Resection in pulmonary hydatid cyst (parasitic disease)

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Abstract
Hydatid cyst (HC) means cyst full of water is a parasitic disease caused by larval stage of Echinococcus Granulosus, characterized by cyst formation in the liver and lung, rarely in other parts of the body. To evaluate the indications, rate and outcome of resection in pulmonary HC, which is an important health problem in our country. This is a retrospective and prospective study of forty-patients with pulmonary HC, admitted and surgically treated at the thoracic and vascular surgery department in the Medical City Teaching Hospital, Baghdad, Iraq from 1st of January 2011 till 1st of July 2017. They underwent some sort of pulmonary resection.Twenty four of our patients were female (60%), while the remaining 16 patients were male (40%). The mean age was (25.375±15.775) day. The most common symptom was cough, seen in 29 patients (72.5%), hepatic involvement was seen in seven patients (17.5%), bilateral lung involvement seen in six patients (15%). The most affected lobe was Right lower lobe, seen in 16 patients (36%). Posterolateral Thoracotomy was the standard surgical approach, right thoracotomy was done in 22 patients (55%), left thoracotomy done in 16 patients (40%), staged bilateral Thoracotomy done in two patients (5%). The most common indication for resection was destroyed lobe seen in 16 patients (40%). The most common resection technique was lobectomy, done in 23 patients (57.5%). The morbidity rate was 27.5% and prolonged air leak and pneumothorax were the common complications. Mean duration of hospital stay around 9.625 days. No mortality or recurrence reported. The most common cause of resection in pulmonary HC was destroyed lobe, taking in consideration parenchymal preserving techniques as priority.

Key-Words: Hydatid cyst, pulmonary resection, lobectomy

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Introduction
Hydatid cyst means cyst full of water [¹]. It is a parasitic disease caused by larval stage of Echinococcus Granulosus, characterized by cyst formation in the liver and lung, rarely in other parts of the body? It is endemic in south and Central America, Middle East, sub-Sahara Africa, Russia, China, Australia and New Zealand (usually in sheep raising area) . Pulmonary hydatid cysts are characteristically solitary, usually affecting single lobe, mostly lower lobe, and more commonly the right side. [²]. In Iraq it still main health hazard [³]. Hydatid disease is seen most frequently in the liver (50–60%) and, in the second instance, in the lung (18–35%), while an incidence of only 10% in other parts of the body. However, the lung is the most common site in children. Large cysts with a diameter of more than 10 cm in the lung are a special clinical entity, defined as giant hydatid cyst [⁴]. The first report of hydatid cyst in humans in the medical literature is attributed to Bremser in 1821 [⁵].

In 30 to 50% of cases E. granulosus does not produce characteristic symptoms. The typical clinical picture for the diagnosis of pulmonary hydatidosis is represented by a patient in his third or fourth decade that comes from an endemic region and presents with cough, chest pain, hemoptysis, and radiologic findings of cystic lesions in one or both lungs. Clinical manifestations depend on the site and size of the cyst. The growth of the cyst is slow, and it is symptomatic.
only when the cyst is large enough to cause compression. If the hydatid cyst ruptures into an adjacent bronchus, vigorous coughing and vomit-like expectoration of salty or peppery water consisting of mucus, hydatid fluid, and, occasionally, fragments of laminated membrane (generally described as egg white membranous particles) together with bloody sputum occur.\(^5\).

In clinical practice, plain radiographs of the chest have been shown to be most reliable in diagnosing pulmonary hydatid disease. Radiographically an intact cyst appears as a round or oval shape, solitary or multiple, with homogeneous density and perfectly defined margins as shown in Fig (1)\(^1\). In the acute stage of rupture of the cyst into the pleural cavity, chest radiographs may show a blurred hemi-diaphragm or a loculated pleural effusion. Although plain radiographs of the chest have a diagnostic accuracy of nearly 99\%, CT has added to the diagnosis of hydatid disease of the lung.\(^5\). Bronchoscopy is only indicated when there is suspicion of tumor or when the radiologic picture is atypical. The finding of laminated membrane in a bronchus is diagnostic. The bronchial aspirate can be examined for the presence of hooklets.\(^6\).

