

(RESEARCH ARTICLE)



Presentation, diagnosis, management and outcome of complicated hydatid cyst of the lung

Manouchehr Aghajanzadeh ¹, Ali Alavi Foumani ², Azita Tangestaninejad ², Seyed Aliaskhar Fakhre Mosavi ², Zahra Sadin ², Omid Mosaffae Rad ¹, Ehsan Hajipour ², Alireza Shirzadi ³ and Mohaya Farzin ^{4,*}

¹ Department of Thoracic Surgery, Guilan University of Medical Sciences, Iran.

² Inflammatory Lung Diseases Research Center, Department of Internal Medicine, Razi Hospital, School of Medicine, Guilan University of Medical Sciences, Rasht, Iran.

³ Department of Anesthesiology, Negah hospital, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran.

⁴ Department of physiology, Razi Clinical Research Development Center, Guilan University of Medical Sciences, Rasht, Iran.

GSC Advanced Research and Reviews, 2024, 18(02), 362–373

Publication history: Received on 29 December 2024; revised on 11 February 2024; accepted on 14 February 2024

Article DOI: <https://doi.org/10.30574/gscarr.2024.18.2.0050>

Abstract

Introduction: Introduction: The complicated hydatid cyst of the lung is defined as any cyst ruptured in the bronchi tree or in the pleural cavity, infected, and rarely in the pericardial cavity. The aim of this study was to evaluate the problems of complicated pulmonary hydatid cyst, including presentation, diagnosis choice of surgical methods. and complication of delay in surgical treatment of pulmonary hydatid cysts.

Methods: Between 2016 and 2021, 192 operations operated for pulmonary hydatid cysts, 42 of these patients were complicated hydatid cyst. Presentations were cough, chest pain and dyspnea. Diagnosis tools were CXR and CT-scan of chest. surgical approach was a posterolateral thoracotomy and anterolateral thoracotomy in all patients; a phrenotomy in eight patients and one-stage bilateral thoracotomy in six patients.

Results: In 18 patients (67.5%), there were single hydatid cysts; whereas 4 patients (32.5%) had multiple cysts. 12 patients had bilateral cyst and 8 had both lung and liver and others organs, 6 patients had preoperative hydatid cyst history. Iatrogenic rupture of an intact hydatid cyst occurred in 4 patients. Extrathoracic involvement was apparent in 6 patients (27%). Intrathoracic but extrapulmonary involvement was apparent in 4 patients (16%).

Conclusion: Complicated hydatid cyst may present with different clinical and radiologically manifestations as a primary lung tumor, pleural effusion, empyema, hydropneumothorax. In patients with suspicious lung masses in endemic area or history of a hydatid cyst in patients a complicated pulmonary hydatid cyst may be in differential diagnosis.

Keywords: Hydatid Disease; Surgery; Management Outcomes; Complex Hydatid Cyst

1. Introduction

Hydatid disease is caused by an infection with the cestode *Echinococcus granulosus* and is endemic in Iran (1). Hydatid disease is a serious health problem in some countries like Iran, where it is endemic in some country [1,2,3]. Adult worms mature in the intestine of dog (definitive host) and the eggs are released in the stool (3,4). Hydatid disease is caused by an infection with the cestode *Echinococcus granulosus* and is endemic in Iran (1). Adult worms mature in the intestine of dog (definitive host) and the eggs are released in the stool (2,3,4). Animals like sheep get this disease by via ingestion of contaminated vegetables (2,3,5). By an accidental ingestion in human beings (accidental host), oncospheres hatch in

* Corresponding author: Mohaya Farzin

the duodenum, penetrate the intestines and are carried via the bloodstream to various organs(1,2,3,4) .Animals like sheep get this disease by via ingestion of contaminated vegetables(2,3,5). By an accidental ingestion in human beings (accidental host), oncospheres hatch in the duodenum, penetrate the intestines and are carried via the bloodstream to various organs.

it most often affects the liver and the lungs tissue [1,3,4].Hydatid disease mostly affects the liver (75%) and the lungs tissue (15%), and occurs only 10% in others organ [1,2,3,6] . Hydatid disease mostly affects the liver (75%) and the lungs tissue (15%), and occurs only 10% in others organ [2-5-6]. About 60% of pulmonary hydatid cyst occur in the lower lobes of lungs [1,3,4,7]. Bilateral pulmonary hydatidosis accounts for 4% to 26.7% in of all cases [1,3] and multiple pulmonary hydatid cysts occur in 30% of cases [1,3,4,8,9] . Pulmonary hydatid disease may be accompanied by complications including cyst rupture into the pleural space(tension hydropneumothorax, hydropneumothorax, empyema or bronchi,abcess , lung mass , hemoptysis, suppuration large size cysts, multiplicity and concomitance with liver cysts(2,3,7-10-11,12,13)

Although it may involve any organ, it most often affects the liver and the lungs tissue [6]. Complications of pulmonary hydatid cysts include rupture, secondary infection, pneumothorax, and suppuration. Patients may develop sudden onset of chest pain, cough, fever, and hemoptysis after a cyst ruptures, urticaria wheezing and anaphylaxis [3-4,7,13]. Other symptoms of pulmonary hydatid cysts include, cough, chest pain, breathlessness, expectoration, fever, hemoptysis, and anaphylactic phenomena [2,4,7,8,13]. The most serious complication is a secondary bacterial infection (13. Infection resulting in difficulty in differentiation diagnosis (11,13) . Chest imaging is the principal investigational modality for pulmonary hydatid cyst.US, computed tomography (CT), and magnetic resonance imaging (MRI) of the lungs are the various useful modalities in the diagnosis of thoracic hydatid cyst [3,5,6,7,14]. The treatment in complicated cysts are surgery. The goal of surgical intervention includes removal of the entire cyst while preserving the lung parenchyma as much as possible and without allowing intra operative spillage [1-3,,15,16,17,18]. The aim of this study is to show our experience in complicated of pulmonary hydatid cysts and to evaluate the clinical presentation, diagnosis, treatment ,recurrences and outcomes of complicated pulmonary hydatid cyst.

