

Original Article

Our eight-year surgical experience in patients with pulmonary cyst hydatid

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Abstract: Background: In this clinical retrospective study, we aimed to investigate our experiences and whether capitonnage is an effective therapy method for a pulmonary hydatid cyst or not. Material and methods: A total of 412 patients with hydatid cyst operated in our hospitals were evaluated retrospectively between January 2003 and January 2011. In order to create a study group to compare the hydatid cyst operations with and without capitonnage in our department, 60 uncomplicated patients with the diagnosis of hydatid cyst who had undergone operations in the previous two years, were divided into two groups; while no capitonnage was performed and bronchial leaks were closed in one group, standard cystotomy plus the capitonnage operation was performed in the second group. All patients underwent surgery. Results: In many patients, one or more symptoms were present on admission (339 cases, 82%). Perforated cysts/ nonperforated cysts rate was statistically significant ($p = 0.001$). There was no statistical difference between patients with or without capitonnage in terms of morbidity rates between patients with or without capitonnage ($p = 0.041$). However, morbidity rates were higher in the group without capitonnage. There were found statistically significant between capitonnage and non capitonnage groups in terms of length of hospital stay ($p=0.001$). Conclusions: In the surgical treatment, resection should be avoided as much as possible. An average time of 3-5 minutes should be allocated and capitonnage should be performed. Capitonnage should always be performed in the surgical treatment of hydatid cyst. We believe that povidone iodine per se provides sufficient disinfection.

Keywords: Cyst, thoracotomy, capitonnage, albendazole

Background

Hydatid cyst disease is one of the most common parasitary diseases in our Turkey, especially in our region (Eastern Anatolia). It leads to major medical, social and economical consequences. In our region, where rural life style is predominant and agriculture and livestock farming are the major sources of income, the life cycle and infestation of the helminth is facilitated; furthermore, the social life style conditions increase the risk of contamination. Hydatid cyst disease is a well known condition with a long history ever since Hippocrates, and was first described by Thebesius in the 17th century [1, 2]. The disease progresses as an endemic condition in certain regions of the world. Our region and the surrounding areas are one of these endemic regions. In Turkey, 2 types of echinococcosis are seen, namely the granulosis and alveolaris

types [3]. While the granulosis type may be seen in every region of Turkey, the 2nd type is predominantly observed in Eastern Anatolia [3]. For echinococcosis granulosis, the estimated number of operated cases in Turkey is 0.87-6.6 in 100,000 [3]. In a trial conducted in Turkey [4], the prevalence was reported to be around 50 in 100,000 and the incidence as around 2 in 100,000. Postmortem autopsies of dogs revealed a relatively higher prevalence in the Eastern Anatolian Region. The disease predominantly affects the liver, followed by the lungs. On the other hand, pulmonary involvement is more frequent in the pediatric age group [5].

No consensus is available among thoracic surgeons regarding the capitonnage procedure used in the surgical treatment of hydatid cysts. Despite a number of published studies stating that capitonnage is not essential [6-8], our

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study results indicate that capitonnage is essential and hence, we intended to share this experience.

In our trial, hydatid cyst operations performed in two centers specialized in Thoracic Surgery in our region, were evaluated retrospectively between 2003 and 2011. Sixty cases among uncomplicated patients having undergone operations between 2009 and 2011, were divided into two groups and the results of the surgical interventions with and without capitonnage were evaluated.

Materials and methods

A total of 412 patients with hydatid cyst operated in our's two hospitals were evaluated retrospectively between January 2003 and January 2011. Cases 216 (52.42%) were male, 196 (47.58%) were women the difference was not statistically significant ($p = 0.165$). The mean age was 23.6 (age range: 3-78 years).

