


Video-Assisted Thoracoscopic Surgery for Bilateral Giant Pulmonary Hydatid Cysts: A Case Report and Literature Review

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Introduction: Bilateral giant pulmonary hydatid cysts (HCs) are rare but can lead to serious respiratory complications. Despite growing interest in minimally invasive surgery, the role of Video-Assisted Thoracoscopic Surgery (VATS) in their management remains controversial. This report describes a case of giant bilateral pulmonary HCs managed using a VATS approach.


Case presentation: A 34-year-old male presented with chest discomfort, productive cough, and exertional dyspnea. Imaging revealed bilateral giant pulmonary HCs, including an uncomplicated cyst in the right upper lobe and a ruptured, infected cyst in the left lower lobe. The patient underwent single-session bi-port VATS with cyst evacuation, hypertonic saline irrigation, and closure of bronchopleural fistulae. Intraoperative culture grew *Pseudomonas aeruginosa*, and the patient received albendazole and culture-directed antibiotics, resulting in an uneventful recovery.

Literature review: Among 12 reviewed cases of pulmonary HCs, patients' ages ranged from 3 to 42 years, with a predominance of males (7/12). Cough was present in all cases, while dyspnea and fever were reported in 50% of the cases. Bilateral cysts were documented in 6 cases. Management included VATS alone in 5 cases, thoracotomy-based surgery in 4, hybrid approaches in 2, and conservative treatment in 1. Complications occurred in 2 cases. Albendazole therapy was administered postoperatively in 7 cases, and overall outcomes were positive, with 11 patients experiencing uneventful recovery.

Conclusion: Bilateral VATS in a single session may be a feasible therapeutic approach for giant pulmonary HCs, even when complicated cysts are present.

Keywords: Pulmonary Echinococcosis, Giant Hydatid Cyst, Video-Assisted Thoracoscopic Surgery, Bilateral Lung Cysts

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1. Introduction

Cystic echinococcosis, commonly known as hydatid disease, is a zoonotic parasitic infection caused by the larval stage of the *Echinococcus granulosus* tapeworm [1]. Although the disease can occur worldwide, it is considered endemic in several regions, including the Middle East, the Mediterranean basin, parts of South America, South Africa, and Australia. [2].

The definitive hosts of *Echinococcus granulosus* are carnivores such as dogs and wolves. The adult tapeworm inhabits the small intestine of the definitive host. After ingestion of the eggs by an intermediate host, such as sheep, goats, pigs, cattle, horses, or camels, they hatch in the small intestine, penetrate the intestinal mucosa, and reach the liver, lungs, or other organs through the blood or lymphatic

circulation [3]. Pulmonary involvement is the second most frequent site of infection; however, simultaneous bilateral lung involvement is observed in only 4-26% of affected individuals [3].

Key risk factors for acquiring cystic echinococcosis include frequent contact with dogs, involvement in livestock farming or herding, and residence in regions where the disease is endemic [2]. Once the diagnosis is established through imaging or serological testing, surgery remains the mainstay of treatment. Several surgical techniques have been described, including cystotomy, capitonnage, pericystectomy, and segmentectomy, with the choice of approach depending on the cyst's size, features, and location within the lung [4].

Advances in minimally invasive techniques, particularly video-assisted thoracoscopic surgery (VATS), have significantly transformed thoracic and pulmonary surgery. Compared with conventional open procedures, VATS offers several benefits, including less postoperative pain, shorter hospital stays, and comparable effectiveness for cyst removal, while preserving lung function [4]. However, the role of VATS in the management of pulmonary HCs remains debated, as factors such as large cyst cavities, dense adhesions, hemoptysis, prolonged air leak, and difficulties in controlling bronchopleural fistulas may limit its applicability [4]. Pulmonary echinococcosis is well-documented. However, bilateral occurrence of giant cysts is rare. It is often associated with more severe respiratory compromise than unilateral disease, due to the significant reduction in lung volume [5]. This report describes a case of bilateral giant pulmonary HCs managed with VATS in a single session. The case was written in accordance with the CaReL guidelines, and all references were verified for validity [6,7].

2. Case presentation

2.1 Patient information

A 34-year-old non-smoking male from an urban area presented with a 15-day history of chest discomfort and productive cough, accompanied by dyspnea on exertion. He denied fever, rigors, or hemoptysis. There was no history of contact with dogs or cattle, and no family history of hydatid disease. His past medical and surgical history was unremarkable.

2.2 Clinical findings

On physical examination, the patient was afebrile and hemodynamically stable. Chest auscultation revealed decreased air entry bilaterally.