2. Material and methods

The medical records of 58 patients with complicated pulmonary hydatid cysts who had underwent operation in teaching and private hospital in Rasht, Iran between January 2016 and December 2021, were reviewed. forty cases were male and eighteen females with a mean age 34 years (range, 4 to 69 years). The follow-up times for all 58 patients ranged from 10 months to 3 years. The pulmonary cysts were diagnosed by various combinations of chest roentgenogram, thoracic computed tomography and intraoperative findings. Each patient also underwent abdominal ultrasonography to assess for concomitant hepatic hydatid cysts. Serologic testing was not used routinely in our study for diagnostic workup. Any cyst that had ruptured into the bronchus or pleural cavity,with effusion ,empyema, hydropneumothorax , tension hydropneumothorax and suppuration was defined as complicated cyst. A ruptured cyst with purulent sputum, leukocytosis, fever, and with or without lobar and segmental pneumonia or consolidation was considered to be infected cyst. Operations in all of patients performed with posterolateral, anterolateral and bilateral anterolateral thoracotomies. A total of 62 surgeries were performed on the patient. In patients with right pulmonary and liver cysts underwent right posterolateral and anterolateral thoracotomy with phrenotomy. In patients with lung cysts whom presented with pneumothorax and empyema with liver cysts, underwent thoracophrenotomy. These patients usually underwent closed-chest tube drainage initially, and surgical procedure after diagnosis. In 34 patients (79.31%) surgical treatment for pulmonary hydatid cysts was cystotomy with evacuation of laminated membrane and closure of Bronchial openings with capitonage. For prevention of spillage of cysts contened the edges of the surgical wound and the lung surface were protected with saline3% impregnated gauze cyst. Due to risks of leakage into the bronchial system and tracheobronchial irritation or pulmonary edema postoperative no scolicial agent was injected into in the cysts The cyst fluid were evacuated by needle aspiration, and the cystic membrane was removed with ring forceps. The remaining cavity was irrigated with3% saline solution. Bronchial openings in the cavity were stitched up with absorbable sutures in a figure of eight. After the bronchial openings were closed, the residual cavity was left open in some 14 patients. In patients with complicated cysts pericyst layer and had damaged the adjacent parenchyma, a pericystectomy was performed. Decortication was performed in seven patients (5.9%). wedge resection was performed in 4 patients (10.3), segmental resection in 6 patients (3.44%) type of incision for surgery show in (Tab 1). Before surgery, all patients were placed on albendazole (800 mg/d in adults, 10 mg/kg/d in children) After surgery,all patients were place on albendazole therapy (800 mg/d for three period of 28 day and 14 rest. Data as symptoms, preoperative presentations, surgical procedures, postoperative complications, mortality, hospital stay, and cyst recurrence from related to each patient's records were collected and analyzed

3. Results and discussion

In this study forty cases were male and 18 females with a mean age 34 years (range, 4 to 69 years) The age of 14 patients in this study was under 36 years, therefore most of the patients were at the age groups of 25 to 38 years. In all of patients Chest X Ray and thoracic CT scan was used for diagnosis of variation of complications. With clinical presentation and findings. chest roentgenograms and thoracic computed tomography, in 46 patients led to the correct preoperative diagnosis of complicated pulmonary hydatid disease. The other 12 patients were diagnosed intraoperatively. In two of these patients, the respective misdiagnoses before surgery were pneumonia in two patients, three lung abscess, two lung mass, four pleural effusion and one tension pneumothorax (Fig 1,2,3,4,5,6) .

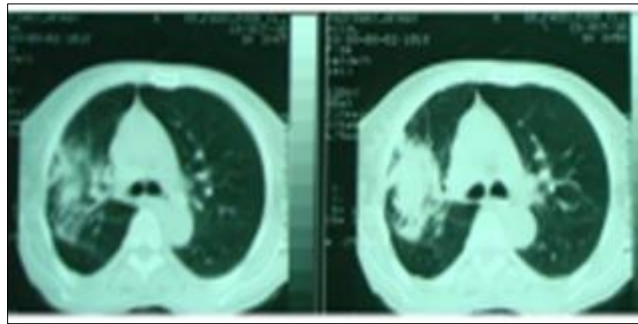


Figure 1 Preoperative diagnosis was pneumonia

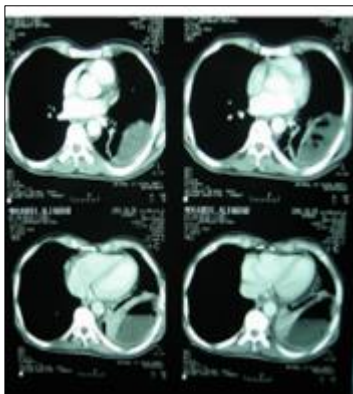


Figure 2 Lung abscess preoperative diagnosis was perforated hydatid cyst

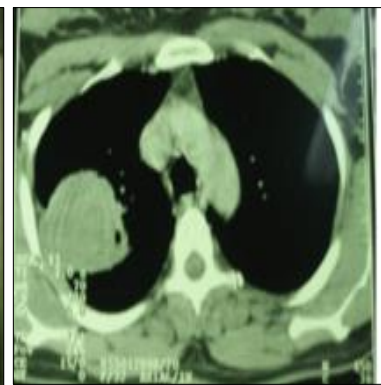
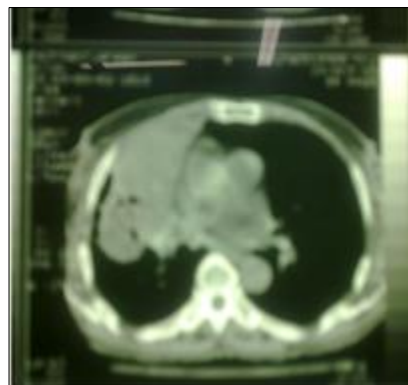