Sixteen patients with extra-pulmonary involvement were excluded from this trial. The data were verified through the patient records and face to face interviews with patients. Among all the cases, 162 were under 15 years of age. Personal history records revealed that 372 patients were involved in agriculture and livestock farming. On admission to the hospital, 339 cases were symptomatic. Owing to undeveloped sociocultural and socioeconomic conditions, 82% of our patients (339 patients) had been referred to the hospital during the symptomatic stage. There was a significant statistical difference between patients with and without symptoms ($p = 0.001$). Therefore, the number of symptomatic cases was relatively high. Upon referral, the most common symptom was cough, which was observed in 211 cases (51.2%). Due to the presence of cases with perforated cysts (176 cases, 42.7%), hemoptysis was the second most common symptom observed in our cases (163 cases, 39.5%). The other symptoms were fever, chest pain and dyspnea. In most cases, more than one symptom was observed. No definite symptom was detected in 73 patients; in general, these cases were patients who had been incidentally detected in other hospitals and referred to our clinic. The methods used in the diagnosis were antero-posterior chest X-ray, computerized tomography of the thorax, and tomography of the upper abdomen

and abdominal ultrasonography. In our department, the routine skin tests and serological tests were not performed for the diagnosis of hydatid cyst. Due to a possibility of malignancy, flexible bronchoscopy was performed in 14 cases. Three cases presented with hydropneumothorax and perforation to the pleura, as a result of thoracentesis performed in different centers. Eight cases presented with hydropneumothorax as a result of spontaneous perforation. Finally, 4 cases referred with perforated cysts following andazole therapy.

Three patients with bilateral hydatid cyst, who were found to be suitable for sternotomy and surgical intervention, were operated through a median sternotomy incision. The thoracotomy incision was performed in 38 cases, saving the serratus muscle. Muscle-saving posterolateral thoracotomy was performed in 6 children only. In the remaining cases, the standard posterolateral thoracotomy incision was utilized. In 28 patients with pulmonary and liver dome cysts, the cyst in the liver was reached via thoracophrenotomy and appropriate surgical intervention was performed. In 18 cases with bilateral pulmonary hydatid cyst, a 2-step thoracotomy was performed at an interval of 3 weeks. The number of patients with pulmonary and hepatic hydatid cyst was 42. In 11 of these patients, the cysts in the lung and the liver were intervened in the same session with thoracotomy and laparotomy operations. Six cases operated in our department and 1 case operated in another center underwent re-operation due to recurrence. The decortication procedure was performed in 22 cases due to the high number of complicated cases. These were perforated and suppurative cases with chronic pleuritis.

In order to create a study group to compare the hydatid cyst operations with and without capitonnage in our department, 60 uncomplicated patients with the diagnosis of hydatid cyst who had undergone operations in the previous two years, were divided into two groups; while no capitonnage was performed and bronchial leaks were closed in one group, standard cystotomy plus the capitonnage operation was performed in the second group. In the cystotomy plus capitonnage group of 30 patients (group X), 12 were women and 18 were men; the age range was 5-52 and the mean age was 25 ± 13.2 . In the cystotomy group (group Y), 14 were women and 16 were men; the age range was 6-48 and the

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mean age was 28 ± 14.7 . Age and gender in both groups were not found to be statistically significant ($p = 0.143$).

The preferred surgical technique in our department is the standard cystotomy plus capitonnage (322 cases, 78.1%). Other procedures were cystotomy in 48 cases (11.6%), wedge resection in 12 cases (2.9%), enucleation in 6 cases (1.4%), decortication in 22 cases (5.3%) and lobectomy in 2 cases (0.04%). In cases where only cystotomy was performed, the bronchial air leaks were closed and no capitonnage was performed.

Statistical analysis

The definitive statistic for the constant variables among the properties analysed have been expressed as median, mean, standard deviation, minimum and maximum value, whereas categorical variables have been expressed as number and percentage.

In the comparisons made for the categorical variable, Z test was used for the comparison of rate and Fisher-Exact was used. In the measurement the statistical significance level as % and SPSS (ver:13) statistical programme was used.