2.3 Diagnostic approach

Hematological analysis showed leukocytosis with a white blood cell count of $14.3 \times 10^9/L$ (Normal range: $4.5\text{--}11.0 \times 10^9/L$). Inflammatory markers were markedly elevated, with an ESR (erythrocyte sedimentation rate) of 100 mm/hr (Normal range: 0–15 mm/hr) and CRP of 237 mg/dL (Normal range: <1.0 mg/dL). Chest radiography revealed a well-defined opacity in the right upper zone and a cavitary lesion in the left lower zone (Figure 1).

Contrast-enhanced computed tomography (CT) confirmed the presence of bilateral giant cysts suggestive of HCs. The right upper lobe contained a large, uncomplicated HC measuring $14 \times 12 \times 11$ cm, associated with mild adjacent atelectasis. In addition, a complicated (ruptured and infected) HC was identified in the left lower lobe, measuring $12 \times 12 \times 11$ cm, characterized by a thick, irregularly enhancing wall and a prominent air–fluid level with undulating internal membranes, consistent with the water-lily sign (Figure 2).

2.4 Therapeutic intervention

Under general anesthesia, the patient was placed in the left lateral decubitus position. Single-lumen endotracheal intubation was used with intermittent apnea as the patient did not tolerate single-lung ventilation. A bi-port VATS approach was employed. Controlled cyst drainage was performed, the germinal membrane was removed (Figure 3), and the cavity was irrigated with hypertonic saline (20% NaCl), followed by pericystectomy, closure of the bronchopleural fistulae, and capitonnage. Intercostal nerve cryoablation was performed from levels 3 to 11.

A chest tube was inserted, and the patient was repositioned to the right lateral decubitus position. The same procedure was repeated; however, dense pleural adhesions with pleural thickening and a foul odor were encountered. Therefore, extensive irrigation with hypertonic saline (20% NaCl) was performed, and bronchopleural fistulae were closed without capitonnage. Intraoperative pleural fluid culture revealed growth of *Pseudomonas aeruginosa*.

2.5 Follow-up

Postoperatively, the patient was empirically started on oral Amoxicillin–clavulanate (1 g twice daily for 3 days) and albendazole (400 mg twice daily). Albendazole therapy was continued (400 mg twice daily for 3 months). The postoperative course was uneventful, and she has remained well during 6 months of follow-up. She continues to be followed up on regularly.

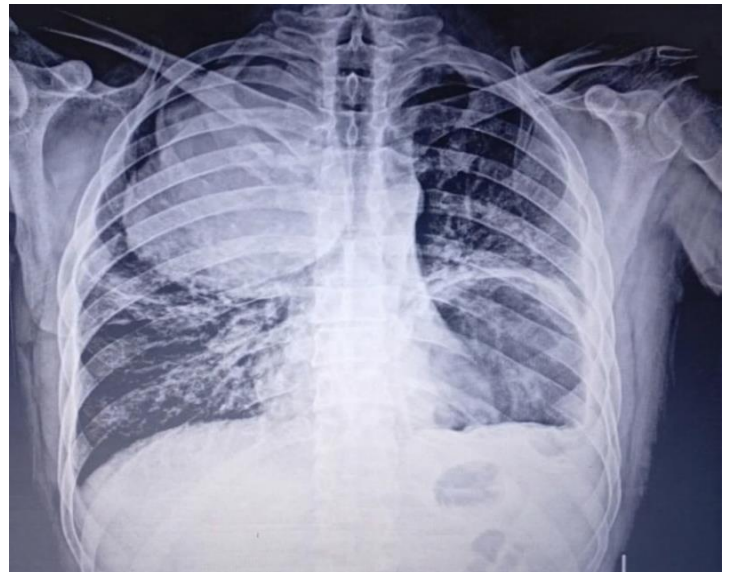


Figure 1. Pre-operative Chest X-ray (PA view) demonstrating a massive radiopaque density in the right upper hemithorax and a large cavitary lesion in the left lower hemithorax.

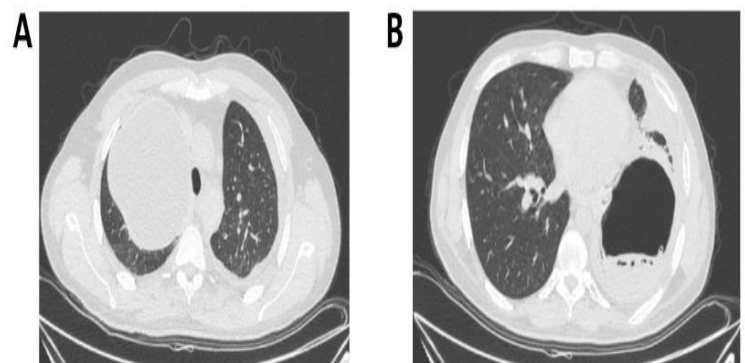


Figure 2. Contrast-enhanced CT chest (axial view). (A) Right upper lobe giant uncomplicated hydatid cyst causing compression of adjacent lung parenchyma. (B) Left lower lobe ruptured cyst showing air–fluid level and detached floating membranes ("water-lily sign").