Figure 3 Lung mass preoperative during operation diagnosis was hydatid cyst

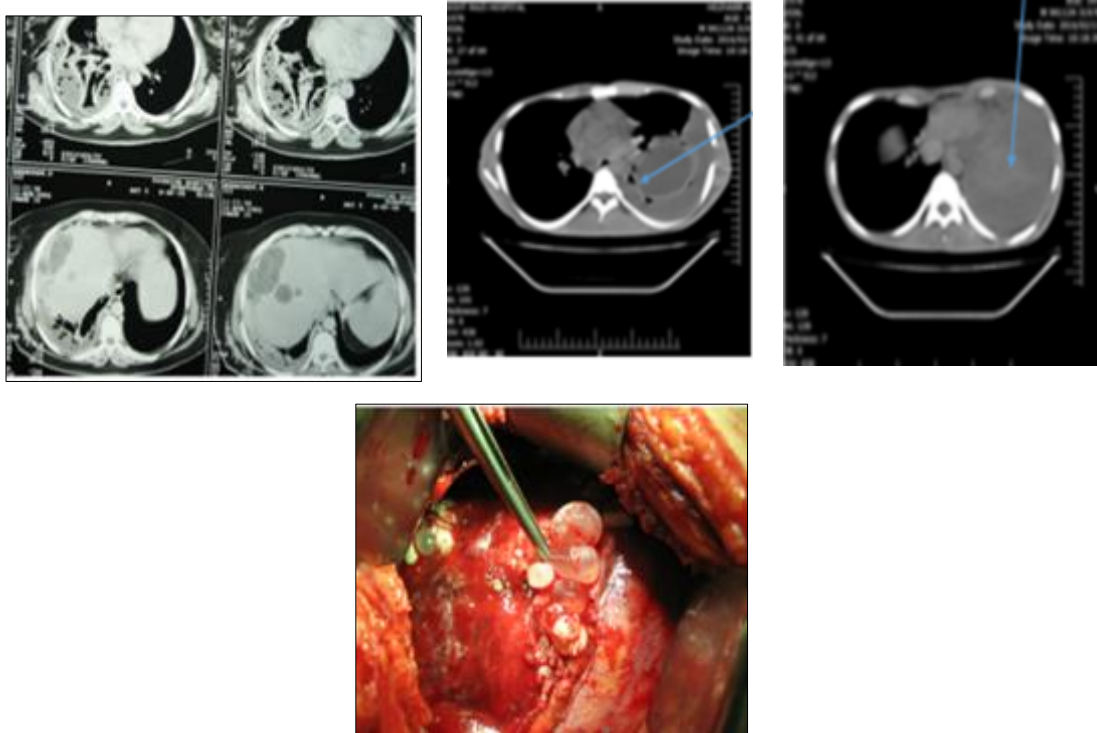


Figure 4 Pleural effusion postoperative



Figure 5 Tension hydropneumothorax preoperative but rupture hydatid cyst postoperative



Figure 6 Bilaterally and multiple pulmonary hydatid cyst

Most common location of involvement of the cyst in the lungs was right lower lobe in 28 cases (58.62%) and left lower lobe in 12 cases (20.68%), left upper lobe in 2 cases (12.06%), right upper lobe in 4 cases (6.89%) and right middle lobe in one case (1.72%). 38 patients (68.96%) had one pulmonary cysts and 20 patients (31.03%) had multiple cysts. 18 patients had bilateral pulmonary cysts, 6 patients (8.62%) had unilateral multiple pulmonary cysts, and 10 patients (22.41%) had unilateral pulmonary cysts and concomitant liver hydatid cysts (Fig 6, 7, 8). Of the 8 patients with bilateral pulmonary hydatid cysts, 6 patients also had cysts in the liver. In 2 patients pulmonary cysts present with splenic hydatid cyst which operated in one stage with thoracotomy and laparotomy. The most common symptom was dyspnea, followed by chest pain, productive and dry cough, hemoptysis, and fever, others show in (Table 2). The most common preoperative complications were rupture into tracheobronchial tree and pleural space other complications show in (Table 3). Posterolateral thoracotomy in 35 patients and anterolateral thoracotomy in 6 patients were the most common surgical procedures. One stage operation with anterolateral thoracotomy was performed in 8 patients (tab 1). After thoracotomy and walling with wet sponge with saline 5% of around the cysts, the procedures cautioning as aspiration, evacuation of cyst with cystostomy and Closure of the Bronchial Opening. remnant cavity was irrigated with saline for missed bronchial opening. The preferred surgical treatment procedure was cystotomy, evacuation, bronchial opening closure and modified capitonnage, which was carried out in 34 patients (xx%). Other procedures included a cystotomy, evacuation and bronchial opening closure in 17 (14%) and decortication in 7 (16%) patients. Segmentectomy was carried out in 6 (3%), and wedge resection in 4 patients (11%). Two patients needed lobectomy. Poster - lateral thoracotomy and phreniotomy performed in 8 patients for concomitant lung and liver cysts. Postoperative complications were developed. In 16 patients (34.48%). Prolonged air leak was the most common postoperative complications other show in (Table 3). In this study postoperative mortality was happened in one patient. All 8 patients with Prolonged air leak underwent pleurodesis by autologous blood. In 2 patients prolonged air leak was not responded to pleurodesis by autologous blood was controlled with segmentectomy and Atelectasis improved with chest physiotherapy and FOB bronchoscopy. Empyema and pleural effusion treated with Chest-tube. Hemoptysis stopped with Transamic Acid prescription. The hospital stay ranged was from 7 to 14 days (mean, 9 days). During 24 month follow-up there was not recurrence.

