

Surgical Management of Pulmonary Hydatid Disease

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Abstract: Background: hydatid disease is a parasitic disease endemic in many sheep-raising countries; it is still a significant health problem in Iraq. **Objective:** To evaluate the surgical management, postoperative complications, and results of surgery in our unit and compare them with other studies around our country. **Study Design:** case series with chart review. **Setting:** IBN AL-NAFEES teaching hospital for Cardiovascular and thoracic surgery. **Patients & Methods:** the clinical courses of 130 patients with thoracic and hepatic hydatid disease operated on from the 1st of January 2010 to the 30th December 2011 are studied. All surgical procedures were performed under general anesthesia. Lateral thoracotomy at the level of the fourth to the sixth rib, depending on the number and location of the cyst, provided ideal exposure for the surgical treatment of pulmonary hydatid disease. **Results:** from 130 patients with pulmonary hydatid disease (33%) were females and (67%) were males, sixty-five percent of them from rural areas. Age distribution ranged from (8-75) years; the majority were in the second, third, and fourth decades of life. The right lung was more frequently affected than the left. **Eighty percent** of patients had a single hydatid cyst, while (20%) had bilateral. Conservative operations were performed in (67%) while resection was done in (33%). Mortality rate was (1.5%). **Conclusions:** Hydatid disease is still endemic in Iraq. Surgery is the treatment of choice for most patients with pulmonary hydatid disease. Conservative surgical procedures which preserve lung parenchyma are preferred. The mortality in our study (1.5%) parallels other studies.

Keywords: Pulmonary hydatid disease, Hydatid, Echinococcus, multilocular, pulmonary.

INTRODUCTION

Hydatid cyst is a parasitic disease caused by the larval growth of the tapeworm, *Echinococcus granulosus*, or *Echinococcus alveolaris*; the latter species is very rare. [Qian, Z. X. *et al.*, 1988]

Also, there are another two species of the genus *Echinococcus*: *E. vogeli* (polycystic). [Benenson, F. *et al.*, 1985] and a fourth species, *E. oligarthus*, is not known to occur in man.³ Infestation by the ovum is the main route of infection, and it is characterized by the formation of single or multiple expanding cysts, which is unilocular in the majority of cases or multilocular. [Benenson, F. *et al.*, 1985; Hunter, J. *et al.*, 1976]

The word "hydatid" is Hellenic in origin and means a "cyst full of water" [Bonomo, L. *et al.*, 1999]. Hydatid cyst in man was first described by Hippocrates as a "liver filled with water" and later by Galen [Bonomo, L. *et al.*, 1999]. It was also mentioned by AL-Razi in his famous book AL-Hawi [Solak, H. *et al.*, 1988].

In 1786, Batch gave it the name "granulosus," and in 1804, Rudolphi placed it in the genus *Echinococcus* [Qian, Z. X. *et al.*, 1988; Little, M.D, 1999]. In 1855 Virchow recognized a morphologic form of human hydatid that is different from the usual unilocular type [Little, M.D, 1999]. In 1862 leukart named it multilocularis [Little, M.D, 1999]. In 1972

Rausch and Bernstein described *E. Vogeli*.

Hadatidosis is a serious public health hazard and a major problem for the community with a worldwide distribution [Hunter, J. *et al.*, 1976]. Wherever there is an association between dogs, sheep, and humans.,⁸ This has been termed a "pastoral "disease in contrast to a less common wild or "sylvatic" life cycle which is seen in parts of Canada and Australia [Auld, A.W. *et al.*, 2009]. The primary hosts are wolves and moose in Canada and dingoes and kangaroos in Australia. Control programs introduced into Australia and New Zealand around 1970 have almost completely eradicated the disease. Hydatid disease is still common in the Middle East, North Africa, and parts of South America. In 2002 the incidence of hydatid disease per 100,000 populations varied from country to country (Uruguay 6.2, Spain 6.2, Turkey 4.4, Italy 1.9, Argentina 1.42, Peru 1.1,

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In Iraq, the disease is endemic and is considered to be one of the most serious helminthic diseases in the country [El- Hassani, N.B. *et al.*, 1985; AL – Mukhtar, A. S. *et al.*, 1989], mainly in the southern and northern area. However, the incidence of the disease is still unknown. [EL-Hassani, N.B. *et al.*, 1983] It is caused by *E. granulosus*, but a multilocular cyst of *E. multilocularis* has also been recovered from the liver of women in Erbil, in the north of Iraq. [Al-Attar, H.K. *et al.*, 1981; Benyan, A.Z. *et al.*, 1987]

PATIENT AND METHOD

This is a retrospective study. The study was conducted through the period from the 1st of January 2010 to the 30th of December 2011. The patients were admitted to the thoracic and cardiovascular department in Ibn-AL-Nafees teaching hospital.

