

Research Article | Araştırma Makalesi

PULMONER HYDATİD CYST SURGICAL TREATMENT, SINGLE CENTER EXPERIENCE

AKCİĞER HİDATİK KİSTİ CERRAHİ TEDAVİSİ, TEK MERKEZ DENEYİMİ

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ABSTRACT

Objective: Lung hydatid cyst is an infectious disease caused by the parasite Echinococcus granulosus. Surgery is the main treatment of the disease in lung hydatid cysts. In our article, we aimed to share our experiences with our patients who underwent surgical treatment for hydatid cysts of the lungs.

Methods: The data of 41 patients who underwent surgical treatment for pulmonary hydatid cysts in our clinic were analyzed retrospectively. The factors affecting the success of surgical treatment were analyzed.

Results: Eighteen (43.9%) of the patients were male and 23 (56.1%) were female. There was no statistically significant difference between the size groups in terms of length of hospital stay ($p=0.070$). No statistically significant correlation was found between the number of lesions and postoperative complications ($p=0.367$).

Conclusion: Lung hydatid cysts are a public health problem that can be seen in all age groups. Although different symptoms and complications related to the disease are encountered in lung hydatid cysts, surgery is an effective treatment method with low recurrence, morbidity and mortality.

Keywords: Echinococcus granulosus, lung hydatid cyst, surgical treatment

Öz

Amaç: Akciğer hidatik kisti Echinococcus granulosus cinsi parazit tarafından oluşturulan bir enfeksiyon hastalığıdır. Akciğer hidatik kistlerinde hastalığın esas tedavisini cerrahi oluşturmaktadır. Makalemizde akciğer hidatik kisti nedeni ile cerrahi tedavi uyguladığımız hastalarımızla ilgili deneyimlerimizi paylaşmayı amaçladık.

Yöntem: Kliniğimizde akciğer hidatik kisti nedeni ile cerrahi tedavi uyguladığımız 41 hastanın verileri retrospektif olarak incelendi. Cerrahi tedavi başarısını etkileyen faktörler analiz edildi.

Bulgular: Hastaların 18'i (%43,9) erkek, 23'ü (%56,1) kadındı. Hastanede kalış süresi açısından lezyon boyut grupları arasında istatistiksel olarak anlamlı fark saptanmadı ($p=0,070$). Lezyon sayısı ile postoperatif komplikasyonlar arasında istatistiksel olarak anlamlı bir ilişki bulunmadı ($p=0,367$).

Sonuç: Akciğer hidatik kisti her yaş grubunda görülebilen bir halk sağlığı sorunudur. Akciğer hidatik kistlerinde hastalığa bağlı farklı semptom ve komplikasyonlarla karşılaşılsa da cerrahi, düşük nüks, morbidite ve mortalite ile etkili bir tedavi yöntemidir.

Anahtar Kelimeler: Echinococcus granulosus, akciğer hidatik kisti, cerrahi tedavi

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Introduction

Lung hydatid cyst is an infectious disease caused by the parasite *Echinococcus granulosus*. Human is the intermediate host in this disease, it becomes infected by intake parasite eggs.^{1,2} Geography and occupation, especially animal husbandry, is a risk factor.³ Lung is the second most frequently involved organ after the liver, and lung involvement is more common in the pediatric age group.⁴ Surgery is the main treatment of the disease in lung hydatid cysts. Medical treatment is applied after surgical treatment or in cases where surgery cannot be performed for different reasons and in some patient groups. In our article, we aimed to share our experiences with our patients who underwent surgical treatment for hydatid cysts of the lungs.

Methods

Patient Selection and General Features

The data of 55 patients who were operated for pulmonary hydatid cyst in Kocaeli University Hospital Thoracic Surgery Clinic between March 2005 and April 2022 were scanned retrospectively. Patients who had insufficient data and were not followed up regularly in our clinic were excluded from the study, and the data of the remaining 41 patients were analyzed. The data used in our study were accessed from patient files, hospital radiological imaging systems, and telephone interviews with patients. Age, gender, side, number, symptom, occupation, size, localization, simultaneous liver involvement, radiological features, rupture status, surgical procedure, drain follow-up, hospitalization time, postoperative complications, mortality, additional procedures-interventions performed by other branches analyzed. Lesions were divided into 4 groups according to their radiological size as 0-3≤cm (Group I), 4-5≤cm (Group II), 6-8≤cm (Group III), 9 cm and above (Group IV). The size of the largest lesion was taken into account in multiple/bilateral lesions. The first 30 days were considered as early, and the period after 30 days were considered as late postoperative complications.