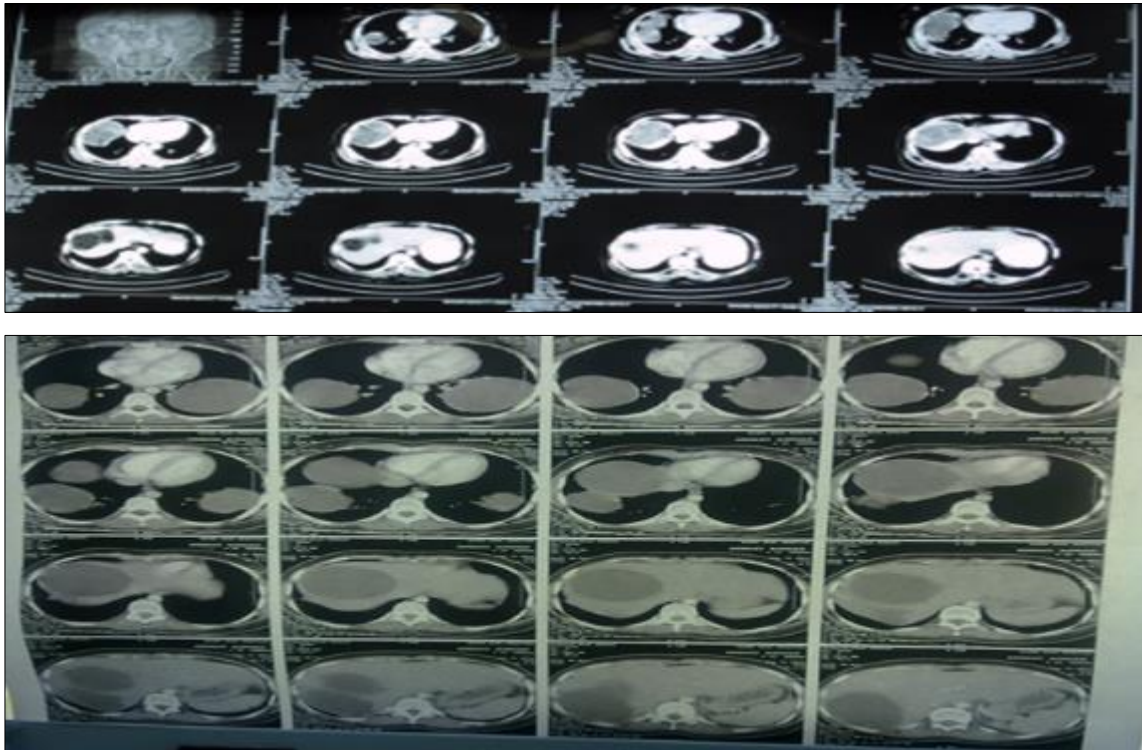


Figure 7 Conditment hydatid cyst and lung

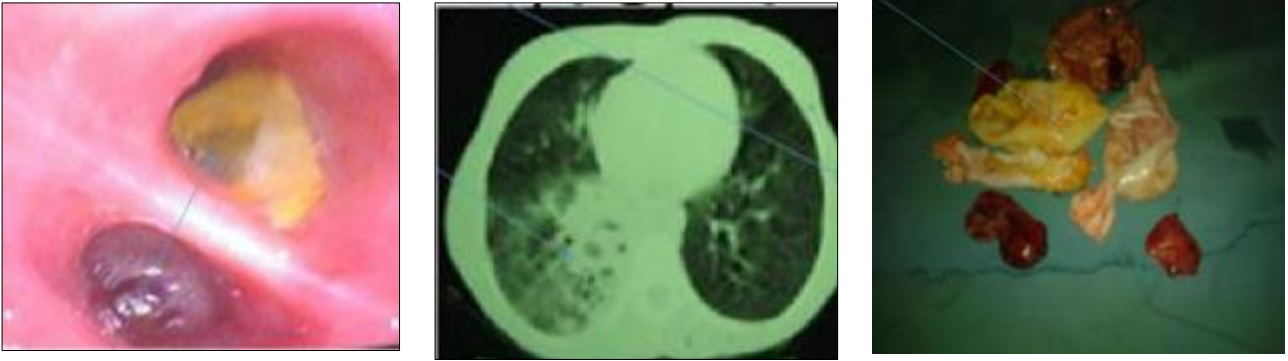


Figure 8 Pneumonia and bronchoscopy and element of hydatid cyst

Table 1 Type of incisions

Type of incisions	N	%
PL thoracotomy only	35	60.34
AL thoracotomy only	6	10.34
Bilateral AL thoracotomy	6	10.34
PLthoracotomy plus pherintomy	5	8.62
PL thoracotomy plus laparotomy	4	6.89
AL thoracotomy plus phrinotomy	2	3.44

PL =Postero-lateral AL=Antero -lateral

Table 2 Clinical presentations

Clinical Manifestations	No	%
Chest pain	24	41.37
Fever	18	31.03
Dyspnea	16	27.58
Cough	12	20.68
Sputum production	11	18.96
Expectoration of cystic content	8	13.79
Hemoptysis	5	8.62
Weight loss	4	6.89
Allergic episode	4	6.89
Bilioptysis	2	3.44

