

Surgical Management of Pulmonary, pulmonary and Concomitant Hepatic and Abdominal Hydatid cysts : experience at tertiary care centre from North India

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Abstract: Echinococcosis is caused commonly by larval forms of Echinococcus granulosus , can affect any organ, Liver and Lungs being commonest organs involved. Surgical Evacuation of endocyst and management of residual cavity cures the disease. Staged procedures in bilateral Lung Hydatid cysts and concomitant Liver and abdominal hydatid cysts is the routine however Right thoracotomy and transphrenotomy can be performed for hydatid cyst in Right Lung and Hydatid cyst on superior surface of right lobe of Liver.

Key Words: Hydatid cyst , Lung , Liver, Abdomen, surgery

Introduction: Echinococcosis is one of the most neglected disease and needs to be controlled by 2050(WHO). Echinococcosis is zoonotic disease and is caused by larval forms of metacestodes ,commonly caused by Echinococcus granulosus with incidence of less than 1 to 200 per 100000 population depending upon the endemicity .Life cycle is based on predator-prey association passed through 2 hosts-Carnivore & herbivore prey. Carnivores(Canids & Felids) serve as definitive hosts for adult tapeworm (Gut) and their herbivorous prey(ungulates, rodents and lagomorphs) act as intermediate hosts for metacestodes .Humans are incidental intermediate hosts on ingestion of eggs from Definitive hosts. Ingested eggs by intermediate host release hexacanth embryo (Oncosphere) in gut and enter circulation and get trapped in organs. Oncosphere in organs mature into metacestodes with 3 layers (inner Germinal layer , laminated membrane and pericyst).Inner germinal layer contain brood capsules with protoscoleces (4 muscular suckers and an invaginated rostellum). Protoscoleces develop into adult worm in definitive host on ingestion, Protoscoleces can also develop into daughter cysts in intermediate host on cyst rupture/leak. Endocyst (Germinal layer with its contents and Laminated membrane) is surrounded by thick fibrotic layer lined (Pericyst which is produced by host inflammatory response) along healthy lung parenchyma.

Echinococcosis may involve any organ , however most commonly affected organ is Liver 80.23% (66.87% in children and 84.94% in adults). Lung is the second most common organ involved 22.91% (38.59% in children and 17.38% in adults .Spleen 2.36%, musculoskeletal system 1.59%, kidneys 1.13%, intracranial region 0.91%(2.61% in children, 0.31% in adults), omentum 0.91%, mediastinum 0.61%, cardiac region 0.58%, pelvic cavity 0.58%, diaphragm 0.55%, pancreas 0.13%, retroperitoneal area 0.13%, ovarian region 0.13%, uterine wall 0.06%,thyroid gland 0.03% and nasal cavity 0.03%.¹

In Children Lungs are the most common site -facilitate growth 3 times faster than in Liver due to negative pressure and compressive nature. Calcification occurs only in 0.7%, and daughter cysts formation is less common.

Bilateral Pulmonary hydatid occur in 4% to 26.7% of all cases of Lung hydatid disease .²

In about 8-10% of the cases, the cyst tends to appear in unusual body sites.³

X-Ray Chest, Ultrasound examination of Abdomen and Computerised tomography (Fig CT picture of two Pulmonary cysts), are mainstays of diagnosis of Hydatid disease . Complete blood count may show Leucocytosis, eosinophilia and Erythrocyte Sedimentation Rate may be raised but are non specific⁴

Surgery remains the mainstay of treatment for hydatid disease with preoperative and postoperative medical treatment .

Materials and Methods:

Records of all patients operated for Hydatid cysts of Lung , Hydatid cysts of Lung and Liver, Hydatid cysts of Lung , Liver and Spleen, Hydatid cysts of Lung , Liver , retroperitoneum and Pelvis , in the department of Cardiovascular & Thoracic Surgery , Government Medical College Jammu, a teaching tertiary care Centre were retrieved from Medical Records Department from year 2010 -2023 and analysed for Surgical Procedures. 101 patients were admitted from 01.01.2010 to 31.10.2023. There were 101 patients with 61 males and 40 females with age ranging from 6 years to 65 years.