Surgical Procedure and Follow-up

The diagnoses of the patients were mainly made by radiological imaging (chest radiography, thorax tomography, abdominal usg) and clinical correlation. Serological tests were not performed by us, except for the diagnostic serological tests that were already available before the patients applied to us. Patients whose cysts ruptured into the intrapleural space were operated urgently with appropriate medical treatment, while other cases were operated in the early period. All patients were operated with a posterolateral thoracotomy, 40 patients underwent cystotomy + capitonage and enucleation, while wedge resection was performed in 1 patient. Two patients with bilateral lesions were operated with consecutive thoracotomy. After the operation, albendazole treatment was given to

the patients, and liver function tests were performed at 4-week intervals. After discharge, the patients were followed up with physical examination and radiological imaging.

Statistical Analysis

All statistical analyses were performed using IBM SPSS for Windows version 20.0 (IBM Corp., Armonk, NY, USA). Shapiro-Wilk's test was used to assess the normality assumption. Continuous variables were presented with median (interquartile range). Categorical variables were presented with counts and percentages. Comparisons between groups were performed using Mann-Whitney U test and Kruskal-Wallis test. Associations between categorical variables were examined by Chi-square test. A *p*-value <0.05 was considered statistically significant.

Results

Eighteen (43.9%) of the patients were male and 23 (56.1%) were female. The median age of the patients was 30 years (min: 7, maximum: 76). 14 (34.1%) patients were housewives, 9 (22%) patients were self-employed, 8 (19.5%) patients were students, 7 (17.1%) patients were workers, 2 (4.9%) patients were shepherds-farmer, 1 (2.4%) patient was not engaged in any work. Thirty-five (85.4%) of the patients were symptomatic (Table 1).

Table 1. Symptoms

	n (%)
Asymptomatic	6 (14.63)
Chest Pain	16 (39)
Cough	12 (29.3)
Hemoptysis	8 (19.5)
Dyspnea	7 (17.1)
Sputum expectoration	6 (14.6)
Weakness	5 (12.2)

While hydatid cyst was considered in 30 (73.2%) patients in preoperative radiological imaging, abscess or non-specific cyst was considered in 11 (26.8%) patients. 33 (80.5%) of the patients had a single hydatid cyst and 8 (19.5%) had multiple hydatid cysts. The cyst was most commonly observed in the right hemithorax and lower lobes (Table 2). Sizes of the lesions were between 0-3 cm in 5 (12.2%) patients, between 4-5 cm in 10 (24.4%) patients, between 6-8 cm in 16 (39%) patients, and 9 cm or more in 10 (22.5%) patients. Simultaneously, 16 (39%) of the patients had hydatid cysts in the liver. Percutaneous biopsy was performed on liver lesions of 2 (4.9%) patients. The liver lesions of 7 (17.1%) patients were operated by the general surgery team. Rupture was detected in 10 (24.4%) of the patients, 4 of them in the intrapleural area and 6 of them in the bronchial area. While cystotomy+capitonage or

enucleation was performed in 40 (97.6%) patients, wedge resection was performed in 1 (2.4%) patient. Diaphragm was opened in 5 (12.2%) patients, liver was intervened in 4 and spleen in the other. Additional tube thoracostomy was performed to 2 (4.9%) patients due to expansion defect. No mortality was observed.

The median number of drains was 2 (min: 1, maximum: 3). The median drain time and hospital stay were 5 days (min: 3, maximum: 74) and 7 (min: 4, maximum: 54) days, respectively.

There was no statistically significant difference between genders in status of rupture ($p=0.300$). Rupture was found in the right hemithorax in 4 (16%) patients and in the left hemithorax in 4 (28.6%) patients, while at least one hemithorax was found in 2 patients with bilateral lesions. Considering the relationship between size and rupture status, there were 2 (40%) rupture in Group 1, 1 (10%) in Group 2, 4 (25%) in Group 3, and 3 (33.3%) in Group 4. Rupture was found in 7 (25.9%) patients without postoperative complications, while rupture was found in 3 (23.1%) patients with postoperative complications. No statistically significant correlation was found between postoperative complication and rupture status ($p=1.00$) (Table 3). The median hospital stay was 7 days in the group with and without rupture. No statistically significant difference was found between the groups with and without rupture in terms of length of hospital stay ($p=0.656$).

