> * (19)	2015	77
Ma <i>et al.</i> (21)	2016	44
Eroglu <i>et al.</i> (23)	2016	23
Bakhytzhan <i>et al.</i> * (24)	2018	30
Ocakcioglu <i>et al.</i> * (22)	2018	18
Total	–	221

*, comparative study including open surgery.

ago, the approach typically used three ports without rib-spreading (8). There could also be an additional ‘utility’ port to extract the resected specimen. During the recent 10 years, great effort has been paid to reduce the port numbers to 3 and 2 in order to further reduce the postoperative pain and increase the quality of life (10). Performing the procedures using only one incision (uniportal VATS) was first introduced by Rocco (11). Uniportal VATS has been become eventually the major breakthrough in thoracic surgery and it was proven that most thoracic procedures can safely and perfectly be performed via uniportal VATS (12).

The minimally invasive treatment of pulmonary hydatid disease was first introduced in 1994 by Becmeur and colleagues (13). The feasibility of the procedure has been proven by others (14-23). Alpay *et al.* demonstrated that, VATS treatment of pulmonary hydatid disease was superior to thoracotomy causing lower pain, shorter operation time, lower chest tube drainage volume and shorter chest tube duration (19). Ma and colleagues (21) also reported that, VATS treatment of pulmonary hydatid disease in children was associated with less intraoperative blood loss, shorter chest tube duration, reduced postoperative pain and lower hospitalization cost. Ocakcioglu and Sayir (22) confirmed that, VATS is better in terms of postoperative patient-related parameters. VATS treatment follows the same principles as the thoracotomy: aspiration of the cystic fluid, instillation of scolicial agents (diluted povidone-iodine), removal of the germinative membrane, closure

of the bronchial openings, and capitonnage of the cavity. Total enucleation of unruptured cyst can be performed in open surgery, whereas, it is not safely doable during videothoracoscopic approach since small (i.e., 3–5 cm) utility incision would prevent safe extraction. It is questionable if capitonnage is necessary for pulmonary hydatid surgery. However, we previously showed that, it provides no statistically significant advantage (4), although the difference was approximately 1 day. *Table 1* summarizes the studies published regarding VATS treatment of pulmonary hydatid disease.

A number of contraindications for minimally invasive treatment of pulmonary hydatid cyst were reported including giant hydatid cyst, multiple cysts and fissure or hilar location of cysts (19). However, they should not be necessarily the contraindications since multiple cysts can be dealt separately, giant cysts can be removed after aspiration of cystic fluid. Treatment of hydatid cysts at hilar location can be challenging. However, careful exploration of cyst or segmentectomy in select cases can be performed safely. Only non-feasible procedure for VATS approach in the management of pulmonary hydatid disease is enucleation of intact hydatid cyst and removal of the cyst with germinative membrane (i.e., Ugon method) since, complete extraction of unruptured cyst is physically not possible due to narrow and smaller utility incision and delicate nature of the unruptured cyst. However, there has been no publication indicating the necessity of this method as surgical management. Careful aspiration with installation of scolicial agent around the area has been proven to be equally effective (1-4).

Uniportal approach to hydatid disease

Ocakcioglu and colleagues reported that, uniportal VATS can be used for the treatment of pulmonary hydatid disease safely (22). They reported 18 patients who had undergone this approach. We performed uniportal treatment of intact and ruptured pulmonary hydatid disease. The incision was a 3 cm long incision placed at 5th intercostal space. We used 30-degree telescope. After the lung was deflated by the usage of double-lumen intubation, the povidone-iodine soaked gauzes were placed around the cystic lesion to prevent any possible intrathoracic contamination. The cystic fluid was aspirated if the cyst was intact. using an inserted needle connected to a closed-circuit suction device (*Figures 1,2*). The cystic fluid was aspirated almost completely. If the cyst was ruptured seen on chest computerized tomography (CT), no aspiration was performed. The exocyst was cut using