Table 3 Preoperative diagnosis in imaging

Preoperative diagnosis in imaging	NO	%
Infected cyst and pneumonia	11	18.96
Infected cyst	8	13.79
Pleural effusion	6	10.34
Recurrent Pneumonia	4	6.89
Simple hydropneumothorax	4	6.89
Empyema	4	6.89
Bronchobiliary fistula and pneumonia	4	6.89
Lung mass	4	6.89
Tension hydropneumothorax	2	3.44

Table 4 Postoperative Complications

Postoperative Complications	NO	%
Prolonged air leak (>7)	8	13.79
Pneumonia	6	10.34
Atelectasis	5	8.62
Wound infection	5	8.62
Empyema	4	6.89
Hemoptysis	3	5.17
Pleural effusion	2	3.44
BP fistulae	2	3.44

4. Discussion

Hydatid cysts is one of the most important health problem and parasitic diseases in some country (1,3,13). The liver is the first common effected organ, the second organ is lung which involved nearly 25% of cases in patients with hydatid cysts (3,10,13,15). The lung may be affected when the filtration of liver failed or lung involved by the lymphatic system (3,13,15,18).

The hydatid cysts of lung and liver may remain asymptomatic for a long time. When cyst become enlarge more than 7-10 cm, they may rupture spontaneously, or with trauma or any diagnostic procedures (22-23-24). rupture is One of the usual complications of pulmonary hydatid cyst, which can occur spontaneously when it reaches 7–10 cm in diameter, or secondary to an infectious process, or after sever coughing, trauma to the chest and needle aspiration (2,3). In the study by Aribas and colleges, of 145 patients with hydatid cysts of the lung, 88% had ruptured cysts and 12% had intact cysts (19). In another study involving 537 patients with PHC, 87 (16%) had ruptured cysts, with a higher incidence in cysts >10 cm in diameter (20). Another study by Sayir et al (.21) revealed a similar percentage of rupture (18%).

Pulmonary hydatid cysts may rupture into tracheobronchial system, pulmonary parenchyma, or in the pleural space and rarely in the pericardial cavity but in our study we have not this complication (22-24). These patients complain of cough, expectoration of membranes, hemoptysis, dyspnea, thoracic pain, and anaphylaxis (25-26,27). In addition, in uncomplicated cases it would be an either an incidental finding or presents as a dry cough, dyspnea, and chest pain (27,28).

When parasitic membrane remain in the collapse cavity could be considered as a source of recurrent infection (27,28). After coughing and expectoration of hydatid fluid and remnants of others parasitic element will present with recurrent hemoptysis, purulent sputum, or fever in case of pulmonary abscess due to hydatid cyst (25,26,27). Moreover, expectoration of cystic element can lead to fetal complications, such as asphyxia due to laminated membrane or huge cyst fluid, acute respiratory failure, simple or massive hemoptysis, allergic reaction and anaphylactic shock (25,26,30)

When a cyst rupture into the pleura space, the diagnosis become difficult by radiologic imaging, because The rupture into pleura usually misdiagnoses as empyema and effusion (13,25) .In this condition, after chest tube insertion, hydatid material usually observed within the bottle [13,14]. Although the diagnosis with computed tomography this complication of hydatid cyst are difficult , but in the planning of the operation it was successful in detecting the localization, contents, and borders of the lesion [16,17,18]. In contrast to rupture into a bronchus, rupture of a hydatid cyst into the pleural cavity usually causes pneumothorax, pleural effusion, or empyema. (16,17,18,19) xx of our patients developed pleural effusion. Cyst rupture into thepleural cavity can also result in tension pneumothorax [12,21,22,23]. this complication occurred in one of our patients. The documented rates of simple pneumothorax in patients with pulmonary hydatidosis ranged from 2.4% to 6.2% (12,21,22,23,24).

Empyema is reported to occur in 7.6% of patients with hydatid disease of the lung (3,13,16,18). In our series,pneumothorax occurred preoperatively in 4 of patients and empyema in 6 patients, and two patients with recurrent pneumonia and 4 patients present with lung masses (13). These complications can be misdiagnosed as empyema or hydropneumo thorax (17,22,23,30,31).

In these complications, hydatid material would be detected following chest tube insertion with primay diagnosis of pneumothorax, effusion, empyema or hydropneumothorax (23). In some cases, while CT scan may not help the diagnosis (7,27, 31,32). In addition, FO Bronchoscopy can be considered as both diagnostic and treatment tool in some cases (11; 33-34), due to their ability in detecting the cause, content, localization, and borders of the lesion (11,34,35) (Fig 8). The cyst frequently ruptures into the bronchus but in some cases, it ruptures into the pleura (1 8). Usually, rupture can be classified into three types: contained, communicating, and direct (18,27,31,32). In most cases, the solid residues in the collapsed parasitic membrane cavity are the source of the recurrent infection (18) . Coughing sputum, chest pain, haemoptysis, dyspnoea, and fever are the most common symptoms of complicated PHC (18,23,30,35). Rupture of a hydatid cyst into the pleural cavity can cause pneumothorax, pleural effusion, or empyema Cyst rupture into the pleural cavity can also result in tension pneumothora (11,13,16,18,30).

Generally, complications such as pneumothorax, pleural effusion, and hydropneumothorax may occur following rupturing a cyst into a pleural space ((11,13,16,18,30)). Cyst rupture into the pleural space can also results in tension pneumothorax (23,29,30). This complication occurred in one of our patients. The rates of simple pneumothorax in patients with pulmonary hydatidosis ranged from 2.4% to 6.2% (24,34,27).

Empyema has been reported to occur in 7.6% of patients with hydatid disease of the lung (7,35). In our series, simple pneumothorax presents preoperatively in six of patients and empyema present in six patients and lung abscess (Infected cyst) in eleven patients and six patients developed pleural effusion.