The information from 130 patients was taken from operative room records at Ibn-AL- Nafees teaching hospital, covering the following items:

Identifying information: age, gender, occupation.

Clinical features.

Physical examination.

Chest X-ray findings.

Other non-invasive imaging techniques like CT

scan and MRI.

Bronchoscopic findings.

Type of operation in those who were treated surgically.

Post-operative complications.

Results of surgery.

Hospital stay.

All surgical procedures were performed under general anesthesia, and after that, the patients were transferred to the surgical ward and stayed postoperatively there for several days.

Lateral thoracotomy at the level of the fourth to the sixth rib, depending on the number and location of the cyst, provided ideal exposure for the surgical treatment for pulmonary hydatid disease.

The patients were followed up on outpatient bases. The operative and follow-up notes in the surgical ward postoperatively, which are present in case sheets, provided further information to this dissertation. But unfortunately, long-term follow-up was unavailable for all patients.

AIM OF STUDY

To evaluate the surgical management, postoperative complications, and results of surgery.

Compare them with other studies around our country.

RESULTS

In this study, there were 130 patients with pulmonary hydatid disease, 43 patients (33%) were females, and 87 patients (67%) were males.

The age & gender distributions of patients in our study were illustrated in the table (1) below.

Table 1: Distributions of patients in the study according to age & gender

| Age | Number of patients | Males | Females | Percentage |
|-----------------|--------------------|-------|---------|------------|
| (Up to 9 years) | 9 | 6 | 3 | 6.9% |
| (10-19) | 30 | 23 | 7 | 23% |
| (20-29) | 29 | 19 | 10 | 22.3% |
| (30-39) | 27 | 18 | 9 | 20.8% |
| (40-49) | 14 | 8 | 6 | 10.8% |
| (50-59) | 13 | 5 | 8 | 10% |
| (60-69) | 7 | 7 | 0 | 5.4% |
| (70-79) | 1 | 1 | 0 | 0.8% |
| total | 130 | 87 | 43 | 100% |

Regarding the presenting clinical features, the most common were cough, shortness of breath, and fever. Patients may also present with other clinical features related to complications of the disease, which are shown in table (2).

Table 2: Distribution of patients according to complications of the disease

| Presentations | No. of patients |
|---|-----------------|
| <i>Cough</i> | 65 |
| <i>Shortness of breath (SOB)</i> | 55 |
| <i>Fever</i> | 50 |
| <i>Chest pain</i> | 46 |
| <i>Haemoptysis</i> | 45 |
| <i>Sputum</i> | 25 |
| <i>Hydro pneumothorax</i> | 6 |
| <i>Cough grape-like material</i> | 5 |
| <i>Anaphylactic shock</i> | 5 |
| <i>Empyema</i> | 3 |
| <i>Spontaneous pneumothorax</i> | 2 |
| Subcutaneous cysts (had the previous operation of hydatid). | 2 |

Some of the physical signs were related to the chest, like decreased air entry, tachypnea, Rhonchi, dull percussion, bronchial breathing, and crepitation, and are shown in table (3) below.

Table 3: Clinical signs related to chest

| Signs in chest | No. of patients |
|----------------------------|-----------------|
| <i>Decreased air entry</i> | 70 |
| <i>Tachypnea</i> | 36 |
| <i>Rhonchi</i> | 13 |
| <i>Dull percussion</i> | 9 |
| <i>Bronchial breathing</i> | 5 |
| <i>Crepitation</i> | 3 |

Table 4: Physical signs not related to the chest

| Signs not related to chest | No. of patients |
|---------------------------------|-----------------|
| <i>Pallor</i> | 20 |
| <i>tachycardia</i> | 15 |
| <i>Hypotension</i> | 8 |
| <i>Right hypochondrial pain</i> | 7 |
| <i>Hepatomegaly</i> | 4 |

The diagnosis of patients was based on plain **chest X-ray** and/or **CT- scan** and **US** of the abdomen. These investigations showed that some of the patients had additional extrapulmonary hydatid cysts, like in hepatic hydatid cysts, **24** patients (**18.4%**). Renal **three** patients (**2.3%**) and splenic **2** patients (**1.5%**).