There were 1 (7.7%) postoperative complication in the 1st group, 3 (23.1%) postoperative complications in the 2nd group, 6 (46.2%) postoperative complications in the 3rd group, 3 (33.3%) postoperative complications in the 4th group. Postoperative median hospital stay was 7 days in the 0-3 cm group, 5 days in the 4-5 cm group, 8 days in the 6-8 cm group, and 7.5 days in the 9 cm and above group. There was no statistically significant difference between the size groups in terms of length of hospital stay ($p=0.070$). No statistically significant correlation was found between the number of lesions and postoperative complications ($p=0.367$).

Table 2. Cyst Localizations

	n (%)
Hemithorax	
Right	25 (61)
Left	14 (34.1)
Bilateral	2 (4.9)
Lobe	
Right up	9 (22)
Right middle	3 (7.3)
Right lower	23 (56.1)
Left up	4 (9.8)
Left lower	4 (9.8)
Diaphragm	2 (4.9)

Table 3. Postoperative Complications

	n (%)
Expansion defect	3 (7.3)
Atelectasis	2 (4.9)
Dyspnea	2 (4.9)
Prolonged air leakage	2 (4.9)
Arrhythmia	1 (2.4)
Hemoptysis	1 (2.4)

Discussion

Lung hydatid cyst is a public health problem mainly caused by the parasite *Echinococcus granulosus*. It can affect any age group and its main treatment is surgery. Successful results are obtained with surgical treatment. In our study, demographic characteristics, characteristics related to lesions, surgical treatment results and factors affecting them were analyzed.

In three studies conducted in our country, it was observed that the patients were young and the mean age was 21.5-45.8 years.^{3,5,6} Lung hydatid cyst is more common in male gender (52%-69%).^{3,5} The median age in our study was 30 years. In our study, the rate of female gender was higher (56.1%). Considering the occupational risk factor, while most of the patients are expected to be engaged in animal husbandry,^{3,5} housewives were more common in our study. We explain this situation as the expected occupational distribution will be different from normal due to the fact that our region is an industrial city and the animal husbandry sector is limited.

Hydatid cysts may be asymptomatic (30-32%)^{3,7} or may present with very severe symptoms.⁸ Different symptoms may occur depending on the localization of the cyst, its size, adjacent organs, and complications due to rupture. The most common symptoms are cough, chest pain, dyspnea, and hemoptysis.^{1,3,5,9} Also, membrane expectoration can be observed more specifically for this disease. Perforation of the cyst may cause serious morbidity and even mortality.⁶ Rupture rate in the intrapleural area is reported to be between 1.5% and 2.3%.⁸ The risk of rupture is expected to increase as the cyst size increases.¹⁰ In a study examining the relationship between the size of cysts and complications, no difference was found between giant size and small size in terms of rupture into the bronchial area (36.7%-31.7% $p=0.17$), In contrast giant cysts were found to be riskier rupture into the intrapleural space (3.1%-22% $p=0.002$).⁶ In the same study, although a numerical difference was found between the size groups in terms of size and preoperative and postoperative complications with a higher rate in giant cysts, no statistically significant difference was found ($p=0.80$, $p=0.19$, respectively).⁶ In our study, 85.4% of the patients had at least one symptom at the time of admission, and the most common symptoms were similar to the literature. In our study, there were ruptures in 10 patients, including 6 bronchial and 4 intrapleural spaces. The rupture was

numerically higher on the left than on the right (16.7-28.6%), and 2 people with bilateral lesions had ruptured on at least one side. As the cyst size increased, a numerical increase was found in terms of rupture.

Lung hydatid cysts have been reported most frequently in the right lung and lower lobe.^{2,11} It is 25-30% multiple^{2,11} and a bilateral rate of 8.5-30% has been reported.^{1,9} Due to the elastic structure of the lung, the dimensions of the cyst can reach large diameters rapidly.^{6,12} Hydatid cysts of 10 cm and above are called giant hydatid cysts.^{1,3,10} In our study, we detected the lesions most frequently in the right lung and lower lobes. In our study, the cysts were grouped according to their sizes, 24.4% of the cases were 9 cm and above, and 2 (4.9%) were giant cysts.