### Treatment

#### Medical Options

There is no curative medical treatment. It may be indicated in bilateral multiple cysts of different sizes, when patient is not a surgical candidate or may be used in the post-operative period in ruptured hydatid cyst provided that the patient has normal liver function tests\(^1\). drugs used Albendazole Tab. (10-12 mg/kg/day) or Praziquantel Tab.(40mg/kg)

#### Surgical options

The traditional therapy for pulmonary hydatid cysts is surgical.\(^7\). The goal of surgical treatment is to safely eradicate the parasite, avoiding intraoperative rupture and subsequent dissemination. The most important point in the management of the residual cavity is closure of patent bronchial openings.\(^8\). Recurrence may occur due to spillage of hydatid fluid, incomplete resection of germinal layer or by retrograde metamorphosis process.\(^3\). The standard approach consisted of a lateral decubitus position (posterolateral thoracotomy) through the fifth or sixth intercostal space under general anesthesia with a double lumen endotracheal tube, except in small pediatric patients, who received a single lumen tube. The preservation of lung parenchyma was always the first priority.\(^8\). Now adays, video-assisted thoracic surgery has been seen among the surgical procedures.

The principal indications for lobectomy are large cyst involving more than 50\% of the lobe, cysts with severe pulmonary suppuration not responding to preoperative treatment, multiple uni-lobar cysts, and sequel of hydatid disease, such as bronchiectasis, severe hemorrhage, or when the located lobe or lung tissue has been completely destroyed.\(^9\). The morbidity of the surgical treatment is low and its mortality is nearly nil. The rate of morbidity in
children was 13.6%, atelectasis being the most frequent one. The morbidity rate was found as 11.6% in adults [9]. Post-operative complications of both intact and ruptured cysts include empyema, extended air leaks, development of bronchopulmonary fistulae, atelectasis, pneumonia, sepsis and recurrence of cysts or rarely anaphylaxis [10].

 Patients and Methods

Study Design

This is a Randomized Retrospective and Prospective study for surgically treated patients with pulmonary Hydatid cyst in single center, done in the Medical City / Ghazzi AL- Hariri Hospital for Surgical Subspecialties, Thoracic and Vascular Surgery Department / Baghdad /Iraq from 1st of January 2011 till 1st of July 2017.

Sample’s characters

The main determinant of sampling and inclusion in our study was parenchymal resection in surgery technique, the other criteria’s were:

I. Patients sampled regardless of their age groups (adults and pediatrics).

II. Both genders included.

III. Both complicated HC (ruptured, infected) or non-complicated (intact, non-infected) were included.

Data Collection and Processing

All patients with pulmonary Hydatid Cyst which treated surgically in our center were submitted to the research. Only the patients which their surgical technique included parenchymal resection (lobar or sub-lobar) included in the study and met the study criteria, while those with parenchymal preserving surgery excluded from study. One hundred and ninety two patients with pulmonary Hydatid Cyst were operated in our center during six and half year from 1st of January 2011 till 1st July 2017, only 40 cases included which met the criteria of the study.

History taking (cough, hemoptysis, chest pain, and dyspnea) and physical examination were recorded for all the patients with radiological assessment by CXR and CT-scan in addition to Abdominal US to exclude hepatic cyst especially in right sided pulmonary Hydatid cyst. After confirmation of diagnosis, patients were scheduled for surgery according to their symptom severity and cyst condition, intact or ruptured, infected or non-infected. Pre-operative blood investigations were obtained in addition to fitness for surgery regarding respiratory status. The information of prospective cases was taken during their visit to out-patient clinic and at admission time when they were prepared for surgery. While those retrospectively collected, information recorded from patients’ medical files or surgeons notes.

Surgical Methods

Surgery was done under GA with double endotracheal lumen except in pediatric age group where single lumen tube used. Lateral position (right or left) according to cyst location, classical posterolateral thoracotomy done through 5th or 6th intercostal space. After accessing the pleural space, adhesions were released (if exists), iodinated packs were applied to the surrounding of the affected lobe. Controlled evacuation technique used in cysts with or impending rupture then cystectomy done (removal of laminated layer). Inoculation was done in tension relatively small or medium size intact cyst. After that fistulae were closed by Ethibond 2/0 suture material then peri-cystectomy done (resection of fibrosed adventitial layer. Good irrigation of cavity and pleural cavity by normal saline.