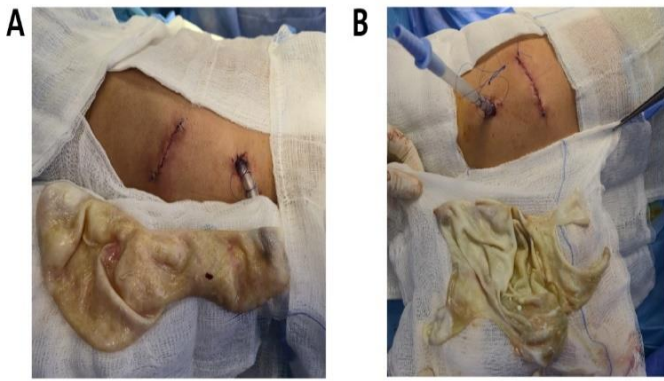


Figure 3. Intra-operative images. **(A)** View of the right hemithorax showing the bi-port access sites and the large, intact germinal membrane extracted from the uncomplicated giant cyst. **(B)** View of the left hemithorax showing the trocar placement and the extracted, fragmented, thickened membranes from the ruptured, infected cyst.

3. Discussion

Uncomplicated pulmonary HCs are often asymptomatic and are frequently discovered incidentally on imaging. Their slow growth may contribute to delayed clinical presentation. When symptoms occur, pulmonary hydatid disease most commonly presents with cough, chest pain, fever, and hemoptysis [8]. For the present report, twelve cases of pulmonary hydatid cysts were reviewed as part of a brief literature review (Table 1). Cough was the most frequently reported symptom, occurring in all cases, followed by dyspnea and fever, both in 6 cases [1,2,9-15]. In the present case, the patient presented with chest discomfort, a productive cough, and dyspnea on exertion. Pulmonary HCs can develop in any lobe; however, they most frequently affect the right lung, particularly the lower lobes. Approximately 60% of cases are reported in the right lower lobe [4].

Imaging plays a central role in the diagnosis of hydatid disease. Chest X-rays and CT scans are particularly useful for identifying characteristic cystic lung lesions [13]. In uncomplicated pulmonary hydatid disease, the typical chest radiographic appearance consists of single or multiple well-defined, round masses with smooth borders and homogeneous density [9]. In the present case, chest radiography demonstrated a well-defined opacity in the right upper zone and a cavitary lesion in the left lower zone. The radiographic crescent sign, often linked to HCs, can also be observed in other conditions, including aspergilloma, cavitating malignancies, blood clots, and Rasmussen aneurysm [9]. The CT appearance of HCs can be variable and may occasionally mimic solid tumors due to associated inflammatory changes [9]. In cases such as the present one, particularly when the cyst is ruptured or infected, imaging may reveal a thick, irregularly enhancing wall and a prominent air–fluid level with undulating internal membranes, producing the characteristic water-lily sign.

Management of bilateral pulmonary hydatidosis remains controversial. It can be performed either as a one-stage procedure or as a two-stage approach, typically spaced 4–5 weeks apart, beginning with the uncomplicated cyst [8]. Due to intolerance of single-lung ventilation, this case underwent a single-stage surgery, as some authors advocate a single-stage procedure, citing advantages such as reduced morbidity, shorter hospitalization, and lower overall costs [8]. VATS has been employed as a minimally invasive alternative to reduce the risks associated with open surgery. However, its use is limited to select cases due to concerns about postoperative

complications, including cyst rupture, spillage of cystic contents, and the management challenges associated with bronchial fistulas [5]. Hybrid interventions have also been utilized, though open surgery remains more common [4].

Among the reviewed cases, open surgical approaches were employed in four patients, all of whom experienced uneventful recoveries [1,10,12,14]. VATS was utilized in seven cases, with no reported complications, suggesting favorable outcomes in carefully selected patients [8,9,11,13]. These findings highlight that both open surgery and VATS can achieve good outcomes when appropriately indicated, although VATS may offer advantages in terms of reduced invasiveness. In contrast, conservative approaches may carry a greater risk of complications depending on case complexity and selection. In the present case, a single-stage VATS approach was adopted, given its association with lower morbidity, shorter hospital stays, and reduced overall cost [4].

A key controversy in the surgical management of pulmonary HCs is whether capitonage should be performed following cystotomy. Traditionally, it has been recommended to obliterate the residual cavity; however, some authors suggest it may be unnecessary, emphasizing that meticulous closure of bronchial openings alone can allow adequate re-expansion and healing of the lung parenchyma [4]. In the present case, capitonage was performed on the right side but omitted on the left side, where the infected, thickened pericyst precluded safe suturing. The patient had an uneventful recovery.

