

HYDATID CYST IN THE PAST AND THE PRESENTMayuri A. Kamble¹, Anand P. Thawait², Ashok T. Kamble³**HOW TO CITE THIS ARTICLE:**

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ABSTRACT: BACKGROUND: Hydatid cyst is a parasitic infection that is widely endemic in India. It is a zoonotic disease with man being an accidental dead end host. Despite its world-wide affection, its diagnosis still remains a matter of challenge due to lack of an authentic gold standard for its early detection. In such cases, clinical judgment and high index of suspicion, in an endemic area is a worthy tool. **AIMS AND OBJECTIVES:** The study was undertaken to highlight important clinical features of hydatid cyst to help early diagnosis and management, the rare presentations of hydatid cysts in an endemic belt of Maharashtra along with their management and the shift that had occurred from past to present in hydatid cyst management along with future implications. **MATERIALS AND METHODS:** The hydatid cyst pattern (etiology, symptomatology, diagnosis and treatment) was retrospectively analyzed in operated hospitalized patients at three hospitals, GMC, Nagpur, VNGMC, Veotmal and MGIMS, Sewagram from 1975 to 2010 at different cross-sections of time. **RESULTS:** A total of 560 patients, 289 males and 271 females, who were diagnosed and operated for hydatid cyst, were evaluated. The mean age of presentation was 39.8 years with 61.9% rural population. Abdominal pain was most common complaint among symptomatic group (88.5%). Liver was most commonly involved (56.9%) followed by lung (32.7%). The most common radiological method to diagnose the disease was ultrasonography, with 91.4% accuracy, followed by CT scan. Multiple organ involvement was seen in 11.1% cases. The recurrence rate was 3.7%. There was no mortality and no serious postoperative complication other than bile leak (8.4%) and pus discharge (4.1%) from drain. Preoperative Albendazole followed by surgery and postoperative albendazole had a definite role in preventing recurrence. The mean hospital stay was 10.8 + 2.67 (3-35) days. **CONCLUSION:** A sound knowledge of various modes of presentation of hydatid disease, combined with clinical judgment, high suspicion in endemic areas and confirmation by newer diagnostic modalities like USG and CT is required for early diagnosis and treatment and prevent complications.

KEYWORDS: Hydatid cyst, endemic, past, present.

INTRODUCTION: Hydatid disease has plagued mankind from its very origin. The ancient Greeks used the word "echinococcus" meaning "hedgehog berry" for hydatid cysts. Hippocrates pointed out "livers full of water" for cases of echinococcosis. Echinococcosis is endemic in developing countries like South America, Middle East, Australia, India and Mediterranean countries where flocks of sheep and cattle are raised with dogs. Increased travel, tourism and immigration, all over the world, has resulted in occurrence of echinococcosis, even in highly developed countries. The life cycle of *Echinococcus granulosus* was first described by Haubner in 1855, by experimentally infecting a domestic pig with *Echinococcus granulosus* eggs and later demonstrating a fully developed hydatid cyst of liver.^{1,2}

Intermediate hosts for *E. granulosus* are goat, sheep, swine, cattle, deer and human while definite hosts are dogs, wolves, jackals, and hyenas. The life cycle of echinococcosis begins in

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intermediate host and ends in definitive hosts. The digestive enzymes dissolve protective membrane of eggs ingested, releasing embryos which enters portal circulation to get trapped into liver (first filter). Some cysts escape portal area of liver and pass to second filter (lung). Hydatid cyst most frequently localizes in right lung and both lower lobes.^{3,4} Hydatid cysts can affect any organ of body except hair, teeth and fingernail. The sites of occurrence in descending order are liver (50-93%), lungs (18-35%), peritoneal cavity (10-16%), spleen (2-3%), kidney (1-4%), and retroperitoneum (0.5-1.5%).⁵ Most cysts of liver are univesicular (62.5%), single and involves right lobe (80.77%) due to drainage pattern of portal vein.⁶ Due to decreased resistance offered by alveolar loose tissue in lung parenchyma, cysts grow faster in lung than in liver.³ Hydatid cysts are usually asymptomatic until they are more than 5 cm in diameter.