In our patients no cappitonage used due to risk of post-operative atelectasis or infection, we used to keep the cavity open for drainage (Marsipulazition). Parenchymal resection was done when the entire lobe was destructed, not expanding lobe or cavity is close to the main lobar bronchus. Also resection done in some cases of chronic ruptured cysts with non-expanding lobe. Two chest drains were inserted with chest closure in multiple layers. The patients were discharged when no more air leak or drain and followed up in outpatient clinic which was not regular depending on patients’ compliance.

Data Form:

A data form used to collect and organize the data of patients which include introductory information about the patient (age, gender), presenting symptoms, pre-operative investigations, imaging findings, operative findings, surgery technique, resection indications and post-operative complications, morbidity and mortality.

Study limitations:

One of important limitations was poor documentation about the patients whom records were evaluated retro-spectively and lack of records about their imaging studies.

The Results
During six year and half, in the Thoracic and Vascular surgery department in Gahzzi AL-Hariri Hospital, Medical City Teaching Complex, Baghdad-Iraq, 192 recorded surgeries were done for pulmonary HC. Forty cases of them underwent some sort of parenchymal resection with resection rate being (20.83%). Twenty four of our patients were female constituting (60%), while the rest of them (16 patients) were male representing (40%) The youngest one was four years old with oldest one approaching 70 years. The mean age of the involved patients was (25.375±15.775) year. The following diagram (Figure 2) showing the distribution of age with relation to patients’ gender:

![Age-Gender distribution](image)

**Figure (2):** Age-Gender distribution.

The most common symptom was cough which was seen in 29 patients (72.5%), followed by dyspnea which was seen in 23 patients (57.5%) then hemoptysis which was seen in 13 patients (32.5). The distribution of the symptoms and signs with their percentages illustrated in Table (1):

**Table (1):** Distribution of most common presenting symptoms.

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>No. of patients</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cough</td>
<td>29</td>
<td>72.5%</td>
</tr>
<tr>
<td>Dyspnoea</td>
<td>23</td>
<td>57.5%</td>
</tr>
<tr>
<td>Haemoptysis</td>
<td>13</td>
<td>32.5%</td>
</tr>
<tr>
<td>Chest pain</td>
<td>7</td>
<td>17.5%</td>
</tr>
<tr>
<td>Fever</td>
<td>7</td>
<td>17.5%</td>
</tr>
<tr>
<td>Material expectoration</td>
<td>3</td>
<td>7.5%</td>
</tr>
<tr>
<td>Pleural collection</td>
<td>1</td>
<td>2.5%</td>
</tr>
<tr>
<td>Recurrent chest infection</td>
<td>1</td>
<td>2.5%</td>
</tr>
<tr>
<td>Skin rash</td>
<td>1</td>
<td>2.5%</td>
</tr>
</tbody>
</table>

The duration between onset of sympyoms and presentation to medical healthcare was documented in 31 patient with mean duration about (155.129±203.868) days taking in consideration the shortest period being three days and the longest one about 730 days. After taking history and physical examination performance, routine blood tests followed by radiological imagings were done (including chest x-ray [29 patients’ x-ray documented] with CT-scan [27 patients’ CT-scan documented]) and abdominal US in patients complaining from abdominal symptoms or in RT-sided pulmonary HC (for possibility to perform surgical management for combined hepato-pulmonary HC). Six patients had hepatic HC in addition to pulmonary HC with one patient had hepatic and splenic HC in addition to pulmonary HC (hepatic involvement seen in seven patients (17.5%) and splenic involvement seen in one patient (2.5%)) while Bilateral lung involvement with HC was seen in six patients (15%).
Chest x-ray was done for every patient complaining from respiratory symptoms. The most common finding in the available chest X-rays was uniform, well defined, homogenous, rounded opacity which was seen in 18 patients representing 62.07%. The Figure (3) shows the distribution of x-ray findings:

![X-ray findings distribution](image)

**Figure (3):** X-ray findings distribution (total number 29).

CT-scan of chest and upper abdomen was done for all patients prepared for surgery with most common finding being the cyst with fluid density which was seen in 11 patients which constituted 40.74%. The next Figure (4) shows the distribution of CT-scan findings:

![CT-scan findings](image)