Radiologic methods and serologic tests are used to diagnose the disease. Radiological methods play the main role. In radiological imaging, the lesion may have a well-defined, homogeneous, round appearance, and it may even be confused with malignancy from time to time.^{2,7} While there are specific radiological findings,³ sometimes clinical correlation may be required for diagnosis. In our study, hydatid cyst was considered radiologically in 73% of the patients, while 27% had abscess-cyst formation and hydatid cyst was considered when clinically correlated. There may be hydropneumothorax appearance in ruptures to the intrapleural space, this appearance was present in 4 patients in our study. Due to the low diagnostic value,^{2,7} no new diagnostic and follow-up tests were performed, apart from the existing serological tests at the time of admission.

Under appropriate conditions, surgery forms the basis of the treatment of pulmonary hydatid cysts.⁹ The aim of surgery is to remove the cyst without contaminating the surrounding area while preserving the lung parenchyma as much as possible. Great parenchymal losses should be avoided.¹³ Anthelmintic treatment is not recommended before surgery due to the risk of rupture.^{5,6} The treatment approach is important in bilateral lesions, they can be operated with a two-stage approach. First of all, it can be started from the side that is not ruptured and is large and numerous, or the ruptured side that is complicated and presents symptoms.^{3,5,9} Cystotomy+capitonnage, enucleation, anatomical/non-anatomical resection can be applied as surgical procedures.^{9,13} We approached all of our patients with posterolateral thoracotomy, we performed cystotomy+capitonnage and enucleation in 40 of the patients, and we performed wedge resection in 1 patient, we did not perform anatomical resection. We approached 2 patients with bilateral lesions with consecutive thoracotomy. The symptomatic ruptured side in 1 patient was operated on first on the larger side in the other patient. The rate of simultaneous hydatid cysts in the lungs and liver has been reported to be 4-40%.^{1,3} Masses in the liver dome or intra-abdominal organs such as the spleen can be accessed by opening the diaphragm. We performed this approach in 5 of our patients, including 4 liver domes and 1 spleen.

3.4-20% complications have been reported in the early postoperative period.^{2,3,5} The most common postoperative complications are prolonged air leakage and infection processes.⁵ Factors expected to increase postoperative complication; cyst size, number, simultaneous liver cyst, rupture and hemoptysis.² In our study, the postoperative complication rate was 22%. The most common early postoperative complications were expansion defect, dyspnea, atelectasis, prolonged air leak, arrhythmia, and hemoptysis. In our study, there was no statistically significant relationship between the number of lesions ($p=0.367$), rupture ($p=1.00$) and postoperative complications, but a numerical increase was observed with increasing lesion size. In addition, no statistically significant difference was found in terms of increase in lesion size and length of hospital stay ($p=0.070$).

It has been reported that tube thoracostomies are terminated in an average of 4 days³ and the average postoperative hospital stay is 6-8 days.^{3,5} It is reported that the length of hospital stay is not significantly affected in giant hydatid cysts.¹⁰ In our study, the median drain termination time was 5 days, and the median discharge time was 7 days. No statistically significant correlation was found between size and rupture status and length of hospital stay ($p=0.070$, $p=0.656$, respectively).

The recurrence rate after surgical treatment is expected to be 0.6-1.7%.³ To prevent recurrences after the operation, albendazole treatment is recommended for 3-6 months.^{1,5} In some studies that had no long follow-up period and a small number of patients, it was reported that no recurrence was detected after surgery with albendazole treatment.^{2,3,5} We applied albendazole treatment similarly to our patients in the postoperative period, and no recurrence was observed in the follow-ups.

In conclusion, lung hydatid cysts are a public health problem that can be seen in all age groups. It should be kept in mind in the differential diagnosis in cases where lung abscess-cyst is considered in radiological imaging. In these patients, the region and occupation should be questioned. Although different symptoms and complications related to the disease are encountered in lung hydatid cysts, surgery is an effective treatment method with low recurrence, morbidity and mortality.

Compliance with Ethical Standards

The study protocol was approved by the Kocaeli University Ethics Committee (Date: 09.05.2023, No: 2023-110).

Conflict of Interest

The author declares no conflicts of interest.

Author Contribution

All the authors equally contributed to this work.

Financial Disclosure

None

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