Dull aching abdominal pain is the commonest mode of presentation, followed by organomegaly, anorexia, loss of weight, fever and dyspepsia. The rare presentations include hematemesis, jaundice, ascites and urticaria. Respiratory symptoms include breathlessness, cough, chest pain, hydatidoptysis and biliptysis.^{1,7} Though albendazole is useful in small sized, incidentally diagnosed hydatids, and surgery is the treatment of choice for large hydatids producing symptoms.

The diagnosis of hydatid cysts is challenging despite its widespread endemicity. It still depends on clinical judgment, experience and high index of suspicion and lacks a definitive investigative gold standard.⁸ Radiological investigations are useful, but serological investigations have limited value. The study was undertaken to highlight some important features of hydatid cyst, to help early diagnosis and management.

MATERIAL AND METHODS: A total of 560 cases were studied retrospectively from 1975 to 2010 in hospitalized operated patients at GMC, Nagpur, VNGMC, Yavatmal and MGIMS, Sewagram. The data was collected by searching patient's files in hospital medical record section and parameters like age, sex, habitat, source of infection, site of involvement, symptoms, management and outcome were analyzed. The cases that were not operated were not included in the study. USG was done in all cases; however, CT arrived in these hospitals only after 1972, thus benefitting only 283 cases, who actually required diagnostic confirmation. Isolated single organ involvement was labeled, when only one organ was found to be involved after USG, CXR and on exploratory laparotomy. Serological tests were not performed routinely due to non-availability, high cost and less weightage against radiological investigations.

Albendazole was approved for human use in 1987 and its use was seen in latter part of study. Follow up for recurrence was done for minimum of five years. Minimally invasive surgery was introduced in these hospitals only after 1990, replacing the earlier open method, after learning curve. Use of better scolicedal agents like betadine, chlorhexidine with less complication rate, was seen in latter half of study. Z test of significance was used for statistical comparative analysis (as the sample size was more than 30 with 95% confidence interval). P value <0.05 was considered significant and P value < 0.01 was considered highly significant. All the parameters were statistically analyzed using EPI6 INFO 6 programme.

RESULTS: 43.9% cases were seen in 30-40 years age group, followed by 22.7% cases in 20-30 years age group. The mean age of presentation was 39.8 years (3-69 years). 51.6% were males with a male

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to female ratio of 1.6:1. 61.9% were inhabitants of rural area, indicating that hydatid affected more outdoor field, young workers with unhygienic practices and contact with animals. [Table I]

26.3% patients related uncooked vegetables as source of infection, followed by dogs (17.5%), cattle (15.0%) and goat (7.9%). In 22.1% cases, the source of infection was not identified [Table II]. 65% patients presented to hospital between six months to two years of onset of symptoms. 12.8% patients presented within three months, mostly the urban population, who were thoroughly diagnosed even for minor symptoms. 16.4% patients presented after five years of onset of symptoms, either with large organomegaly or disseminated disease. The rural population tolerated symptoms till it became unbearable. [Table III]

53.1% patients presented asymptotically and were diagnosed incidentally in routine checkup. Among symptomatic group, pain was the most common symptom seen in 88.5% cases, with dull aching type being most common in 76.8%. Colicky pain was due to rupture into the biliary tract, which was seen in 3 cases. Throbbing type of pain was seen in all infected cases i.e. 10.6% cases. 68.1% cases presented with hepatomegaly, 8.7% cases presented with splenomegaly and 11.8% patients presented with lump at other sites (viz iliac bone, muscle). 87.1% patients had loss of appetite and weight and 38.4% patients had vomiting. 13.7% patients presented with fever, suggestive of infected hydatid. 4.9% cases presented with ascites, secondary to generalized hydatidosis in abdomen or portal hypertension.