**Figure (4):** shows CT-scan finding distribution (total number 27).

Bronchoscopy was done in 11 patient (27.5%) which usually performed in patients complaining from hemoptysis or their diagnosis was unconfirmed. Bronchoscopy was diagnostic in two patients (5%). All surgeries were done by
postero-lateral thoracotomy, no anterior thoracotomy or sternotomy used. Two patients underwent staged bilateral thoracotomy for HC, one of them had bilateral resection technique in their surgical management. Table (3-2) shows the distribution of approaches used:

**Table 2: Approaches used in surgery.**

<table>
<thead>
<tr>
<th>Approach</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT-posterolateral Thoracotomy</td>
<td>22</td>
<td>55%</td>
</tr>
<tr>
<td>LF-posterolateral thoracotomy</td>
<td>16</td>
<td>40%</td>
</tr>
<tr>
<td>Staged bilateral Thoracotomy</td>
<td>2</td>
<td>5%</td>
</tr>
</tbody>
</table>

From these 40 patients, 45 lobes were affected (some patients had more than one HC in different lobe in same hemithorax). The most affected lobe was the Right Lower Lobe (may be due to direct extension from liver) followed by Left Lower Lobe while the Right Middle Lobe was the least affected. The following Figure (5) shows the distribution and percentage of the affected lobes:

**Figure (5):** showing distribution of affected lung lobes

The cyst size was documented for 22 cysts in 18 patients, nine of them (40.9%) were larger than 10 cm while the smaller than 10 cm constituted 13 (59.09%). The intra-operative findings regarding the cyst were categorized into: Intact (I), Ruptured non-infected (Rn) and ruptured infected (Ri). In these 40 surgeries 50 cyst were found intra operativly, only 39 cyst’s condition documented. The figure (6) shows these categories:
The parenchymal resection techniques used in our study divided into sub-lobar resection and anatomical resection. The most common technique used was lobectomy which done in 23 patients represented (57.50%). The following Figure 7 shows the distribution of surgical technique:

The indications of parenchyma resection was categorized as destroyed lobe, big HC occupying more than 50-60% of the lobe, atelectasis non-inflating parenchyma or proximity of the lesion to major lobar bronchus. The following Figure 8 shows the categorization of resection indication with their percentages:
In our study 11 patients (27.5%) out of 40 patients had complications. The most common complication was post-operative prolonged air leak as early complication and pneumothorax as late one (three patients for each). Only one patient needed operative management (Redo-Thoracotomy) while all the other treated conservatively. The next Figure 9 describes the complications encountered in the study:

No mortality encountered in our study. The hospital stay time ranged from the shortest duration four days to longest one 60 days with mean duration about 9.625 days. The patients were followed at outpatient's clinic; some patients were not complaint to follow up. No recurrence was encountered in our study. Only one patient complained from recurrent pneumothorax which necessitated Redo-thoracotomy.

**Discussion**

Hydatid disease is a common life problem in Iraq and surrounding countries. A hydatid cyst is a parasitic infestation caused most commonly by Echinococcal Granulosus. The most common location of a hydatid cyst is the liver and the lungs at the second place (10-40%). It is an important health problem in regions where people earn the living by agriculture and livestock raising, while veterinary services, public health and preventive policies are poorly offered. In our study the resection rate was (20.83%) and it's higher than other studies, Dakak et al (9.2%) [4], Kavukcu et al (7%) [12], Bagheri et al (10.3%) [13], Yekeler et al (1.88%) [14], Ceran et al (9.3%) [15]. The explanation of this high rate
can be attributed to the late presentation to medical health care from onset of symptoms [this documented in 31 patient with mean around 155.129±203.868 days, taking in consideration the shortest period being three days and the longest one 730 day] in addition to patients’ non-compliance, ignorance with medical screening programs like using chest x-ray in evaluation of patients with respiratory symptoms especially in endemic areas. On contrary only Vasquez et al [8] reported high rate of resection (58%) which may be attributed to their selection criteria of patients.

Our sample size was 192 patients (40 included in the study) operated over six years and half. In comparison to studies, the largest sample size was by Yekeler et al [14] which included 1909 patient over 20 years and smallest sample was by Sadrizadh et al [11] which included 87 patients over 2 years. The longest duration in research was by Dakak et al and Bagheri et al which were 27 years [4, 13]. The mean age of our patients was (25.36±15.77) days ranging from four years to 70 years which is comparable to the others, Dakak et al [14] (15-63 years, median 23.4), Sadrizadh et al [11] (7-70 years with mean age 29.61 ±14.6), Kavukcu et al [12] (1-87 years with median age 32.7), Bagheri et al [13] 4-81 years with mean age 30.6±16.1), Yekeler et al [14] 6-87 years with median age 34.3±18.8).