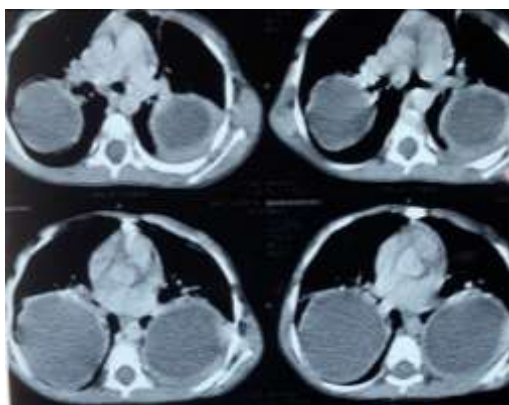
Procedure: All patients with Pulmonary Hydatid cysts were started on Albendazole 10mg/kg in two divided doses daily preoperatively and continued for at least 3 months postoperatively. Those who had Pulmonary and concomitant Liver , Spleen and other abdominal cysts were prescribed Praziquantal 600 mg twice weekly in addition to Albendazole and were given these drugs for 6 months postoperatively. Patients are prescribed these drug/drugs for 3 weeks and then stopped for a week , Liver function is monitored after every third week. Then again the drug /drugs started for three weeks and cycle repeated.

Operations were performed under general anaesthesia , using Single Lumen endotracheal tubes in initial years and double Lumen endotracheal tubes in later years of study . To start with , Thoracotomy incision is made between anterior and posterior axillary fold through 5th intercostal space, assessment made and accordingly incision can be extended anteriorly or posteriorly. For Right Lower lobe Lung hydatid cyst and concomitant Hydatid cyst on superior surface of Liver, right thoracotomy through 6th intercostals space is performed.

After thoracotomy the adhesions if any are released with cautery , the hydatid cyst /cysts is/are identified(if hydatid cyst/cysts are large and identified easily on thoracotomy, adhesions should be released after aspiration of cysts) , Cyst is isolated using 10% Povidone iodine soaked gauze pads, two stay sutures are taken on the pericyst and Hydatid fluid is aspirated using 16 gauge canula attached to suction tubing connected to wall suction. Another suction with suction tip should be available. Once the cyst collapses , Pericyst is incised using cautery and laminated membrane pops out which is incised and remaining fluid and contents sucked out using routine suction tip. Endocyst (Laminated membrane

with inner germinative lining) removed with sponge holding forceps. Daughter cysts if any are scooped out using spoon or larger scoop. Pericyst cavity is inspected for any debris and removed . Bronchial leaks are looked for using saline from syringe and asking the Anaesthetist to ventilate the lung, and sutured with non- absorbable sutures. Anaesthetist is asked to do endobrochial suction. The area of pericyst cavity is dabbed with povidone iodine gauze . the pericyst is not excised . Only in case of large cysts, the excessive, redundant pericyst wall on surface of Lung without overlying Lung parenchyma is excised without compromising normal lung parenchyma. Capitonage of residual cavity was performed in all cases except one 6 years old child . Three patients with uncomplicated Pulmonary Hydatid cysts underwent enucleation using positive pressure ventilation , to demonstrate the procedure to residents. Chest is closed after draining the pleural cavity using intercostals chest tube/tubes. All patients were extubated on table.

After discharge patients were followed up regularly every month for 3-6 months and then yearly.



CT of Bilateral Lung Hydatid Cysts



Aspiration of Lung Hydatid

Results:

Table I Age Distribution : Age ranged from 6 to 65 years

0-10 Yrs	11-20 Yrs	21-30 Yrs	31-40 Yrs	41-50 Yrs	51-60 Yrs	61-70 Yrs
2	17	33	24	18	3	4

Table II Symptoms : Many patients had more than one symptoms

Symptoms	Number of patients	Percentage
Chest Pain	68	67.32
Cough	51	50.49
Dyspnoea	9	8.91
Haemoptysis	8	7.92
Incidental Finding	3	2.97
Hydatidoptysis	2	1.98
Abdominal Pain & Swelling	2	1.98
Abdominal Pain	2	1.98
Urticaria	1	0.99