Only three cases presented with jaundice and also ascites, who had calcified hydatid cyst near portal triad. Considering lung hydatids, 36.9% presented with breathlessness followed by cough (17.1%) and chest pain (13.7%). Four cases expectorated membranes in cough due to ruptured hydatid in bronchus, without anaphylaxis. Only one case of biliopytysis, secondary to hepatobronchial fistula was seen. One case presented with urticaria and erythema, without any other manifestation and was incidentally diagnosed as liver hydatid. There was no case of hematemesis, hydatidemia, hemoptysis, hydatiduria or hydatidenteria. 1.52% patients had right shoulder pain due to diaphragmatic irritation and two patients had associated polyarthritis secondary to circulating IgE and immune complexes. [Table IV]

Chest X ray was the initial investigation in lung hydatid, followed by confirmation on USG/CT. 53.6% cases had abdominal hydatid, 35.7% cases had thoracic hydatid (lung or mediastinal) and 10.8% cases had other site involvement [Table V]. Calcifications in right upper quadrant or lung was seen in 8.2% cases, of which 5.4% were round and 2.9% had other shapes. Gas within radioopaque shadow was seen in only one case of lung hydatid, depicting the combo's sign or pneumopericystic sign. [Table VI]

Ultrasound was the initial investigation for abdominal hydatid and it diagnosed hydatid cyst with an accuracy of 91.4%. USG was performed in all cases, to rule out other sites of hydatid also. Confirmation was done by CT in only 50.5% cases. As most patients were poor and CT was unavailable earlier, CT was not done in all cases. USG misdiagnosed hydatid as benign tumor in 5.7% cases, as ascites in 1.2% cases, as abscess in 1% cases, as ovarian tumor in 0.5% cases and as bronchogenic cyst in only one case. [Table VII]

Liver was involved most commonly as single organ (45.3% cases), followed by lung (32.7%), spleen (4.2%) and muscle (3.2%). Two cases involved ala of ileum bone, two cases involved total retroperitoneum and four were isolated in kidney. One case involved only small bowel mesentery while three were giant abdominal hydatid, with pericyst extending to whole peritoneum, and

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presented as massive ascites clinically. Multiple organ involvement was seen in 11.1% cases. Among these, 93.5% cases had two organ involvement. Lung was the most common extra-abdominal organ involved in multiorgan hydatid. Multiple hydatids in heart were seen with kidney and spleen hydatids in one case. Third filter involvement, after bypassing lung (second filter) was seen in 8% cases. [Table VIII]

On ultrasound, 68.9% cysts were solitary, 25% were multiple in single organ and 10.5% were multiple involving more than one organ. 53% cysts were unilocular, 42.5% cysts were multilocular. 51.3% cases showed multiple daughter cyst, 12.8% showed hydatid sand and 7.7% showed internal echoes suggesting infected hydatid. 17.5% cysts were calcified on USG, 92.3% were more than five cm, indicating late presentation due to hydatid slow growth and 42.5% cysts were deep (> 2cm from surface). Among hepatic hydatids, 85% had right lobe involvement. Postero-superior surface was the most common site involved (48.0%). [Table IX]

Eosinophilia more than 4% was seen 23.5% cases, while leucocytosis was seen in 8.2% cases. Bilirubin more than 1 mg% was seen in five cases while altered liver enzymes were seen in 4% cases. [Table X]

5% cases presented with suppuration. Considering rare presentations, three cases presented with biliary rupture and only one case with intraperitoneal rupture, without anaphylaxis. One case presented with intrathoracic rupture through diaphragm, hepatobronchial biliary fistula and destruction of lung parenchyma. Calcification of dead parasite with organ destruction (left lobe of liver atrophy) was seen in one case. Three cases of lung hydatid presented as empyema, one case as pneumothorax secondary to broncho-pleural fistula and four cases as intra-bronchial rupture and spontaneous expectoration of membranes in cough. Three had subsequent cure and one had residual infected cavity. One case of cardiac hydatid presented as arrhythmia. [Table XI]

The patient who received preoperative albendazole had 1.2% recurrence and 0.7% intraoperative spillage in contrast to 2.3% recurrence and 1.25% spillage in patients who received no albendazole [Table XII]. 70% cases were operated by open method (thoracotomy or laparotomy). 24.2% cases were operated by laparoscope and 5.8% were operated by VATS [Table XIII]. In all hydatid cysts, before opening pericyst, scolicalid agents were injected. 10% Betadine was most commonly used in 61.6% cases, followed by 0.5-1.5% cetrimide in 20.2% cases. [Table XIV]