In all of the studies, Dakak et al [4], Vasquez et al [8], Sadrizadh et al [11], Kavukcu et al [12], Bagheri et al [13], Yekeler et al [14], Ceran et al [15], Hasdiraz et al [16] the male were predominant over the female (in a male percent 80%, 51%, 52%, 51%, 52%, 61%, 53% and 75%) respectively, while in our study it was vice versa, female 24 (60%) and male 16 (40%) in ratio of 1.5:1. This may be attributed to the demographic composition of our population which is affected by wars since the last three or four decades and since the women are involved in work like agriculture and stock raising in the last years. The most common presenting symptom was cough which was seen in 29 patients representing (72.5%), which is comparable to Sadrizadh et al [11] 57%, Kavukcu et al [12], Bagheri et al [13] and Yekeler et al [14], while Dakak et al [4] and Vasquez et al [8] reported chest pain as the common presenting symptom in a percent of 54% and 62% respectively.

The most common chest x-ray finding (reported in 29 patients) in our study was uniform opacity which was seen in 18 patient representing (62.07%); only Hasdiraz et al [16] reported the most common chest x-ray finding in their study which was similar to ours, in which their finding was seen in 85 patients (61%). Regarding CT-scan finding (reported in 27 patients 67.5%, the cyst with fluid attenuation composition was predominant finding. Only Bagheri et al [13] reported similar CT-scan finding but in less frequency (64.3%) while others, Dakak et al [4], Vasquez et al [8], Sadrizadh et al [11], Kavukcu et al [12], Yekeler et al [14], Ceran et al [15], Hasdiraz et al [16] didn’t mention data about CT-scan findings.

Bilateral pulmonary involvement was seen in six patients representing 15%, lower incidence of bilateral pulmonary involvement was reported by Dakak et al. 1% [4] 1%, Vasquez et al [8] 11.3%, Kavukcu et al 1.25% [12], Bagheri et al 6.6%, Ceran et al 3.5% [16], and Hasdiraz et al 6.5% [16] while Sadrizadh et al [11] reported higher incidence in percentage of 25.3%. Hepatic involvement was seen in seven patients 17.5%, it was also comparable to Vasquez et al [8] and Sadrizadh et al [11] in percentage of 19% and 19.5% respectively. While Kavukcu et al [12] and Ceran et al [13] reported less involvement in percentage of 6% and 9% respectively. In the other hand, Bagheri et al [13] and Hasdiraz et al [16] reported higher hepatic involvement in percentage 34.4% and 26% respectively. The lobe most commonly affected in our study was the right lower lobe which was affected in 16 patients representing 36%, which is similar to compared studies, Dakak et al (52%) [4], Kavukcu et al (35%) [12], Bagheri et al (51.1%) [13], Yekeler et al (30.5%) [14], Ceran et al (38.7%) [16] and Hasdiraz et al [16] apart from Sadrizadh et al (29.9%) [11] and Vasquez et al (31%) [8] Whom reported left lower lobe as mostly affected lobe but does not go out from the concept of the lower lobes being most commonly affected lobes (the lower lobes affected more due to more blood supply and direct extension of worm through diaphragm to the lower lobe from the liver).

The cyst size larger than 10cm constituted 40.9% [documented in 18 patients] which is higher than Vasquez et al [8] 36.5%, Sadrizadh et al [11] 29.9% and Hasdiraz et al [16] 8.4% while Dakak et al [4] and Yekeler et al [14] mentioned the mean diameter of the cyst. Kavukcu et al [12], Bagheri et al [13] and Ceran et al [15] didn’t report such a data. The high incidence in our study may be due to deficit documentation of patients’ radiological findings and reports.