Table III

Organ/s involved	Number of Patients	Males	Females	Remarks
Right Lung	63	42	21	7 had more than one cysts
Left Lung	29	15	14	In other lobe of lung on same side
Bilateral Lungs	4	2	2	Case with bilateral lung cysts, with Liver & Spleen cysts included
Rt.Lung & Liver Superior Surface	2	1	1	
Rt.Lung & Liver Inferior Surface	1	0	1	
Left Lung & Liver Inferior Surface	1	0	1	
Left Lung(Unruptured) Rt Lung (Ruptured) Multiple in both Liver lobes,Spleen	1	0	1	
Right Lung, Diaphragm, Multiple retroperitoneal-between stomach &Spleen,Spleen & Diaphragm,around abdominal Oesophagus ,aorta and Liver invaginating into left lobe,Pevic Between lateral wall of Urinary bladder and Rectum	1	1	0	

Surgical Procedures:

Procedure
Number

Enucleation of Pulmonary hydatid cyst with overrunning of edges of cavity
1

Enucleation of Pulmonary hydatid cyst with capitonnage
2

Canula(16G) Aspiration,Incision of Pericyst and endocyst, suction of remainig cyst fluid , Evacuation of Endocyst (Laminated membrane with germinative lining), closure of bronchial leaks and Capitonnage (includes cases of Bilateral Lung cysts, VATS Surgery and those of Associated Liver , Abdominal cysts)
98

Single Stage Bilateral Thoracotomies: Aspiration ,Incision of Pericyst and endocyst,suction of remaining cyst fluid , Evacuation of Endocyst ,closure of bronchial leaks and Capitonnage
3

Single Stage right thoracotomy with Transphrenotomy: Aspiration , Incision of Pericyst and endocyst,suction of remaining cyst fluid , Evacuation of Endocyst ,closure of bronchial leaks and Capitonage ; with transphrenotomy for right lobe of Liver hydatid cyst on superior surface Aspiration , incision, suction of remaining cyst fluid , Evacuation of Endocystl , & drainage of remaining Liver

2

Single stage Left thoracotomy and Right Subcostal Laprotomy: Aspiration ,Incision of Pericyst and Endocyst, suction of remaining cyst fluid , Evacuation of Endocyst , closure of bronchial leaks and Capitonage ; and right subcostal laprotomy for inferior surface of right lobe of Liver hydatid cyst Aspiration , incision, suction of remaining cyst fluid , Evacuation of Endocyst and omentoplasty 1

Single stage Right thoracotomy and Right Subcostal Laprotomy: Aspiration ,Incision of Pericyst and Endocyst, suction of remaining cyst fluid , Evacuation of Endocyst , closure of bronchial leaks and Capitonage ; and right subcostal laprotomy for inferior surface of right lobe of Liver hydatid cyst Aspiration , incision, suction of remaining cyst fluid , Evacuation of Endocyst and drainage of Residual Liver Cavity

1

Single stage Left thoracotomy and Upper Midline Laprotomy: Aspiration, Incision of Pericyst and Endocyst, suction of remaining cyst fluid , Evacuation of Endocyst , closure of bronchial leaks and Capitonage for unruptured Left Lung cysts; and upper Midline Laprotomy for Multiple Abdominal—removal of large multiple Liver hydatids (both lobes) , omentoplasty and tube drainage of Large liver residual cavity and Splenectomy

1

Single stage Right thoracotomy and Upper Midline Laprotomy : Aspiration , Incision of Pericyst and Endocyst, suction of remaining cyst fluid , Evacuation of Endocyst , closure of bronchial leaks and Capitonage for Right Lower Lobe Lung cyst, removal of diaphragmatic cyst in toto; and upper Midline Laprotomy for Multiple Abdominal— Multiple retroperitoneal hydatid cysts between stomach and Spleen, between spleen and diaphragm around oesophagus ,aorta invaginating into left lobe of Liver , Pelvic cyst between Rectum and Urinary Bladder

1

We performed three Single Stage bilateral thoracotomies and two right Thoracotomy and transphrenotomy for Right Lung hydatid cyst and Liver hydatid cyst on superior surface.

Two patients underwent Single stage Left thoracotomy and right subcostal laparotomy for inferior surface of right lobe of Liver hydatid cyst and omentoplasty.