The chest X-ray findings of our patients revealed that most of them had simple cyst represent (**58%**), water Lilly appearance, and lung abscess (**15.3%**) and (**12.3%**), respectively. While the other radiological appearance is described in table (5) below.

Table 5: Chest X-ray finding in pulmonary hydatid cyst

| Radiological appearance | No. of patients | Percentage |
|---------------------------|-----------------|------------|
| <i>Simple cyst</i> | 76 | 58% |
| <i>Water Lilly</i> | 20 | 15.3% |
| <i>Lung abscess</i> | 16 | 12.3% |
| <i>Crescent signs</i> | 10 | 7.7% |
| <i>Pleural effusion</i> | 3 | 2.3% |
| <i>Pneumothorax</i> | 3 | 2.3% |
| <i>Hydro pneumothorax</i> | 2 | 1.5% |

Tomography (chest CT-scan) was done in most of the patients, and the findings were more detailed than plain chest X-ray, ranged between intact

simple cysts filled with clear fluid in 93 patients (71.5%) to ruptured complicated cysts in 18 patients (13.8%), and Water Lilly 20 patients

(15.3%).

One hundred and four patients (80%) of cases had unilateral hydatid disease, while 26 patients (20%) had bilateral hydatid disease.

The right lung was more frequently involved than the left; in those with unilateral disease, 74 patients (71%) had right lung involvement, while the rest 30 patients (29%) had the left lung affected.

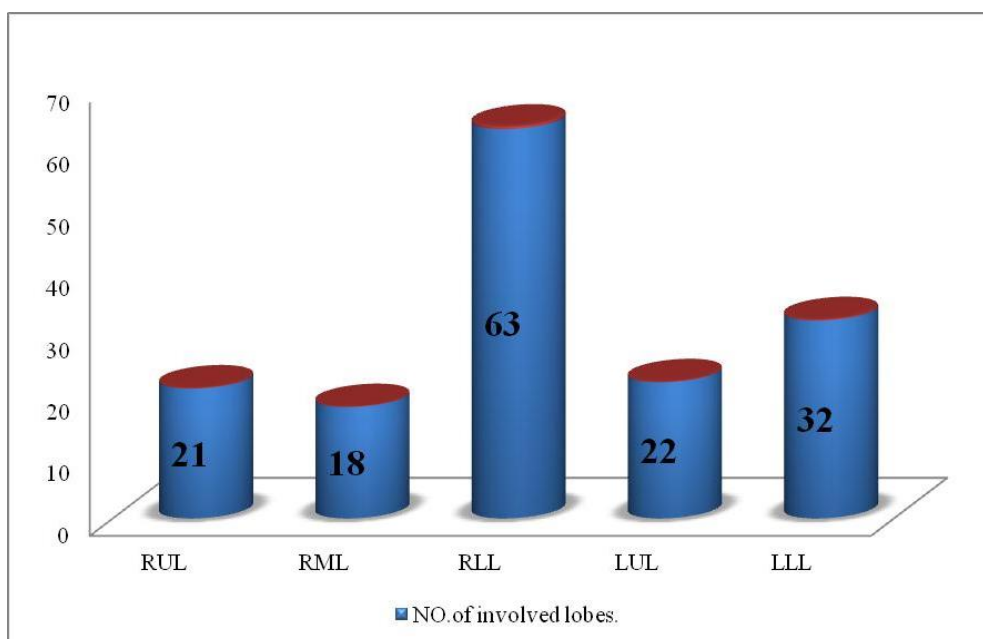


Figure 1: Number of involved lobes by hydatid disease

The most frequently involved lobe was the RLL, followed by the LLL, while the RML was the least to be involved. It is noteworthy that some patients had bilobar involvement either in one lung or in both.

Lung preservation surgical procedures were performed in (67%), and pulmonary resection was necessary in (33%) of patients—broncho-Biliary fistula not found in our study.