Intraoperatively, 82.8% cysts were non-infected with clear fluid, while 17.1% cysts were infected. 51.6% cysts were flaccid, but intact while 34.3% cysts were tense. 10.9% cysts were calcified. 1.9% cases had intra operative rupture without anaphylaxis. Among abdominal hydatids, 16.9% cases had omental adhesions. Biliary rupture was seen in three cases (0.5%). Communication into thoracic cavity was seen in five cases (0.8%). [Table XIII]

52.3% cases had enucleation with partial pericystectomy performed, while total pericystectomy was done in 47.6% cases. Saucerisation with drainage was the most common fate of residual cavity after partial pericystectomy, performed in 56.3% cases, followed by suturing with closure of cavity (after filling with saline), performed in 15.4% cases. The pericyst was left open into peritoneal cavity without drainage in 1% cases. Segmental liver resection was performed in one case. In no case, hemihepatectomy was done. Lobectomy was done in one case. [Table XV]

Post operatively, 8.4% patients had bile leak in drain while 4.1% patients had pus discharge from drain. Among recurrent cases, only 61.9% cases were re-operated, with maximum patients undergoing two operations. There was no mortality. 2.8% patients had recurrence at same site, while

0.9% patients had recurrence at other sites. The mean post-operative hospital stay was 10 + 2.67 days (3-35 days) [Table XVI].

DISCUSSION: Despite long standing public health measures to control spread of *Echinococcus granulosus*, hydatid cysts is still endemic in many sheep rearing areas of India. Very few retrospective studies have been undertaken to throw light on the clinical manifestations, diagnosis, treatment and outcome of hydatid cysts in India and how this scenario has changed with time and advancements in surgery.

Demographic data in this study has indicated that males were more affected than females (51.6% vs 48.4%) with male to female ratio of 1.6:1. 61.9% cases were inhabitants of rural area. Montazeri et al, Priego et al and Rokni et al,^{4,9,10} also concluded in their study that hydatid cysts affect those engaged in outdoor field workers, are in contact with animals and follow unhygienic practices.

The disease had its peak incidence in 20-40 years with age range from 3 to 69 years. Khalili et al,¹¹ and Shiryazdi et al,¹² in their series had peak incidence between 27 and 40 years. This young age group were in more contact with animals (either occupational or as pet), which introduced the disease in them. Being the most active and productive members within the family, any affection of this age group can economically ruin the family. No data is available about the economical impact of hydatid cyst which needs further research and evaluation.

Most patients presented to hospital between six months to two years of onset of symptoms, suggesting the benign nature of the disease. The educated urban population presented early and most of them were diagnosed incidentally, during routine checkup for minor symptoms. All those with presentation more than five years, belonged to rural community. Late presentations were usually associated with complications, which made symptoms unbearable.

Most patients presented asymptotically. Among symptomatic group, pain was most common (88.5% cases). Shiryazdi et al and Mousavi et al also reported abdominal pain as most common complaint (66% cases) followed by anorexia (24%), nausea (20%), fever (12%) and weight loss (12%)^{12, 13}. They concluded that any patient with dull aching pain of long duration with organomegaly and anorexia, arriving from hydatid endemic area, must be evaluated for hydatid.

Ultrasonography was performed in all patients, with 91.4% accuracy followed by CT in 50.5% cases. Torgerson PR et al^{8, 14} also concluded USG as best initial investigation. Ultrasonography appeared as available diagnostic only after 1970, while CT was introduced only after 1995 in all these three medical colleges. All cases, prior to era of CT, with inconclusive USG, were diagnosed on clinical judgment and confirmed on exploration.

Serological tests were available, but only at specialized centre, and their use was limited by high cost, non-affordability and non-availability. Besides, Serological test alone was not useful as many affected patients have negative serological test.⁹ USG with serological tests increased the predictive value and can decrease the need of CT in rural areas, apart from being cost effective, as was confirmed by Priego P et al^{9,15} Chest X ray was used for lung hydatids.