Surgical method

In general, a posterolateral thoracotomy incision was used and the other incisions mentioned above were preferred in the remaining cases; the procedure was performed under general anesthesia, through the intercostal space appropriate for localization of the cyst. The double lumen endotracheal intubation was used in all cases. In certain chronic suppurating cysts, the thorax was accessed by extrapleural intervention and the decortication procedure was performed. Following the release of the cyst area from the surrounding tissues, peripheral tissues were protected with compresses and gauze pads with povidone iodine and the procedure was performed. No other sclerosing agent was used except povidone iodine. No case received hypertonic physiological serum through the cyst pouch. The main purpose of cyst surgery is to avoid contamination of the cyst contents to the surrounding tissues and to evacuate the cyst components and obliterate cyst cavity while saving the lung parenchyma as far as possible. Cystotomy was performed through sections

where the pulmonary parenchyma was weakest and where the cyst could be best explored. The fluid content of the cyst was aspirated with a needle and the pericystic cavity was opened; the germinative membrane was evacuated using ring forceps. The cyst cavity was cleaned thoroughly with properly squeezed povidone iodine-impregnated gauze compresses. Introducing of the povidone iodine solution into cyst cavity was avoided. The area contaminated with the cyst content was irrigated with povidone iodine gauze or povidone iodine irrigation fluid. The pericystic dead tissues were excised, reaching the lung parenchyma. The lung was inflated by the anesthetist and air leakage was controlled; all bronchial leaks were closed using 3-0, 2-0 absorbable polyglactin sutures. In patients undergoing cystotomy plus capitonnage, bronchial air leaks were closed and the cyst cavity was obliterated from the bottom of the cavity upwards with 2-0 polyglactin purse-string sutures. In cases where cystotomy was performed, the bronchial air leaks were closed using absorbable sutures, but the cavity was not obliterated. Wedge resection was performed for peripheral cysts that had caused damage in the lung. In two cases of lobectomy, a giant hydatid cyst involving almost the entire area of the upper lobe was present in one patient and a severely damaged lung was observed in the other patient. Upper lobectomy was performed in these cases.

The liver was the second most commonly involved extra-pulmonary organ. In 42 of our patients (10.1%), hydatid cyst was observed in the liver. In 2 cases, the spleen was also involved besides the liver.

During the postoperative period, cefazolin sodium was administered to all patients as prophylactic antimicrobial therapy. For infected cysts and in patients developing postoperative infections, appropriate antibiotic treatment was commenced following consultation with the Department of Infectious Diseases. Preoperative albendazole was not administered to any patient with unperforated cysts. In all cases with hydatid cyst, this agent was recommended to be used in the postoperative period for 3-6 months.

Results

The preoperative diagnosis was mainly based on plain chest X-ray. In 338 patients (82%), the

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disease was diagnosed by chest X-ray (**Table 1**). In cases over 35 years of age with perforated suppurative disease and pleuritis, the differential diagnosis was sought. For this purpose, computed tomography of the thorax (CT) and flexible bronchoscopy were utilized. In 77 cases where the diagnosis was not possible with plain chest X-ray, the diagnosis was confirmed by CT, bronchoscopy and exploratory thoracotomy or video-thoracoscopy. CT was diagnostic in 58 of 77 cases. In 5 of 14 cases where fiberoptic bronchoscopy was performed, the cyst membrane and the components were confirmed pathologically. In 2 of these cases, the cyst membranes were aspirated by bronchoscopic aspiration. The disease was diagnosed by exploratory thoracotomy in 9 cases and by thoracoscopy in 7 cases. Seven cases were evaluated as peripheral solitary pulmonary nodule in the preoperative stage and appropriate for thoracoscopic intervention; video-thoracoscopic exploration was performed in these patients. The operation results and the postoperative pathology in these patients were assessed as hydatid cyst.