1 patient underwent Single stage Left thoracotomy and right subcostal laparotomy for inferior surface of right lobe of Liver hydatid cyst,

1 patient underwent Single stage Right thoracotomy and right subcostal laparotomy for inferior surface of right lobe of Liver hydatid cyst

1 patient hailing from far off area opted for Single stage Left thoracotomy and Upper Midline Laprotomy: Aspiration, Incision of Pericyst and Endocyst, suction of remaining cyst fluid, Evacuation of Endocyst, closure of bronchial leaks and Capitonage for unruptured Left Lung cysts; and upper Midline Laprotomy for Multiple Abdominal—removal of large multiple Liver hydatids (both lobes), omentoplasty and tube drainage of Large liver residual cavities and Splenectomy

This patient had three large Liver hydatids and one cyst had biliary communications and her bile drainage settled after two months.

1 patient hailing from Nepal insisted for Single stage right thoracotomy and upper Midline Laprotomy for Multiple Abdominal— Multiple retroperitoneal hydatid cysts between stomach and Spleen, between Spleen and diaphragm around oesophagus, aorta invaginating into left lobe of Liver, Pelvic cyst between Rectum and urinary bladder

Discussion:

Patient is cured as Parasite can be completely removed by surgery. Lung parenchyma should be preserved. During surgery spillage of cyst contents is carefully and meticulously avoided to prevent eventual recurrence. Surgical treatment should be tailored for each patient.

Surgical approach for Pulmonary hydatid cyst depends upon site, size, single or multiple, unilateral or bilateral, intact or complicated and destruction of Lung parenchyma.⁵

Staged Procedures were the usual normal routine in our patients.

Cyst Aspiration using 16 G canula, Incision of Pericyst and endocyst, suction of remaining cyst fluid, Evacuation of Endocyst (Laminated membrane with its germinative layer), closure of bronchial leaks and Capitonage of residual cavity was the commonest Procedure undertaken by us, as is done by others^{6,7}.

Capitonage helps to prevent air leak and postoperative empyema⁸. Enucleation of intact Pulmonary hydatid cyst in uncomplicated cysts using positive pressure ventilation was performed in three cases to demonstrate the procedure to the residents.

Bilateral Lung hydatid cysts were 3.96% in our study however 4-26.7%² and 15%¹ have been reported.

Although we have performed Single Stage Bilateral Thoracotomies in three patients, we do not recommend it as a routine as the postoperative complications arising on both sides can be catastrophic, so staged procedures with two to four weeks period should be followed^{9,10}

Single Stage right thoracotomy for hydatid cyst Right Lung with transphrenotomy for right lobe of Liver hydatid on superior surface was performed in 2 patients. 4-25% of patients of Hydatid cysts have concomitant right Lung and Liver cysts and can be tackled by thoracotomy and transdiaphragmatic approach¹¹

If the Liver cyst is giant, omentoplasty can be undertaken. If the liver hydatid cyst is present on inferior surface of Liver right subcostal laprotomy can be used.

1 patient hailing from far off area opted for stage Left thoracotomy and Upper Midline Laprotomy: Aspiration, Incision of Pericyst and Endocyst, suction Single of remaining cyst fluid , Evacuation of Endocyst , closure of bronchial leaks and Capitonage for unruptured Left Lung cysts; and upper Midline Laprotomy for Multiple Abdominal—removal of large multiple Liver hydatids (both lobes) , omentoplasty and tube drainage of Large liver residual cavities and Splenectomy This patient had three large Liver hydatids and one cyst had biliary communications and her bile drainage settled after two months .

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We had one recurrence in our series and no mortality.

Conclusion :

Surgical Plan and approach in patients of Hydatid Cysts should be tailored for each individual patient depending upon site/sites, single or multiple, size, uncomplicated or complicated, co -morbidity, and surgeon's experience of surgery for Hydatid disease and dealing with complications .

Cyst Aspiration using 16 G canula , Incision of Pericyst and endocyst, suction of remaining cyst fluid , Evacuation of Endocyst (Laminated membrane with its germinative layer), closure of bronchial Communications and Capitonage of residual cavity was the commonest Procedure undertaken.

Staged Procedures should be performed in Bilateral Large Pulmonary Cysts, Pulmonary and concomitant Liver and Other abdominal site cysts.

Single stage Thoracotomy and transphrenotomy can be performed for Hydatid cyst of Right Lung and Superior surface of Right Lobe of Liver .

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