Table 6: Types of surgical procedures

| Type of surgical management | No. of patients | percentage |
|-------------------------------|-----------------|------------|
| I - Conservative operation | 87 | 67% |
| Cystectomy | 59 | 45% |
| Cystectomy with decortication | 28 | 22% |
| II – Resection | 43 | 33% |
| Lobectomy | 24 | 18.4% |
| Wedge resection | 18 | 13.8% |
| Pneumonectomy | 1 | 0.8% |
| Total | 130 | 100% |

Table 7: Outcomes of Post-operative complications

| Post-operative complication | No. of patients | percentage |
|-----------------------------|-----------------|------------|
| Persistent air leak | 11 | 22.4% |
| Residual space | 7 | 14.2% |
| Empyema | 6 | 12.3% |
| Collapsed lung or lobe | 6 | 12.3% |
| Wound infection | 5 | 10.2% |
| haemoptysis | 4 | 8.2% |
| Pulmonary embolism | 3 | 6.1% |
| Deep venous thrombosis | 3 | 6.1% |
| Bleeding | 2 | 4.1% |
| Renal impairment | 2 | 4.1% |
| Total | 49 | 100% |

Persisted air leaks occurred in **11 patients (22.4%)**. Two of them had a massive leak with lung collapse and were re-explored within two days; the bronchoplural leaks were found and were controlled with a good outcome. The others were treated conservatively by continuous suction and physiotherapy.

Residual space was found in **7 patients (12.2%)**; those were followed by repeated chest X-rays and needed no surgical intervention because of gradual obliteration of the space and absence of respiratory embarrassment.

Six patients (12.3%) developed early empyema and were treated with proper antibiotics and good physiotherapy. Superficial wound infection occurred in **5 patients (10.2%)** and was treated

with antibiotics, frequent dressings, and then secondary suturing. Mild thoracic blood drainage occurred in **2 patients (4.1%)** who were managed conservatively. Pulmonary embolism occurred in **3 patients (6.1%)**. They were diagnosed by chest **CT –scan** and were treated with low molecular weight heparin.

Deep venous thrombosis occurred in **3 cases (6.1%)** and was confirmed by the Doppler study and managed with an elevation of the limb and anticoagulant drugs. Simple hemoptysis occurred in **4 patients (8.2%)** and was treated conservatively. Transient renal impairment was elicited in **2 elderly patients (4.1%)** who were treated conservatively without dialysis.

Table 8: The duration of stay in the hospital

| Hospital period (days) | No. of patients | Percentage |
|------------------------|-----------------|------------|
| 1-5 | 78 | 60% |
| 6-10 | 35 | 27% |
| 11-20 | 10 | 7.7% |
| More than 20 days | 7 | 5.3% |
| total | 130 | 100% |

DISCUSSION

Hydatid disease is a major health problem in the Middle East as well as in many other countries. In Iraq, the disease is still endemic [El- Hassani, N.B. *et al.*, 1985; AL – Mukhtar, A. S. *et al.*, 1989]. And the incidence of the disease is still unknown in Iraq.

In our study, there were **130** patients with pulmonary hydatid disease through the period of two years in **Ibn-AL-Nafees** teaching hospital, **43** patients (**33%**) were females, and **87** patients (**67%**) were males. This parallels the previous local study. In which the male patients constituted (**52.6%**), while females constituted (**47%**), but this does not parallel the Iranian.³⁹ and Turkish.⁴⁰ studies, where females were more dominant than males (**56%**) and (**52%**), respectively. Because the majority of patients (**65%**) were from rural areas, and a high percentage of them were housewives and farmers. We believe that males are more exposed to infection due to their work and contact with domestic animals (**dogs and sheep**) with ignorance of the preventive measurements against the disease, which play a major role in the high percentage of the disease in these areas, and between these sectors of people.

The most common affected age groups were the **2nd, 3rd, and 4th** decades, and that is similar to others studies [Al Assal, M. *et al.*, 2001; Nourjah, N. *et al.*, 2004; Turna, A. *et al.*, 2002]. This may be attributed to more exposure to infection, or it may be due to early infestation during childhood which takes several years to manifest themselves as deleterious lesions, with late seeking for medical advice and neglecting of patients to some complaints like cough and shortness of breath which are mostly treated as simple bronchitis, without achieving plain chest X-ray.

Regarding the presenting clinical features, cough, shortness of breath, and chest pain were the most common symptoms between them. This does not differ from other studies. And this may be due to the pressure effect on surrounding structures and complications of hydatid cysts which lead to hydropneumothorax and empyema.

The right lung was more frequently involved than the left; this may be attributed to the larger blood supply and large surface area of the right lung with an extra lobe [Turna, A. *et al.*, 2002].

Bilateral cysts were found in (**20%**) of patients, and this is more than what was found in a previous local study [Al Assal, M. *et al.*, 2001], where only (**7.33%**) of the patients had bilateral disease, but

parallel with international comparable studies [Nourjah, N. *et al.*, 2004; Turna, A. *et al.*, 2002]. This can be explained by the increase in no. of **CT- scan** centers so that even small cysts could be detected by this technique. While ten years ago, it was difficult to investigate all patients with **CT-scan** due to the unavailability and limitation of this facility.