In many patients, one or more symptoms were present on admission (339 cases, 82%). Owing to the increased number of cases with infected cysts, cough and fever were the most common symptoms. The increased number of cases with giant cysts had led to blunt chest pain. On evaluation of case histories, 93% of patients were non-smokers.

Localization was in the right lower lobe in most cases (92 cases, 22.3%). The least involvement was observed in the right middle lobe (38 cases, 9.2%). Right pulmonary localization was seen in 208 cases (50.4%) and left pulmonary involvement was observed in 186 cases (45.1%). Bilateral pulmonary involvement was observed in 18 cases (4.3%). The settlement cyst in the right and left lung rates were not significant statistically ($p = 0.126$), but bilateral pulmonary involvement of cysts rate was significant statistically according to right or left lung cysts localization ($p = 0.001$). Solitary hydatid cyst in the right or the left lung was present in 326 cases (79.1%) and multiple cysts were observed in 86 patients (20.8%) (multiple one-sided or multiple bilateral). In our study, the rate of cases of multiple cysts was significant statistically compared with cysts with single formation ($p = 0.001$). Eleven cases had presented with

Table 1. Hydatid cyst cases with various states

Demographic characteristics of patients	P
Age	
Mean age 23.6 year (3-78)	
Sex	
Man 219 (53.1 %)	0.165
Woman 196 (47.5%)	
Job	
Agriculture and farming 372 (90.2%)	0.001
Other jobs 40 (8.8%)	
Symptoms of patients with pulmonary hydatidosis	
Symptomatic 339 (82.2 %)	0.001
Asymptomatic 73 (17.7 %)	
Cough 211 (51.2%)	
Haemoptysis 176 (42.7 %)	
Fever 78 (18.9 %)	
Chest pain 74 (17.9%)	
Dyspnea 68 (16.5 %)	
Diagnostic methods	
Chest X-ray 338 (82.03 %)	
Thorax CT 58 (14.07 %)	
Upper abdomen CT 45 (10.9 %)	
Abdomen USG 42 (10.1 %)	
Bronchoscopy 14 (3.3%)	
Thoracoscopy 7 (1.6 %)	
Exploratis thoracotomy 9 (2.1 %)	
Recurrence	
Recurrence (+) 6 (1.4%)	0.001
Recurren (-) 406 (98.5%)	
The type of surgical approach	
Sternotomy 3 (0.7 %)	
Thoracophrenotomy 28 (6.7 %)	
Thoracotomy 318 (77.1 %)	
Muscle-saving thoracotomy 6 (1.4 %)	
2-step thoracotomy 18 (4.3 %)	
Thoracoscopy 7 (1.6 %)	
Serratus muscle saving thoracotomy 38 (9.2 %)	
Surgical procedures	
Cystotomy 48 (11.6 %)	
Cystotomy+capitonagge 322 (78.1 %)	
Enucleation 6 (%1.4)	
Decortication 22 (5.3 %)	
Wedge resection 12 (2.9 %)	
Lobectomy 2 (0.04 %)	
Thoracoscopy 7 (1.6 %)	
Cyst location	
Right lung 208 (50.4%)	
Left lung 186 (45.1%)	
Bilateral 18 4.(4.3%)	
Radiologic appearance	
Perforation 176 (42.7%)	0.001
Intact Cyst 236(57.2%)	
Giant cyst 46 (11.1%)	
Morbidity	
Capitonagge group 4 (13.3%)	0.041
Uncapitonagge group 11 (36.6%)	
Duration of hospital stay	
Capitonagge group (mean: 7.8)	0.001
Uncapitonagge group (mean: 13.6)	

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hydro-pneumothorax. In 3 of these cases, iatrogenic cyst perforation following thoracentesis was observed. Cyst perforation was observed in 176 cases. Perforated cysts compared with non-perforated cysts rate was statistically significant ($p = 0.001$). Among the perforated cysts, 72 were infected. Decortication was performed in 22 cases with perforation and pachypleuritis (5.3%). History of andazole use was present in 4 of the ruptured cases. Among the 236 cases with intact cysts (57.2%), the number of cases with cyst diameters of ≥ 10 cm was 46. Giant hydatid cysts compared with other cysts rate was statistically significant ($p = 0.001$). These were regarded as giant hydatid cysts. Among cases with giant hydatid cysts, 32 were in the pediatric age group and 14 were adults.