The intra-operative finding of cyst condition was categorized into intact cyst (I), ruptured non-infected cyst (Rn) and ruptured infected cyst (Ri). The incidence of intact cyst was 16 cysts representing (41.03%) while the ruptured non-infected was 13 representing (33.33%) and the ruptured infected constituted ten cysts in percentage of (25.64%). The cyst condition was documented only for 39 cyst from 50 cyst found in the treated patients. Our results showed the
The surgical approach used in managing our patients was posterolateral thoracotomy (55% right side – 40 % left side), staged bilateral thoracotomy carried out in two patients (5%) from which one of them had bilateral parenchymal resection technique in their surgical management. No sternotomy was done in our series and our results are comparable to the others, Dakak et al [4], Vasquez et al [8], Sadrizadh et al [11], Kavucuku et al [12], Bagheri et al [13], Hasdiraz et al [8], Yekeler et al [14], Ceran et al [15] and Bagheri et al [13]. The indication of resection in our cases was destroyed lobe or parenchyma , which seen in 16 patients (40%) followed by atelectatic not expanding lung tissue 13 patients (32.5%) then large HC occupying more than 50-60% of the lobe seen in 10 patients (25%). Only Yekeler et al [14] stated the indication of resection in their study, they concluded destroyed lobe as most reasonable cause for resection with percentage (61.1%).

The most common surgical technique done in our study was lobectomy, done in 23 patients (57.5%) followed by wedge resection. The same thing was done by Vasquez et al [8] in which lobectomy done in 56 patients (48.7%) and Yekeler et al [14], lobectomy done in 35 patients from total 36 patients. While the others, Dakak et al [4], Sadrizadh et al [11], Kavucuku et al [12], Bagheri et al [13] and Ceran et al [15] used parenchymal preserving technique in their surgeries (cystotomy with or without capponatage) in order 55%, 50 patients, 56%, 67.2% and 330 patients respectively.

The morbidity rate in our study was 27.5% which is higher than Kavucuku et al [12] 6.7%, Bagheri et al [13] 8.4% and Yekelar et al [14] 25%. This high rate can be attributed to small sample size and late presentation. The most common complication post-operatively was prolonged air leak as early complication and pneumothorax as late one, each occurred in three patients each (27.27%) which is similar to Sadrizadh et al [11], Hasdiraz et al [16] while Vasquez et al [8], Kavucuku et al [12], Yekeler et al [14], reported wound infection as common post-operative complication in percentages 6.08%, 2.3% and 19.7% respectively. Atelctasis was reported as common post-operative complication by Dakak et al [4] 8.3% and Ceran et al 13% [15].

The mean hospital stay in our patients was 9.625 days ranging from four to 60 days. Bagheri et al [13] reported shorter stay time ranging from four to six days while Dakak et al [4] (7-63 days) and Vasquez et al (10-17 days) [8] but on the other hand Yekeler et al [14] and Ceran et al [15] reported little longer stay time.

Our mortality rate was zero and it’s ranging from zero to 1.15% in the compared studies Dakak et al [4], Vasquez et al [8], Sadrizadh et al [11], Kavucuku et al [12], Bagheri et al [13], Yekeler et al [14], Ceran et al [15], Hasdiraz et al [16] and recurrence rate was zero, this can be attributed to that most patients are young with good health and good immunity. Other reason can be short duration of follow up or small size sample in addition to patients non-compliance with follow up. The recurrence was only reported by Vasquez et al [8] 0.86% and Kavucuku et al [12] 3.3%.

The follow up of the patients extended between 12 month to 18 month usually. The follow up was limited due to patients’ incompliance and some patients from old records didn’t attend regular visits for follow up or their phone number was invalid at time of research. As we stated no recurrence was documented in our study, only one patient presented two years later complaining from persistent cough which needed lobectomy due to rupture of lobar bronchus into the cavity. Another two patients complained from recurrent pneumothorax. The use of Thorascoscopic surgery or VATS in surgical treatment of pulmonary HC was reported by S.V. Parelkar et al [17] and L. Alpay et al [18], but still not used in our department till now mostly due to unavailability of devices and lack of experience with such approach in surgical treatment of pulmonary HC.

Conclusion
- Resection is indicated in:
  - A. Giant intact HC, that causes permanent and irreversible changes in the lobe.
  - B. Complicated HC ruptured or infected that lead to lung abscess or bronchiectasis.
  - C. Also in recurrent haemoptysis or recurrent suppuration following resection of affected part of lung.
- The most common cause of resection is destroyed lobe.

Declaration
Ethic committee approval obtained
Financial support and sponsorship:Nil
Conflicts of interest: There is no conflicts of interest

References