Complicated pulmonary hydatid cysts can mimic several pleural and pulmonary disease such as non-resolving pneumonia due to the remnant membrane of the cyst after the parenchymal or bronchial rupture.This membrane would be considered as a foreign body and recurrent pneumonia would present subsequently (11, 24,27 31,36).In our study 11patients present the recurrent pneumonia.In some of them rupture cysts present as a lung abscess with fever malodor sputum with air fluid level in their X-ray (7,14, 24). Generally, in our study 11 patients present with lung abscess. In addition, mass like lesions is another rare presentation of PHC complication, which may occur after incomplete evaocation of content of the cavity (7,27,28). Seventeen cases in our study present with lung mass. According to the previous studies, it is possible that their manifestation would be similar to tuberculosis or bronchiectasis (27,14.7); however, in our study we didn't detect such complications. The clinical picture with complicated cysts is variable and depends on the nature of the rupture (1,2,3,13,42,43). But in most uncomplicated cases of pulmonary hydatid cysts; lung cysts are either an incidental finding or the patient presents with dry cough, dyspnea, and chest pain. (1,2,3,4).

In bronchus ruptures are common complication of the cyst. In most these cases, remnants membrane in the collapsed cavity of parasitic after evacuation are as a source of recurrent infection Such patients present with recurrent hemoptysis, purulent sputum, fever, or a combination of some or all of these symptoms [3,7,17,18,19,20].

There is no specific clinical finding in complicated PHC cases (7,22 ,24,35). Laboratory findings or serologic tests are not diagnostic (7,24, 35). Bronchoscopy is not indicated in patients with a typical clinical and radiological picture of

cysts, in such case Bronchoscopy is dangerous because of the risk of cyst rupture (14,34,35). It can be performed when there is a suspicion of tumor or the possibility of a recurrent pneumonia, mass, lung abscess, and lung collapse (11,34; 37). One of our patients cured with bronchoscopy (Fig 8)

In intact cysts, some researchers recommended medical treatment with oral albendazole (7; 38). Some reports showed that 73% to 75% of patients respond to medical management to some degree; but cure rates are only 25% to 30% (11, 30,33 ,35,38). In the complicated hydatid cysts, the treatment with albendazole have not been recommended (7,13,38; 39). Medical therapy is not effective in complicated cysts because the remnant membrane which is in the cavity are a source of recurrent infection and should be removed from the cavity (7,17 ,24,39, 40). Operation needed as soon as possible after diagnosis because delay in the treatment may produce high complication (7; 17 ,32; 39; 41).

surgical procedures and approach depend on the findings during the operation (7,13,17,24). In our series all patients underwent posterolateral and anterolateral thoracotomy for surgical treatment of cysts. When during exploration parenchymal destruction is present, resection of involvement portion as wedge, segmental resection, and lobectomy is indicated (3,7,15,16,17,24). Our most appropriate procedures for pulmonary hydatid cysts are open surgery which include, cystotomy, evacuation all elements of cysts and closure of the bronchial openings. Video-assisted thoracic surgery (VATS) is indicated for selected patients [16 17,18,20,21]. It is possible to remove the cystic element through thoracoscopically, but uncontrolled spillage of cyst contents may occur and produce allergic reaction, anaphylaxis, pleural hydatidosis in intact cysts or pleural bacterial spread if the cyst was infected [16 17,18,20,21]. We did not use VATS in our patients. Complicated hydatid cysts produce significant pleural thickening and parenchymal destruction; therefore, more radical surgical procedures, such as decortication, wedge resection, segmentectomy, and lobectomy may be required in such cases [4,17,19,20]. Because the hydatid disease is benign, only the destroyed parenchyma should be resected (13,24,31 ,35).

In other patients, our choice of surgical methods is cystotomy and remove all content of cavity and closure of bronchial opening, pricystectomy. In patients with trapped lung, decortication should be performed (7,13,24, 41). Our choice for general anesthesia is single-lung ventilation for preventing aspiration of cystic material and respiratory complications. Lung-conserving procedures are optimal for pulmonary hydatidosis (24,23; 40). Some researchers recommended that the most appropriate procedures for PHC are the open surgery and removal all portions of involved lung as we did in our study (42., 14,22). Video-assisted thoracic surgery (VATS) is suggested for selected patients (7; 32). We did not use VATS surgery in PHC.

Complicated hydatid cysts cause significant pleural thickening and parenchymal destruction; therefore, more difficult surgical procedures, such as decortication, segmentectomy, and lobectomy may be required in these patients (22,34,35,). We used above procedure in our patients. Resection rates of for complicated pulmonary hydatid cysts are 19% to 32% and 0% to 7% for uncomplicated pulmonary hydatid cysts (14,31). We performed decortication, wedge and segmental resection, and lobectomy while pneumonectomy in our cases wasn't performed.

In a study of patients with PHC and pleural complications, they found that decortication was needed in 30 patients (69.8%) and pulmonary resection was needed in 6 patients (14%) (43,13,3). In our series, 7 of the patients with complicated cysts required decortication, while twelve patients needed wedge and segmental resection and two patients needed lobectomy. Morbidity and mortality in Complicated PHC are higher than uncomplicated cysts postoperative (24,27,30,7;30). In complicated cases, infection of the adjacent lung parenchyma may lead to postoperative complications such as prolonged air leakage, empyema, atelectasis, and pneumonia. In addition, many patients with complicated pulmonary hydatid cysts require preoperative antibiotic therapy and supportive treatment. Complicated cases have a higher morbidity and mortality rate and need longer hospitalization than uncomplicated cases (24,7 ,43). There was no mortality in our patients. Safioleas and colleagues (43) reported hospitalization time with pulmonary hydatidosis as a 12-days median hospital stay for uncomplicated cases versus a 21-days median hospital stay for complicated cases. In a report (7) the hospital stay was from 7 to 22 days (mean, 11 days). The hospitalization stays of our patients ranged from 7 to 14 days (mean, 8 days).