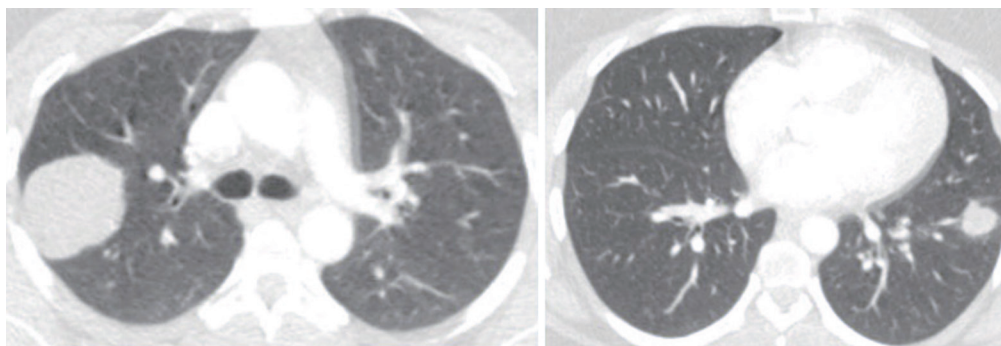


Figure 1 A 32-year-old female with bilateral pulmonary hydatid disease.



Figure 2 Aspiration of cystic content of a patient with bilateral pulmonary hydatid disease (25).

Available online: <http://www.asvide.com/article/view/29875>



Figure 3 Removal of germinative membrane of the patient with right pulmonary hydatid disease (26).

Available online: <http://www.asvide.com/article/view/29877>

endoscopic scissors while a suction cannula was placed around and inside the cystic cavity to remove any possible spillage. The germinative membrane was removed through



Figure 4 Operative view of the subxiphoid single uniportal approach in a patient with bilateral pulmonary hydatid disease and hepatic cyst. Hepatic cyst was treated via a median laparotomy.

the incision (*Figure 3*). After cutting the edges of pericystic cavity, the bronchiolar openings were identified by the instillation of saline solution into the cavity while inflating the lung. The residual cavity was carefully cleaned. The bronchiolar openings were closed using 3-0 polyglactin sutures (Vicryl, Ethicon, USA). After bronchial openings were closed, the cavity was obliterated by imbricating sutures from within using 3-0 polyglactin sutures (capitonnage). With application of positive intrapulmonary pressure, any possible air leak was visualized and sealed.

After the operations, the patients were cared in service ward without a need for intensive care unit. In our practice, we performed unilateral uniportal approach for the cysts as well as consecutive operations for bilateral diseases. It was also possible to perform simultaneous bilateral subxiphoid uniportal treatment for a patient with bilateral pulmonary hydatid disease with a hepatic hydatid disease (*Figure 4*).

Regarding the recurrence after videothoracoscopic approach, only two recurrences were reported out of 221 patients reported so far in the literature. Alpay and associates (19) reported no recurrence in any of groups.

In conclusion, minimally invasive removal of hydatid cysts is feasible and safe operation that is associated with better operative and postoperative results and less pain. Various sizes of peripheral and central hydatid cysts can be removed safely.

Acknowledgments

Funding: None.

Footnote

Provenance and Peer Review: This article was commissioned by the Guest Editor (Kamran Ali) for the series “Asia Thoracoscopic Surgery Education Program (ATEP) Special Issue on Inflammatory Thoracic Diseases” published in *Journal of Visualized Surgery*. The article has undergone external peer review.

Conflicts of Interest: The author has completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/jovs.2019.01.09>). The series “Asia Thoracoscopic Surgery Education Program (ATEP) Special Issue on Inflammatory Thoracic Diseases” was commissioned by the editorial office without any funding or sponsorship. AT serves as an unpaid editorial board member of *Journal of Visualized Surgery* from Jan 2017 to Dec 2018. The author has no other conflicts of interest to declare.

Ethical Statement: The author is accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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doi: 10.21037/jovs.2019.01.09

Cite this article as: Turna A. Minimally invasive approach for pulmonary hydatid cyst. *J Vis Surg* 2019;5:16.