Adjunctive medical therapy with anthelmintic agents, such as albendazole, complements surgical management by reducing the risk of recurrence and targeting residual cystic elements [13]. In seven of the reviewed cases, albendazole was administered as postoperative therapy, and all patients had uneventful recoveries. The only exception was a case managed without surgical intervention, which reported only symptomatic improvement, not full recovery [15]. This pattern suggests that albendazole might be most effective as an adjunct to surgery rather than as a standalone treatment, supporting its role in reducing recurrence.

This report has some limitations. First, serological confirmation was not obtained, which would have provided additional diagnostic support, although serology is not always sensitive in pulmonary hydatid disease. Second, the follow-up period was relatively short, which limits the assessment of long-term outcomes and recurrence.

4. Conclusion

Single-session bilateral VATS may be a feasible therapeutic approach for giant pulmonary hydatid cysts, even when complicated cysts are present.

Declarations

Conflicts of interest: The authors have no conflicts of interest to disclose.

Ethical approval: Not applicable.

Consent for participation: Not applicable.

Consent for publication: Written informed consent for publication was obtained from the patient.

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Table 1. Review of Pulmonary hydatid cyst cases

Author, year [citation]	Age/Sex	Residence/Contacts with dogs or cattle	Presentation	Location/Size (cm)	Management	Complications	Postoperative Management	Outcome
Anari et al., 2023 [1]	14/M	NR/NR	Abdominal pain, cough, nausea, and vomiting	Bilateral/Gigantic (unspecified)	Bilateral anterolateral mini-thoracotomy	None	Albendazole	Uneventful recovery
Mayyaleh et al., 2025 [9]	5/F	Urban/No contact	Left-sided flank pain, anorexia, hypoactivity, dyspnea on exertion, productive cough & fever	Left lower lobe/9x8.5x11	Lateral thoracotomy and VATS	None	Albendazole (130 mg) for 30 days	Uneventful recovery
Aghajanzadeh et al., 2012 [10]	20/F	NR/NR	Right upper quadrant pain, right-sided chest pain, persistent cough, and a low-grade fever	Bilateral/Giant (unspecified)	Bilateral antero-lateral thoracotomies and phrenotomy	None	Albendazole for 90 days	Uneventful recovery
Alpay et al., 2012 [11]	16/M	NR/NR	Fever, shortness of breath, and recurrent attacks of cough.	Left lower lobe/5x4.5	VATS	None	None	Uneventful recovery
	40/F	NR/NR	Recurrent attacks of cough	Left lower lobe/5x5	VATS	None	None	Uneventful recovery
	30/M	NR/NR	Recurrent attacks of cough	Left lower lobe/4x4	VATS	None	None	Uneventful recovery
	28/M	NR/NR	Recurrent attacks of cough and shortness of breath	Left lower lobe/4x4	VATS	None	None	Uneventful recovery
Abubaker et al., 2026 [8]	19/F	Rural/None	Persistent dry cough, shortness of breath, and left flank pain	Bilateral L:15x11 R:10x6.8	Bronchoscopy and uVATS	Right pneumothorax	Albendazole for 6 months and a pigtail catheter for pneumothorax	Uneventful recovery
Ganguly et al., 2012 [12]	8/F	Rural/None	Low-grade fever, occasional abdominal pain, and a non-productive cough	Bilateral, R:7.4x6.7 L:8.5x6.4	Oral Albendazole, Posterolateral thoracotomy	None	Albendazole	Uneventful recovery
Sabr et al., 2024 [13]	15/M	Rural/Yes	Dyspnea and a persistent cough	Bilateral R:16x14 L:14x12	VATS	None	Albendazole for 6 months	Uneventful recovery
Arega et al., 2022 [14]	3/M	NR/Yes	Progressive dry cough, shortness of breath, and low-grade intermittent fever	Bilateral R:9x7 L:8x7	Posterolateral thoracotomy and cystectomy	None	Albendazole	Uneventful recovery
Alawadhi et al., 2025 [15]	42/M	Rural/None	Fever, chills, productive cough, and malaise	Right lower lobe/4x2.9	Conservative	Secondary bacterial infection and pleural effusion	N/A	Improvement of symptoms

M: Male, F: Female, NR: Not reported, CM: Centimeter, VATS: Video-assisted thoracoscopic surgery, N/A: Not applicable

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Use of AI: ChatGPT-5.3 was used to assist with language refinement and improve the overall clarity of the manuscript. All content was thoroughly reviewed and approved by the authors, who bear full responsibility for the final version.

Data availability statement: Not applicable.

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