5. Conclusion

Complicated hydatid cyst may present with different clinical manifestations in radiologically as a primary lung tumor, pleural effusion, empyema hydropneumothorax. In patients with suspicious lung masses in endemic area or history of a hydatid cyst in patients a complicated pulmonary hydatid cyst may be in differential diagnosis. Treatment of a complicated hydatid cyst are as intact cysts. Anatomic resection may be necessary in destroyed lung tissue. however, parenchymal preserving surgery is preferable in an uncomplicated or intact hydatid cyst. A capitonnage may need after bronchial opening closure is recommended for complicated hydatid cyst treatment

Compliance with ethical standards

Acknowledgments

The authors would like to thank the Razi Clinical Research Development Unit.

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

The study was performed in accordance with the declaration of Helsinki and approved by the Ethics Committee of Guilan by the Local Ethical Committee of Arya hospital. Guilan University of Medical Sciences, Iran Tel=+981333759790-9 E-mail =info@Aryahospital.ir

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

References

- [1] Aghajanzadeh M, Safarpour F, Amani H, Alavi A. One-stage procedure for lung and liver hydatid cysts. *Asian CardiovascThorac Ann.* 2008, 16: 392-395.
- [2] Sarkar M, Pathania R, Jhobta A, Thakur BR, Chopra R. Cystic pulmonary hydatidosis, *Lung India.* 2016, 33: 179-191.
- [3] Saviz Pejhan , Mohammad Reza Lashakri Zadeh , Mojtaba Javaherzadeh , Mohammad Behgam Shadmehr , Mehrdad Arab , Abolghasem Daneshvar Kakhki , Roya Farzanegan ,Azizollah Abbasi Dezfouli ,Surgical Treatment of Complicated Pulmonary Hydatid Cyst Tanaffos (2007) 6(1), 19-22
- [4] Havlucu Y, Ozdemir L, Sahin E. Multiple cystic echinococcosis mimicking metastatic malignancy. *Respiratory Med.* 2010, 3: 132- 134.
- [5] Kuzucu A, Ulutas H, RehaCelik M, Yekeler E. Hydatid cysts of the lung: Lesion size in relation to clinical presentation and therapeutic approach. *Surg Today.* 2014, 44: 131-136.
- [6] Polat P, Kantarci M, Alper F, Suma S, Koruyucu MB, Okur A. Hydatid disease from head to toe. *Radiographics.* 2003, 23: 475-494.
- [7] Asgary MR, Aghajanzadeh M, Hemmati H, Safarpour F, Alavi A, Amani H. The clinical finding, diagnosis and outcome of patients with complicated lung hydatid cysts. *Int J Med Res Health Sci.* 2016, 5: 293- 297.
- [8] Hasdıraz L, Onal O, Oguzkaya F. Bilateral staged thoracotomy for multiple lung hydatidosis *J Cardiothoracic Surg.* 2013, 8: 121.
- [9] Trilok C, Avdhesh B, Aanchal T. Hydatid lung disease presented with multiple pulmonary nodules. *J Health Res.* 2016, 3: 137-140.
- [10] Manouchehr Aghajanzadeh1, Ali Alavi, Alirza Jafarnegad, Azita Tangestaninejad, PedramTalebi, Rasool Hassanzadeh, and Mahdi Pursafar ,Multiple and Bilaterally Pulmonary Hydatid Cystic Mimicking Metastatic Lesions,*J Liver Clin Res* 2017. 4(3): 1040.
- [11] Alavi A, Aghajanzadeh M, Hejri GM. Bronchoscopic extraction of a hydatid membrane in a 26-year-old woman with recurrent pneumonia, case report. *Iranian Red Crescent Medical Journ,*2010, 12(1):68-70.
- [12] Reza Rezaei Hossein Sadidi , Pegah Bahrami Taqanaki , Tension pneumothorax caused by the ruptured hydatid cyst of the lung , *Clin Case Rep* 2023 Jul 6, 11(7)
- [13] Ehsan Hajipour Jafroudi1*, Manouchehr Aghajanzadeh1, Ali AlaviFoumani2, Azita Tangestaninejad2, YoushaPourahmadi3, MahsaMousazadeh MD3, Pulmonary hydatid cyst mimicking pneumonia, lung mass, pneumothorax, pleural effusion, pulmonary abscess, and pyopneumothorax , *Int. J. of Life Sciences,* 2022, 10 (4): 308—316.