Calcifications on X ray depict dead hydatid and less chances of intra-operative anaphylaxis. Maximum cysts were solitary, had single organ involvement, with most common localization in liver, followed by lung, which was consistent with other studies of Amouiean S et al and Sadjjadi SM et al^{16, 17,18}. The bone hydatids caused iliac bone expansion and presented with suspicion of malignancy. The daughter cysts were multiple, compactly placed, looked like grapes and had hydatid fluid absorbed.

Previous studies have shown no significant differences between post-surgical resection of a single hydatid cyst or multiple cysts in the literature.^{19, 20, 21}

92.3% were more than five cm, indicating late presentation due to hydatid slow growth and 42.5% cysts were deep (> 2cm from surface). The average size of cysts was 9.8 cm (1-37 cm). Postero-superior surface was the most common site involved (48.1%). Bedioui H et al studied predictors of postoperative morbidity and concluded that cysts located in dome of liver, cysts more than 9 cm, cystobiliary fistula and depth of cyst were independent poor prognostic factor for morbidity.^{22,23}

The larger the cyst, the greater the risk of the cyst to come into contact with bile ducts, leading to erosion, thus resulting in fissuring of bile ducts or rupture of cysts into bile ducts. The morbidities, most commonly encountered, were external biliary fistulas and infection of residual cavity.^{24, 25}

Failure to obliterate a large residual cavity and inability to achieve hemostasis and biliostasis after radical surgery can result in such complications.²⁶ Biliary fistulas, in earlier days, were managed by keeping abdominal drain for long duration, till a tract was formed and slowly withdrawing it. After the availability of endoscopy, biliary drainage was managed with endoscopic sphincterotomy.

The sphincter of oddi at lower end maintains enough pressure, which forces bile to drain through easy natural passage i.e. biliary canaliculi opening into cyst cavity. Endoscopic sphincterotomy and stent placement immediately reduces pressure, allows easy passage into duodenum, rapid decrease in drain and shrinkage of residual cavity.

All of the patients underwent surgery, but only 433 cases received preoperative albendazole. The invention of benzimidazoles particularly albendazole changed the scenario in management of hydatid cyst. It caused a significant decrease in recurrence rate and supported the medical management of small, inaccessible hydatids. Albendazole inoculates into the ectocyst, leading to selective alteration in cell wall permeability. The altered cell wall releases non-antigenic fluid into tissues, which is absorbed. The tension in cyst becomes less, which kills the embryo. Some embryos in vesicular stage are totally phagocytosed.

This mechanism has reduced the recurrence and has facilitated surgical excision in toto without rupture. Albendazole administration decreased intracystic tension, prevented intraoperative spillage from 1.25% to 0.7% and thus decreased recurrence from 2.3% to 1.2%. In previous surveys, the recurrence rate after surgery has been reported between 1.1 and 9.6%.²⁷

Minimally invasive surgeries were performed in 30% of cases (24.2% by laparoscopy and 5.8% by video assisted thoracoscopic surgery). All these surgeries were performed after 1990. Minimally invasive surgeries combined with intraoperative injection of scolicidal agents improved recovery, reduced hospital stay and decreased complication rate.

However, comparative analysis of the same was not done. Partial pericystectomy, enucleation of hydatid cyst, saucerisation and drainage was most commonly performed procedure. With better understanding of lobar anatomy of liver, segmental liver resection and hemihepatectomy were introduced as newer therapeutic procedures.