No perioperatif-postoperatif mortality was observed in our series. The overall morbidity rate was determined as 8.7% (36 cases). The capitonnage/noncapitonnage group's morbidity rate was seen in 15 cases (3.6%). There was no statistical difference between patients with or without capitonnage in terms of morbidity rates ($p = 0.041$). Morbidity was seen in 4 patients in the group of capitonnage. However, morbidity was observed in 11 patients of group cystotomy. Prolonged air leak was observed in 9 cases, wound infection was seen in 6 cases, empyema in 7 cases, pleural effusion in 5 cases (in two cases, residual cavity associated with capitonnage was positive), atelectasia in 6 cases, and postoperative bleeding was observed in 3 cases (lobectomy was performed in one case). In 2 patients, a mild allergic rash was seen during the postoperative period. No serious anaphylactic reaction developed in any patient.

In generally the mean duration of hospitalization was determined as 8.2 days. In capitonnage group the mean duration of hospitalization was 8.33 days ($5-14 \pm 1.94$). In cystotomy group (noncapitonnage) the mean duration of hospitalization duration was 12.97 days ($7-23 \pm 5.41$). There were statistical significance between the two groups in terms of length of hospital stay ($p = 0.001$). Only in the cases of cystotomy group retorakotomi was necessary, and the difference compared to cases without capitonnage was significant ($p = 0.001$).

The patients were followed up for an average duration of 3.8 years (3 months - 9 years) in the postoperative stage. Recurrence was detected in 6 patients during this period (1.45%).

Discussion

Hydatid cyst disease is one of the most common pathologies of the thorax encountered by thoracic surgeons and it is an endemic disease in our region. Rural life and live stock breeding is dominant in the Eastern Anatolian Region. Domestic animal breeding leads to a close relation between cats-dogs-sheep and cattle, and this facilitates the infestation of the parasite. Although complicated hydatid cyst disease may be mixed up with a number of diseases, it is easily diagnosed with chest X-ray in most cases. In this regard, routine application of chest X-ray every 6 months will be extremely beneficial in terms of preventive medicine.

Uncomplicated, intact and simple cysts may not cause any symptoms until they reach a certain dimension. In our series, 73 cases (17.7%) were determined to be in the asymptomatic stage. Owing to the low sociocultural and socioeconomic level of the our region, access of hydatid cyst cases to physicians or specialists may be delayed, as in other diseases. This leads to progression of disease to advanced stages. Among our cases, 339 patients (82.2%) had presented with one or more symptoms. The most common symptoms were cough (51.2%), hemoptysis (39.5%), fever, dyspnea and chest pain. Hundred and seventy six cases were patients with ruptured cysts. In the literature, perforation in pulmonary cysts has been reported to be at a rate of 6.2%-48.3% [9-12]. In our series, ruptured cases were observed in 42.7% (176 cases) and 40.9% of these patients (72 cases) were infected.

The diagnostic value of chest X-ray is quite high, especially in cases with intact cysts. As was the case in some of our patients, perforated cysts may be radiologically mixed up with a number of diseases. In a considerable portion of our patients, tomography of the thorax was performed in addition to chest X-ray, although this was not a routine procedure in our department. In cases where chest X-ray proves to be insufficient, tomography is a relatively guiding procedure, which demonstrates the cystic structure of the lesion and fluid density. However, 338 cases in our series (82%) were diagnosed with X-ray. In ruptured-infected cysts, tomography of the thorax was beneficial in the differential diagnosis with a sensitivity rate of 82.8%. Skin tests and hemagglutination methods were not utilized in our department, despite their diagnostic value.