- [14] Yilmaz A, Tuncer LY, Damadoglu E, Sulu E, Takir HB, Selvi UB. Pulmonary hydatid disease diagnosed by bronchoscopy: a report of three cases. *Respirology*. 2009, 14(1):141-3.
- [15] Usluer O et al. Surgical management of pulmonary hydatid cysts. *Tex Heart Inst J*. 2010, 37(4):429-34.
- [16] Sayir F et al. Surgical treatment of pulmonary hydatid cysts, which perforated to the pleura. *Eurasian J Med*. 2012, 44:79-83.
- [17] Cobanoglu U et al. Therapeutic strategies for complications secondary to hydatid cyst rupture. *Int J Clin Exp Med*. 2011, 4(3):220-6.
- [18] Lahiri, Mayank Mishra, Ajay Kumar, Sandeep Gautam, Navin Kumar, Management of Pulmonary Hydatid Cyst With Pleural Complications: A Case Series, *EMJ*. 2021, DOI/10.33590/emj/20-00179. <https://doi.org/10.33590/emj/20-00179>.
- [19] Aribas O.K., Kanat F., Gormus N., Turk E. Pleural complications of hydatid disease. *J Thorac and Cardiovasc, Surg* 2002, 123:492-497.
- [20] Usluer O et al. Surgical management of pulmonary hydatid cysts. *Tex Heart Inst J*. 2010, 37(4):429-34.
- [21] Sayir F et al. Surgical treatment of pulmonary hydatid cysts, which perforated to the pleura. *Eurasian J Med*. 2012, 44:79-83.
- [22] Chacko J, Rao S, Basawaraj K, Chatterjee S. Ruptured hydatid cyst masquerading as tension pneumothorax. *Anaesthesia and intensive care*. 2009, 37(5):840-2.
- [23] Yekeler E, Celik O, Becerik C. A giant ruptured hydatid cyst causing tension pneumothorax and hemothorax in a patient with blunt thoracic trauma: a rare case encountered in the emergency clinic. *Journal of Emergency Medicine*. 2012, 43(1):111-3.
- [24] Aghajanzadeh M, Asgary MR, Foumani AA, Alavi SE, Rimaz S, Hajipour EH, et al. Surgical management of pleural complications of lung and liver hydatid cysts in 34 patients. *International Journal of Life Sciences*. 2014, 8(4):15-9.
- [25] Tanveer Ahmad • Ambreen Abid • Nazish Sikander • Misauq Mazcuri • Nadir Ali, Management Outcome in Simple and Complex Hydatid Cysts of Lung *Cureus* 12(12): (December 22, 2020)
- [26] Aghajanzadeh M, RasoulHerfatkar M. Ruptured Hydatid Cyst of Liver and Huge Pulmonary Hydatid cyst: Presented as Acute Abdomen with Severe Anaphylaxis Shock: A Rare Presentation. *Ann Clin Pathol*. 2018, 6(1):1131.
- [27] Ekinci GH, Kavaz M, Hacıömeroğlu O, Öngel EA, Ersev A, Yilmaz A. Pulmonary Hydatid Disease Mimicking Lung Cancer. *Respir Case Rep*. 2015, 4(1):60-3.
- [28] Işık S, Sözmen ŞÇ, Güzeloğlu E, Öztürk T, Asilsoy S. Pulmonary hydatid cyst disease mimicking necrotizing pneumonia in a child with leukocytoclastic vasculitis. *Turkish Archives of Pediatrics/Türk Pediatri Arşivi*. 2018, 53(2):117.
- [29] Aghajanzadeh M, Fomani A, Jafarnegad A, Tangestaninejad A, Pourahmadi Y. A Rare Case of Pulmonary Hydatid Cysts with Presentation of Pleural Effusion. *Clin Surg* 2020, 5:2830.
- [30] Kuzucu A, Soysal Ö, Özgel M, Yologlu S. Complicated hydatid cysts of the lung: clinical and therapeutic issues. *The Annals of thoracic surgery*. 2004, 77(4):1200-4.
- [31] Cobanoglu U, Sayir F, Şehitoğlu A, Bilici S, Melek M. Therapeutic strategies for complications secondary to hydatid cyst rupture. *International Journal of Clinical and Experimental Medicine*. 2011, 4(3):220.
- [32] Ramos G, Antonio Orduña M, Mariano García-yuste M. Hydatid cyst of the lung: diagnosis and treatment. *World journal of surgery*. 2001, 25(1):46.
- [33] Cakir E, Ozaydin SE, Tasci E, Baran R. Unusual presentation of hydatid cyst: diagnosis with bronchoscopy. *The Journal of Infection in Developing Countries*. 2010, 4(05):352-4.
- [34] Köksal D, Altinok T, Kocaman Y, Taştepe I, Özkara Ş. Bronchoscopic diagnosis of ruptured pulmonary hydatid cyst presenting as nonresolving pneumonia: report of two patients. *Lung*. 2004, 182(6):363-8.
- [35] Yilmaz A, Tuncer LY, Damadoglu E, Sulu E, Takir HB, Selvi UB. Pulmonary hydatid disease diagnosed by bronchoscopy: a report of three cases. *Respirology*. 2009, 14(1):141-3.

- [36] Kürkçüoğlu IC, Eroğlu A, Karaoğlu N, Polat P. Tension pneumothorax associated with hydatid cyst rupture. *Journal of thoracic imaging*. 200234-, 17(1):78-80.
- [37] Taha ASY. Diagnosis of ruptured pulmonary hydatid cyst by means of fiberoptic bronchoscopy: a report of three cases. *The Journal of thoracic and cardiovascular surgery*. 2005, 130(4):1196-7.
- [38] Horton R.J. Albendazole in treatment of human cystic echinococcosis: 12 years' experience. *Acta Tropica* 1997, 64:79-93.
- [39] Gulsun S, Cakabay B, Kandemir MN, Aslan S, Atalay B, Sogutcu N, et al. Retrospective analysis of echinococcosis in an endemic region of Turkey, a review of 193 cases. *Iranian journal of parasitology*. 2010, 5(3):20.
- [40] Lal C, Huggins JT, Sahn SA. Parasitic diseases of the pleura. *The American Journal of the Medical Sciences*. 2013, 345(5):385-9.
- [41] Mahmood N, Azam H, Ali MI, Khan MA. Pulmonary hydatid cyst with complicating *Aspergillus* infection presenting as a refractory lung abscess. *Clinical Medicine Insights: Case Reports*. 2011, 4: CCRep. S8020.
- [42] Puri D, Mandal AK, Kaur HP, Mahant TS. Ruptured hydatid cyst with an unusual presentation. *Case reports in surgery*. 2011, 2011.
- [43] Safioleas M, Misiakos EP, Dosios T, Manti C, Lambrou P, Skalkeas G. Surgical treatment for lung hydatid disease. *World journal of surgery*. 1999, 23(11):1181-5.