The present study also observed a changing trend in scolicidal agents with more use of 80-95% alcohol, 0.5-1.5% cetrimide and 3% H₂O₂, in early part of study followed by more use of 10% betadine, 1.5% cetrimide and 0.15% chlorhexidine in latter part. The decreasing trend was due to more complication rate associated with previous scolicidal agent. The mean duration of hospital stay

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was 10 + 2.67 days (3-35 days). Priego P et al reported mean duration of hospital stay after surgery as 8.65 days. There was no mortality.⁹

CONCLUSION: Hydatid cyst is still endemic in many parts of India and a sound knowledge of its various modes of presentation, combined with clinical judgement, high suspicion in endemic areas and confirmation by newer diagnostic modalities like USG and CT is required for early diagnosis and treatment and prevent complications. With the availability and cellular mechanism of action of albendazole, the recurrence is markedly reduced. Good postoperative care, fine intraoperative techniques, better scolical agents, suitable antibiotics and employment of endoscopic procedures like CBD stenting, in cases of biliary leak and minimally invasive surgical methods has reduced postoperative hospital stay and expenditure of the patient. So, comparing the past experience with the present, there is significant difference and upward progression of the results.

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Age group	No. of patients (N=560)
0-10	15 (2.7%)
10-20	38 (6.8%)
20-30	127 (22.7%)
30-40	246 (43.9%)
40-50	78 (13.9%)
50-60	56 (10%)
>60	7 (1.25%)

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Sex	No. of patients (N=560)
Male	289 (51.6%)
Female	271 (48.4%)
Habitat of patients	No. of cases (N=560)
Rural	347 (61.9%)
Urban	213 (38.1%)
Total	560

Table I: Demographic data of the patients

Source of infection	No of patients
Uncooked vegetables	147 (26.3%)
Dog pets	98 (17.5%)
Cattle	84 (15.0%)
Goat	44 (7.9%)
Sheep breeders	31 (5.5%)
Pig	16 (2.9%)
Horse	16 (2.9%)
Not Identified	124 (22.1%)
Total	560

Table II: Source of infection among patients

Duration of symptoms	No. of patient
< 3 months	72 (12.8%)
3-6 months	134 (23.9%)
6-12 months	171 (30.5%)
1-2 yrs.	193 (34.5%)
2-5 yrs.	69 (12.3%)
> 5 yrs.	92 (16.4%)
Total	560

Table III: Duration of symptoms before presentation to hospital

Mode of presentation	No. of cases (N=560)
Asymptomatic	297 (53.1%)
Symptomatic	263 (46.9%)
Symptoms	No. of Patients (N=263)
Abdominal	
Pain – dull aching	202 (76.8%)
Pain – colicky (biliary)	3 (1.1%)
Pain – throbbing (severe)	28 (10.6%)
Lump (Hepatomegaly)	179 (68.1%)

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Lump (splenomegaly)	23 (8.7%)
Lump (Generalized)	3 (1.1%)
Lump (Other Sites)	31 (11.8%)
Loss of appetite & weight	229 (87.1%)
Vomiting	101 (38.4%)
Hematemesis	1 (0.3%)
Hydatidemia	0
Jaundice	3 (1.1%)
Ascites	13 (4.9%)
Fever (mild)	5 (1.9%)
Fever (High grade with chills and rigor)	31 (11.8%)
Dyspepsia	135 (51.3%)
Allergic	
Urticaria/ Erythema	1 (0.3%)
Anaphylactic shock	0
Respiratory	
Breathlessness	97 (36.9%)
Chest pain	45 (17.1%)
Cough	36 (13.7%)
Membranes in cough (Hydatidoptysis)	4 (1.5%)
Hemoptysis	0
Bilioptysis (Hepatobronchial Biliary Fistula)	1 (0.3%)
Others	
Hydatiduria	0
Hydatidenteria	0
Shoulder pain	6 (2.2%)
Hydatid thrill (fremitus)	3 (1.1%)
Polyarthrits (Circulating IgE & immune complex)	2 (0.8%)
Table IV: Symptomatology of patients with hydatid disease	

Broad Distribution	No. of cases
Thorax	200 (35.7%)
Abdomen	300 (53.6%)
Bone	2 (0.4%)
Others	58 (10.4%)
Total	560

Table V: Broad Distribution of hydatid cysts in body of patients

X-Ray findings	No. of cases (N=560)
Calcification (Right upper quadrant/ Lung)	46 (8.2%)
Radioopaque shadow	
Round	30 (5.4%)

