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A REVIEW ON HYDATID CYST OF LIVER, WITH A BRIEF REPORT OF 126 CASES FROM FARS PROVINCE

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ABSTRACT

A retrospective review of 126 surgically-proven cases of hydatid cyst of the liver was performed. Sixty percent of the patients were in the third and fourth decades of life. The most common presenting complaint was right upper abdominal pain and/or fullness sensation (92%).

Duration of symptoms was more than two months in 61%. One third of the patients had more than one cyst in the liver. Cysts were located in the right lobe in 68%, left lobe in 19% and both lobes in 13%. In 6%, other intra-abdominal cysts were found during surgery. Cysts were infected in 29% and were complicated by rupture or fistula formation in 10%. Chest x-rays were abnormal in 37% (elevated right hemidiaphragm, 22%; right lower lobe infiltrate/atelectasis, 5%; right pleural effusion, 13%; pulmonary hydatid cyst, 7%). Plain abdominal films were abnormal in 41% (curvilinear calcification, 22.5%; hepatomegaly, 24%; splenomegaly, 5%; air fluid level in the liver cyst, 2.5%). Upper gastrointestinal barium studies showed extrinsic pressure on the stomach and duodenum in 40%. Liver scintigraphy was abnormal in 96%, but in 25% there was a discrepancy either in number or location of the cyst(s) when compared to surgical findings. Angiography was abnormal in all the cases performed. Literature on pathophysiology, radiologic findings (including CT scan and ultrasonography), and on surgical and medical therapy of hydatid disease of the liver is reviewed.

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Key words: *Echinococcus, Hydatid disease, Hydatid cyst, liver*

INTRODUCTION

Hydatid disease has a world-wide distribution; in sheep and cattle-raising countries it is an epidemic problem. There are two main forms of the disease in man. The more common form, cystic hydatid disease, is due to *Echinococcus granulosus*, a 4-6mm long tape worm which infests the small intestine of dogs. The eggs which are released in the infested dogs' feces, contaminate the vegetables which are ingested by sheep and cattle. The chitinous shell of the eggs dissolves and the hatched embryos pass through the intestinal mucosa and

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into the portal circulation. The majority of the embryos are caught in the liver which acts as a filter. Those which escape are caught in the pulmonary circulation which serves as the second filter. The few that escape can end up in all the remaining organs. In these organs the embryo develops into a cyst and reaches 5 mm in diameter after three months. The life cycle of the parasite is completed when the infected sheep or cattle (intermediate host) are slaughtered and dogs (definitive host) eat the viscera which contains the larval form. The larva subsequently develops into adult tape worm in the dog's intestine. Man is the accidental intermediate host who acquires the infection similar to sheep and cattle by ingestion of contaminated vegetables or from close contact with infected dogs. Places where the incidence of hydatid disease has been high include the Middle East, South America, Australia, New Zealand, Japan, the Philippines, Northern China and around the Mediterranean and the Baltic Seas.[1-3]

The less common form, alveolar hydatid disease, is caused by *Echinococcus multilocularis*. It invades the liver and produces a granulomatous reaction which mimics malignancy. It is limited geographically to the northern hemisphere where it is epidemic in Alaska, some areas of Canada, Central Europe, Siberia and northern Japan. Arctic fox and small rodents serve as final and intermediate hosts, respectively.[3]

In Iran, hydatid cyst is prevalent in most parts of the country, especially in the rural areas where offal from slaughter houses in not carefully disposed of, or where slaughtering is practiced on farms. A survey in the west of Iran in 1973 detected infection in 16 of 34 stray dogs. 28 of 55 sheep and 12 of 116 cattle.[4] The average figure for infected stray dogs in epidemic countries has been estimated to be about 30%.[1]

With the increasing ease of travel and migration, the disease which is usually contracted in early childhood is now being encountered in immigrant adults in many parts of the world in which it is not epidemic. Thirty-seven of 40 patients diagnosed and treated for hydatid cyst of the liver in Toronto General Hospital and 22 of 24 in southern California were immigrants.[5,6] For this reason it is important for general physicians, surgeons and interventional radiologists of the nonepidemic areas to familiarize themselves with the diagnostic and therapeutic dilemmas of this disease.