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In 14 cases which resembled malignancies on radiological evaluation, fiber bronchoscopy was performed and in 5 of these cases, the diagnosis was confirmed preoperatively.

In the literature, hydatid cyst has been reported to be most commonly localized in the lower lobe of the right lung, and the incidence of right lung involvement is higher [5, 10]. In our trial, localization in the right lung was observed in 208 cases (50.4%), with the most common localization as the right lower lobe (92 cases, 22.3%).

Involvement of the lungs in hydatid cyst disease of adults is the second most common localization (10-30%) [1]. However, in the pediatric age group, the lungs are the most frequent localization of hydatid cyst [5]. Among children, the rate of cyst localization in the lungs has been reported as 64-67% and as 28% in the liver [13, 14]. Among our cases, the diameter of the hydatid cyst lesion was between 2 and 17 cm. The number of cases with a diameter of ≥ 10 cm was 46. Among these cases, 32 were in the pediatric age group. The increased number of cases with giant cysts among the pediatric age group may be explained by the presence of a more elastic structure and wide expansion capacity of the lungs in this age group.

In the current trial, we observed an increased number of hydatid cyst cases in the younger age group. Upon evaluation of the age range, 162 cases (39.3%) were under 16 years of age. The number of patients within the 16-35 age range was 172 (41.7). Among our cases, 58 (14%) were between 35-50 years of age. The number of cases over 50 years of age was 20 (4.8%). Comparison of the age group under 16 years and/or the 16-35 age range with age groups over 35 years (35-50 age group and the over 50 age group) revealed a statistically significant difference ($p = 0.001$). It was striking to observe a low number of cases with a history of smoking (6.7%). The relatively high number of patients in the younger age group plus the lower rate of exposure to smoking and occupational pulmonary disease indicates that the parasite responsible for hydatid cyst preferably produces a pathological state in a rather clean pulmonary environment.

We did not recommend medical treatment in any case with an intact cyst. Since antihelminthic agents impair the cyst membrane and lead

to rupture [15], these agents were administered postoperatively. In spite of the fact that the parasite is killed by the agent, the cyst components present in the parenchyme cause chronically recurring pulmonary infections. Incidence of cyst rupture due to albendazole has been reported to be as high as 77.3% [16]. In 4 of our cases, rupture of the cyst was detected, associated with andazole treatment that had been commenced in other centers.

One of the pleural complications of hydatid cyst is hydro-pneumothorax [17]. Rupture of the hydatid cyst may be spontaneous, traumatic or iatrogenic. In most cases, rupture develops due to enlargement of the cyst diameter, and in some cases, causing a vigorous cough [18]. In our series, 8 cases with spontaneous perforation of the hydatid cyst and 3 cases with iatrogenic rupture were hospitalized as emergency cases and 5 of these cases were admitted for emergency thoracotomy, following thoracostomy. Indication of emergency thoracotomy was tension pneumothorax in 1 case and severe bronchopleural fistula and prominent air leakage in 4 cases. The remaining 6 cases were operated under elective conditions. Following rupture of the hydatid cyst to the pleura, tension pneumothorax may be seen in rare cases; emergency tube thoracostomy and thoracotomy is required in these cases [19]. In one of our patients, severe air hunger and agitation was present upon admission to the emergency department. Mediastinal shift was observed on chest X-ray. Thoracentesis and tube thoracostomy were performed in the emergency department and the patient was admitted to the operation room.

In terms of surgical intervention, the standard posterolateral thoracotomy was the preferred method in most cases. In cases with bilateral hydatid cyst, a 2-step surgical intervention was performed at a 1-month interval, with priority given to the unperforated side. The reason for preferring the unperforated side for surgery at the initial stage is because of the possibility of perforation of the cyst during anesthesia. In cases with localization in the right lung and the liver dome, which were accessible via the transdiaphragmatic route, we performed right thoracophrenotomy. Although the median sternotomy intervention is not recommended in cases with bilateral cysts [10], we utilized this technique in 3 cases with anterior localization.

