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ORIGINAL ARTICLE

The relation between the location and the perforation rate of lung hydatid cysts in children[☆]

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KEYWORDSChildren;
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Summary *Background/Objective:* The pressure, size, and central or peripheral location of lung hydatid cysts are the most studied topics among the factors affecting perforation. The aim of this study is to investigate the relation between the location and the perforation rate of lung hydatid cysts in children.

Methods: 197 patients under the age of 16 years, who were operated between January 2000 and December 2016 due to pulmonary hydatid cysts, were evaluated retrospectively. Patients who had giant hydatid cysts ($n = 27$), bilateral hydatid cysts ($n = 24$), and more than one cyst in one lung ($n = 12$) were excluded to create a more homogeneous group to enable investigation of the relation between the location and the perforation rates of hydatid cysts. Finally, 134 patients who had only one hydatid cyst were classified into two groups: Group 1 with perforated cysts and Group 2 with intact hydatid cysts.

Results: 70.9% of the patients were male. In total, 134 cysts were detected and 41% were perforated. The highest perforation rates were detected in the right middle lobe (70%) and the lingula (66.7%). There was a statistically significant difference between the location of the cysts and the perforation rates ($p = 0.018$). Also hydatid cysts located in the right middle lobe and the lingula had higher postoperative complication rates than hydatid cysts located in the upper and lower lobes ($p = 0.018$).

Conclusion: We recommend surgical treatment as soon as possible in children with hydatid cysts located in the right middle lobe and lingula to prevent the risk of perforation.

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1. Introduction

Pulmonary hydatid cysts are still endemic in many regions around the world. Although the accepted treatment option for hydatid cysts is still surgery, immediate surgical approach is controversial among many clinicians and patients because of the benign nature of the disease.

However perforation, which is the most common complication of hydatid cysts, may lead to irreversible lung damage, requiring lung resection.^{1,2}

The factors inducing perforation, such as pressure, size, and the central or peripheral location of the cysts, have been investigated in clinical studies.^{3–5} The aim of this study is to investigate the relation between the location and the perforation rate of lung hydatid cysts in children.

2. Methods

We planned a retrospective study in patients under the age of 16 who were operated between January 2000 and December 2016 due to pulmonary hydatid cysts ($n = 197$). The patients who had giant hydatid cysts (cysts >10 cm in diameter)¹ ($n = 27$), bilateral hydatid cysts ($n = 24$), and more than one cyst in one lung ($n = 12$) were excluded to create a more homogeneous group, thus enabling investigation of the relation between location and the perforation rate. Finally, 134 patients who had only one hydatid cyst were enrolled in this study. Clinical characteristics, including age, gender, chest tube duration, postoperative complications, and hospitalization time, were obtained from electronic medical records. All patients had chest and upper abdominal computed tomography scans. Muscle-sparing thoracotomies were carried out in all patients and conservative parenchyma preserved surgical techniques (cystotomy–capitonnage) were the methods of choice. The characteristics of the hydatid cysts, including number, size, and location, were retrospectively obtained from surgical, radiological, and pathological reports. We classified the patients into two groups: Group 1, comprising patients with perforated hydatid cysts; Group 2, comprising patients with intact hydatid cysts. We compared these two groups according to the patients' characteristics, postoperative complications, and location of the hydatid cysts.

Analyses were conducted in SPSS version 21.0 (SPSS Inc., Chicago, IL, USA). The normality of numeric values was evaluated with the Shapiro–Wilk test. Non-parametric numeric values are given as median, minimum, and maximum values. The chi-squared test and the Mann–Whitney U test were performed to analyze the differences between the two groups. A p-value of less than 0.05 was considered statistically significant. This study was approved by the Ethics Committee of the university (No: 2016/126).

3. Results

In all, 70.9% ($n = 95$) of the patients were male and 29.1% ($n = 39$) were female. The characteristics of the patients are given in Table 1. The total number of cysts was 134. Of these cysts, 59.7% ($n = 80$) were peripherally and 40.3%

Table 1 Baseline characteristics of patients.

Characteristics	Group 1	Group 2	p value
Male/female ^a	45/10 (75.0/25.0)	50/29 (67.2/32.8)	0.02
Age (year) ^b	13 (4–15)	11 (3–15)	0.083
Size of cysts (cm) ^b	5 (4–8)	5 (2–8)	0.091
Chest tube duration (days) ^b	7 (5–12)	5 (4–8)	<0.001
Morbidity ^a	13 (23.7)	2 (2.6)	0.004
Hospitalization (days) ^b	8 (6–16)	6 (5–11)	<0.001

Values in bold indicate values with significant difference.

^a Data are presented as n (%).

^b Data are presented as median (minimum – maximum).

($n = 54$) were centrally located. Moreover, 41% ($n = 55$) of all cysts were perforated; 32.1% ($n = 43$) and 8.9% ($n = 12$) of the cysts were perforated into the bronchus and pleural space, respectively. There was no statistical difference between the peripheral/central locations of the cysts and the perforation rates ($p = 0.31$). The most common location of cysts was in the right lower lobe (30.6%, $n = 41$). There was a statistically significant difference between the location of the cysts and the perforation rates ($p = 0.018$). This was based on the high perforation rates of the cysts located in the right middle lobe and lingula (70% and 66.7% respectively) (Table 2).

The most frequent postoperative complication was atelectasis (Table 3). Postoperative complications, chest tube duration, and hospitalization time in Group 1 were higher than in Group 2 ($p = 0.004$, $p < 0.001$, $p < 0.001$ respectively). There was a statistically significant difference between the location of the cysts and the postoperative complication rates ($p = 0.018$). The hydatid cysts located in right middle lobe and lingula presented higher postoperative complication rates than the hydatid cysts located in upper and lower lobes (Table 4). No postoperative mortality was observed.

4. Discussion

Occurrences of impression symptoms and respiratory reserve constraints are very rare due to the relatively slow growing nature of hydatid cysts. For this reason, perforation is the most common and also the most feared complication of pulmonary hydatid cysts. Although high

Table 2 Anatomic locations of hydatid cysts calculated on group bases.

Location	Group 1	Group 2	Total
Right upper lobe	7 (33.3)	14 (66.7)	21 (15.7)
Right middle lobe	14 (70.0)	6 (30.0)	20 (14.9)
Right lower lobe	14 (34.1)	27 (65.9)	41 (30.6)
Left upper lobe	2 (25.0)	6 (75.0)	8 (6.0)
Lingula	8 (66.7)	4 (33.3)	12 (9.0)
Left lower lobe	10 (31.2)	22 (68.8)	32 (23.9)
Total	55 (41.0)	79 (59.0)	134 (100)

Data are presented as n (%).

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