All of our patients were treated surgically; as we believe, surgery is still the treatment of choice in the vast majority of patients. Medical treatment has a very limited role in inoperable cases due to the high doses that should be given for a long period with a high incidence of side effects and considerable failure rate. This is due to the poor blood supply of adventitia of cyst that needs very high doses for the effectiveness of drugs with more drug complications. Other authors share us this belief [Al Assal, M. *et al.*, 2001; Turna, A. *et al.*, 2002].

Lateral thoracotomy at the level of the fourth to the sixth ribs, depending on the number and location of the cyst, provides ideal exposure for the surgical treatment for pulmonary hydatid disease, and this made it our approach of choice. While median sternotomy was not used in our study as it carries high mortality and morbidity., and bilateral disease was dealt with by two separate sessions, one for each side with a minimal two months interval, and this is parallel with other comparable studies [Al Assal, M. *et al.*, 2001; Turna, A. *et al.*, 2002].

The type of surgical management in our study was mostly **conservative** operations which includes cystectomy in **(45%)** of the cases and cystectomy with decortication in **(22%)** of them, this equals to **(67%)** of the total number, which is similar to what was found in other comparable studies [Al Assal, M. *et al.*, 2001; Turna, A. *et al.*, 2002] the general rule is that pulmonary resection must be avoided as much as possible [Auld, A.W. *et al.*, 2009; EL-Hassani, N.B. *et al.*, 1983; Balikian, J.P. *et al.*, 1974]

Intact cyst removal was not widely used in our practice, and this belongs to the surgeon's preference.

Lobectomy was performed in only **(18.4%)**, and wedge resection in **(13.8%)**. This is due to the fact that more extensive pulmonary resection must be avoided in all cases as much as possible and reserved only for those cases where the disease involves more than half a lobe in which a large residual cavity may occurred and prevent full lung

expansion, while the wedge resection is reserved for small diseased areas [Mustfa, W. *et al.*, 2001]. This agrees with other studies.

Pneumonectomy was necessary in only one case **(0.8%)**, in which a huge cyst involved two lobes causing extensive destruction to the residual lung tissue, which failed to expand after the removal of the cyst. This is parallel with other comparable studies [Al Assal, M. *et al.*, 2001; Turna, A. *et al.*, 2002]. Dealing with the residual cavity (**capitonage**) after removal of the cyst by conservative procedure, the edges of sacs were trimmed and sutured, with the meticulous search for all bronchial leaks, which were sutured individually without obliteration or capitonage; this policy is similar to international comparable studies [Nourjah, N. *et al.*, 2004] studies. While in the previous local study [Al Assal, M. *et al.*, 2001] **(18.9%)** of the cases were managed with obliterated of the residual cavity, this may be due to personal experience of the surgeon and because it is thought that it prolongs surgery time and increases morbidity [Turna, A. *et al.*, 2002].

CONCLUSION

Hydatid disease is still endemic in Iraq, and poor medical reports do not give the actual number of cases.

The disease is more common in the periphery of cities due to poor health education and poor medical facilities.

The middle age group is more commonly infected due to their contact with society by their work and habits.

Surgery is still the treatment of choice in most of the patients to allow the complete removal of the cyst. And medical treatment is not effectively used because of their side effects and prolonged use.

The conservative surgical procedure which includes cystectomy is most widely used to preserve lung tissues and prevent lung parenchymal excision.

Management of the bronchial opening is of major importance, whereas capitonage can be omitted to shorten the operation time.

Pulmonary resections were performed when the cyst involved more than half the lobe. When irreversible parenchymal tissue changes occurred, and surrounding alveoli fail to expand after removal of the cyst, and also in massive hemoptysis, severe infection, and abscess.

Combined liver and lung hydatid cyst disease is better to be dealt with in one session to decrease the morbidity and mortality. And hospital stays.

Early diagnosis of disease by the achievement of X-ray for patients with chest symptoms and advice for the early operation to decrease the number of complicated cases.

Screening chest X-rays should be done routinely, especially with those dealing with cattle and dogs.

Establishment of an education programs in sheep raising and street doges' control hopefully to break the life cycle of the parasite.

Our surgical results were similar to those recorded in the world in terms of surgical technique, mortality, and follow-up, which is a very important indicator that we are capable of scientific progression in our country.

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