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Other shapes	16 (2.9%)
Gas within radioopaque shadow	1

Table VI: X ray findings of patients with hydatid disease

Misdiagnosed hydatid cyst on USG	No. of cases (N=560)
As benign tumor	32 (5.7%)
As ascites	7 (1.2%)
As abscess	6 (1%)
As ovarian tumors	3 (0.5%)
As bronchogenic cyst	1 (0.2%)
Total	49 (8.8%)

Table VII: Cases of hydatid cysts misdiagnosed on USG

*Accuracy of USG to diagnose hydatid is 91.2% (100%-8.8%)

Single Organ involved (Isolated)	No. of cases (N=560)
Liver (70%)	261 (46.6%)
Lung (25%)	183 (32.7%)
Spleen	24 (4.2%)
Muscle	18 (3.2%)
Kidney	4 (0.7%)
Totally Retroperitoneum	2 (0.4%)
Giant abdominal hydatid	3 (0.5%)
Bone (Ala of Ileum Bone)	2 (0.4%)
Mesentry	1 (0.2%)
Heart	0
Pancreas	0
Brain	0
Total	498

Table VIII A: Single Organ involvement in patients with hydatid disease

Multiple organ involvement	No. of cases (N=62)
2 organs	58 (93.5%)
3 organs	3 (4.8%)
4 organs	1 (1.6%)
Multiple Organ Involvement	Distribution of cases specifying organs (N=560)
Lung	16 (13 with Liver, 3 with Spleen) (2.8%)
Heart	1 (with Kidney & Spleen) (0.2%)
Abdomen	45 (Liver, Spleen, Peritoneum, Kidney, Mesentry) (8.0%)
Total	62

Table VIII B: Multiple organ involvement in patients with hydatid disease

*Multiple organ involvement was seen in 11.1% cases (62/560)

+All 45 cases of abdomen had liver as main site

ORIGINAL ARTICLE

USG characteristics	No. of patients (N=560)
Solitary	386 (68.9%)
Multiple (Single Organ) (25-33%)	115 (20.5%)
Multiple (> 1 organ)	59 (10.5%)
Unilocular	297 (53.0%)
Multilocular (Single Organ) (50%)	195 (34.8%)
Multilocular (> 1 organ)	43 (7.7%)
Multiple daughter cysts (50%)	287 (51.3%)
Hydatid sand	72 (12.8%)
Internal echoes	43 (7.7%)
Calcification	98 (17.5%)
Size on diagnosis > 5cm	517 (92.3%)
Distance from surface > 2 cm (Deep)	238 (42.5%)

Table IXA: USG characteristics of hydatid cysts (thorax, abdomen and other sites)

Liver lobe Involvement	No. of cases (N=319)
Right (85%)	271 (85%)
Left	42 (13.1%)
Both	6 (1.9%)
Liver Surface involvement	No. of cases (N=319)
Postero-superior	153 (48.0%)
Inferior	110 (34.5%)
Anterior	43 (13.5%)
Lateral	13 (4.0%)

Table IXB: USG characteristics of hepatic hydatid cysts

*Total number of cases of liver hydatids was 319, considering single and multiple organ involvement both.

Complete blood count	No. of cases (N=560)
Eosinophilia (>3%) (25% cases)	132 (23.5%)
TLC > 10000/mm ³	46 (8.2%)
Liver function test	No. of cases (N=560)
Bilirubin > 2 mg%	5 (0.9%)
Altered liver enzymes	23 (4.0%)

Table X: Other Investigations in hydatid cysts

ORIGINAL ARTICLE

Complications	No. of cases (N=560)
Suppuration	28 (5.0%)
Biliary rupture (5-10%)	3 (0.5%)
Intraperitoneal rupture	1 (0.2%)
Calcification of dead parasite with left lobe liver destruction	1 (0.2%)
Intra thoracic rupture with thoracobiliary fistula	1 (0.2%)
Lung hydatid	
Empyema	3 (0.5%)
Bronchopleural fistula (pneumothorax)	1 (0.2%)
Intrabronchial Rupture (Hydatidoptysis)	4 (0.7%)
Others	
Bony Deformity	2 (0.4%)
Muscular Deformity	13 (2.3%)
Arrhythmias	1 (0.2%)
Seizures	0

Table XI: Natural course and complications of hydatid cysts

*13 cases of muscle deformity included 11 cases of muscle hydatid and 2 cases of retroperitoneal hydatid.