Why should capitonnage be performed?

Despite the extra-surgical alternatives having been presented in the treatment of hydatid cyst disease the main treatment alternative is surgery [1]. The cure rates in medical treatment are within the range of 25-30% [20]. Our clinical experience indicates that surgery may not be performed in uncomplicated small cysts, in patients with insufficient respiratory reserve for surgery, and in patients who do not prefer surgical intervention. In these cases, albendazole or mebendazole may be administered. Following surgical operation of the cysts, albendazole may be used to prevent recurrences.

The main purpose of surgery is eradication of the parasite, prevention of intrathoracic rupture of the cyst, eradication of the cyst components while preserving the parenchyme as much as possible, avoiding resection and prevention of contamination during the surgical intervention. For this purpose, the fluid content of the intact cyst was aspirated with aspiration needles, while the surrounding tissues around the cyst were preserved with povidone iodine gauze compresses in surgical operations performed in our clinic. Following removal of the germinative membrane, the cyst pouch was irrigated with povidone iodine-impregnated gauze pads. Formaldehyde or hypertonic saline was not administered in any of the patients in our department. We prefer not to use formaldehyde because it causes necrosis in the parenchyme. Povidone iodine was utilized as the scolicidal agent. This agent also possesses antibacterial efficacy, as in hypertonic saline. We did not encounter any disadvantage due to use of povidone iodine, as opposed to hypertonic saline. In the literature, the recurrence rates have been reported as 2-12% [21]. In our series, the recurrence rate was determined as 1.4%.

Obliteration of the cyst cavity following cystotomy has always been a controversial issue. Some authors [7, 8, 22] have defended that capitonnage does not provide an advantage, compared to cases in whom capitonnage was not performed. In our comparative trial, the duration of hospitalization in the group without capitonnage was found to be significantly high. In general, the duration assigned to the capitonnage procedure during the operation is between 3-5 minutes at the most. This duration may be longer in capitonnage of giant cysts. Based on our clinical experience and results of this comparative trial, we believe that due to its low com-

plication rates, capitonnage is a safe and essential method to be used in the treatment of intact cysts.

In our opinion, pulmonary resection should seldom be utilized in the treatment of hydatid cyst. As seen in the articles of many authors [2], we are in favor of performing resection in severely damaged and unexpandable lung parenchyme. As recommended in the standard procedures, we disagree with the approach in which resection may be performed in cysts involving more than 50% of one lobe. Our clinical experience indicates that in cases where aeration is present in only one segment of a lobe, this lobe should not be removed. In our series of 412 patients, we performed right upper lobectomy operation in 2 cases. One of these cases had a giant cyst involving almost the entire lobe and extending to the lower lobe. The other patient had a perforated and infected cyst with atelectasia and bronchiectasia with severe damage. In the literature, the resection rate among giant cysts has been reported as 6.6-13% [5]. In our series, we performed resection in only 1 of 46 cases with giant hydatid cyst (0.2%).

With regard to surgical treatment of hydatid cyst, thoracoscopic surgery may be performed in lesions of solitary nodules with peripheral localizations. Due to the risk of contamination by cyst contents, we believe that this technique may be used in a limited number of cases. In 7 cases among our series, we performed cyst excision with thoracostomy.

Conclusions

Treatment of hydatid cyst is surgical. Albendazole and mebendazole may be used in perforated cysts and inoperable patients. In the surgical treatment, resection should be avoided as much as possible. Even in cases where only a limited section of aeration is present in one lobe, a trial of expansion should be sought. An average time of 3-5 minutes should be allocated and capitonnage should be performed. Capitonnage should always be performed in the surgical treatment of hydatid cyst. We believe that povidone iodine per se provides sufficient disinfection.

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