+Arrhythmia was seen in one case of cardiac hydatid

Preoperative albendazole (days)	Recurrence (N=560)	Intra-operative spillage (N=560)
No albendazole (N=127)	13 (2.3%)	7 (1.25%)
Pre-operative 7 days (N=112)	6 (1.1%)	3 (0.5%)
Pre-operative 14 days (N=321)	2 (0.1%)	1 (0.2%)

Table XII: Pre-operative treatment given to patients with hydatid disease

Operative procedure	No. of cases (N=560)
Open	392 (70%)
Minimally invasive LAP	136 (24.2%)
VATS	32 (5.8%)

Table XIII: Mode of operative treatment given to patients with hydatid disease

Intra-operative presentation	No. of cases (N=560)
Infected	96 (17.1%)
Non-infected (Daughter hydatid cyst with clear fluid)	464 (82.8%)
Tense	192 (34.3%)
Flaccid but intact	289 (51.6%)
Intra-operative rupture	11 (1.9%)

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Intraoperative anaphylaxis	0
Calcified	61 (10.9%)
Intraoperative biliary communication	3 (0.5%)
Omental adhesions	95 (16.9%)
Fistula formation with organ	0
Fistula into thorax	5 (0.8%)

Table XIII: Intraoperative presentations of hydatid cysts

Scolicidal used (5-10 minutes)	No of cases (N=560)
Betadine (10% polyvinyl pyrrolidone iodine)	345 (61.6%)
Cetrimide (0.5% - 1.5%)	113 (20.2%)
Chlorhexidine (0.15%)	46 (8.2%)
Alcohol (80% - 95%)	31 (5.5%)
H ₂ O ₂ (3%)	25 (4.5%)
Hypertonic saline (15%-20%)	3 (0.5%)
AgNO ₃ (0.5%)	0
Formaldehyde (10%)	0
Gluteraldehyde	0
Iodides	0
Sodium hypochlorite (1%)	0

Table XIV: Scolicidal agents used in treatment of hydatid cysts

Procedures used	No. of cases (N=560)
Pericystectomy	267 (47.6%)
Enucleation with partial pericystectomy	293 (52.3%)
Fate of cavity after partial pericystectomy	No. of cases (N=293)
Saucerisation and drainage	165 (56.3%)
Suturing with closure of cavity (after filling with saline)	45 (15.4%)
Captionnage	33 (11.3%)
Omentoplasty	26 (8.8%)
Marsupialization and drainage	21 (7.2%)
Leaving open into peritoneal cavity	3 (1.0%)
Segmental liver resection	1 (0.3%)
Lobectomy	1 (0.3%)
Hemihepatectomy	0

Table XV: Operative procedures performed for hydatid cysts

ORIGINAL ARTICLE

Post-operative complications	No. of cases (N=560)
Biliary leak in drain	47 (8.4%)
Pus in abdominal drain	23 (4.1%)
Pneumothorax (bronchopleural fistula)	18 (3.2%)
Lung collapse	3 (0.5%)
Empyema	5 (0.9%)

Table XVII: Postoperative complications in operated cases of hydatid cysts

No. of operations	No. of cases (N=21)
One	4 (19.0%)
Two	3 (14.2%)
Three	2 (9.5%)
Four	3 (14.2%)
> four	1 (4.8%)
Total	13 (61.9%)

Table XVIII: Number of operations performed in recurrent cases

*8 cases did not undergo re-operation and were managed medically

Outcome	No. of patients (N=560)
Mortality	0
Morbidity	70 (12.5%)
Recurrence	
Same site	16 (2.8%)
Other site	5 (0.9%)
Hospital stay	10 + 2.67 (3-35 days)

Table XIX: Outcome of patients with hydatid diseases

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