PATIENTS

The present study consists of 126 patients with hydatid cyst of the liver operated at the affiliated hospitals of Shiraz University School of Medicine, Shiraz, Iran. This medical center is the major referral center of Fars, a southern province bordering the Persian Gulf, with a population of about 2 million at the time of the study. Because of tribal migration and rural customs, hydatid disease has remained one of the major community health problems in this region.

RESULTS

During an eight year period, 126 patients were diagnosed and surgically managed for hydatid cyst of the liver. Demographic features are shown in Table I. The youngest patient was seven years old. The most common presenting complaints were right upper quadrant pain (73.5%) or fullness sensation (52%). Presenting features and the duration of symptoms are shown in Table II. The longest duration of symptoms was eight years. Among the laboratory tests, alkaline phosphatase was abnormal in 32%.

Radiologic findings (Table III): Chest radiographs of 109 patients were available for review. They were abnormal in 37% of the cases. Twenty-two percent had significant elevation of right diaphragm, 7% had hydatid

TABLE I. Demographic Features

Total Number	126
Males	53%
Age (years):	
< 20	21%
20 - 29	35%
30 - 39	24%
40 - 49	12%
50-59	5%
≥60	3%

TABLE II. Presenting Signs and Symptoms

Righe Upper Quadrant Pain	73.5%
Right Upper Quadrant Fullness Sensation	52%
Both of the Above	34%
History of Fever	26%
History of Jaundice	26%
Anorexia	10%
Weight Loss	8%
Vomiting	7.5%
Pruritus	1.5%
Duration of Symptoms :	
<10 days	9.5%
< 1 month	25.5%
1-2 months	13%
2-12 months	22%
> 12 months	39%

cyst in their lungs (five in the right and two in the left lung, one substernal), 5% had right lower lobe atelectasis or infiltrate and 3% had right pleural effusion.

Abdominal radiographs were obtained in 80 patients. They were abnormal in 41% of the patients. In 22.5% curvilinear calcification was present in the liver, 24% had hepatomegaly, 5% splenomegaly and 2.5% had air fluid level in their liver cyst.

Upper gatrointestinal barium study revealed evidence of extrinsic pressure over the stomach, duodenum or both in 40% of 42 patients in whom the test was done. Barium enema was performed in only six patients, in four of whom it revealed evidence of extrinsic pressure over the hepatic flexure. Liver scintigraphy was obtained in 48 patients. It was abnormal in 96% of the cases although only 83% of the scans revealed space occupying lesion (SOL) in the liver. In 25% of the scans with SOL there was a discrepancy between the scintigraphic and operating room findings, either in the number or location of the cysts (the latter was the more common discrepancy). Angiography was performed in 12 patients. It was diagnostic in all of these patients.

All of the patients had undergone surgery as detailed by Saidi.[1] Surgical findings are shown in Table IV. In 6% other cysts were found during laparotomy (two spleen, one common bile duct, one kidney, one cecum). Two of the patients were found to have concomittant cirrhosis of the liver.

TABLE III: Radiographic Features

Chest radiograph (CXR):	
Number of Patients	109
Abnormal	37%
Elevated Right Hemidiaphragm	22%
Coexistent Pulmonary Cysts	7%
Right Lower Lobe Atelectasis/infiltrate	5%
Right Pleural Effusion	13%
Abdominal radiographs (obstructive series):	
Number of Patients	80
Abnormal	41%
Curvilinear Calcification in Liver	22.5%
Hepatomegaly	24%
Splenomegaly	5%
Air fluid Level in Hepatic Cyst	2.5%
Uper Gastrointestinal Barium Studies:	
Number of Patients	42
Extrinsic Pressure on Stomach/Duodenum	40%
Barium Enema:	
Number of Patients	6
Extrinsic Pressure on Hepatic Flexure	67%
Liver Scintigraphy:	
Number of Patients	48
Abnormal	96%
Space Occupying Lesion(s)	83%
Discrepancy with Surgical Finding	25%
Angiography:	
Number of Patients	12
Cystic Lesion	100%

DISCUSSION

Liver and lung are the organs most frequently involved with hydatid disease. Liver is reportedly involved in 75%, lungs 15% and other organs in 10% of patients.[1] In our patients, 73% had a single hepatic cyst, in two-thirds of the patients the cyst was located in the right lobe and in the remaining cases it was either in the left lobe (19%) or they had one or more cysts in each lobe (13%). Others have also reported 50-75% involvement of the right lobe with less frequent involvement of the left lobe or both lobes.[5-8]

Our findings that 60% of the patients were in their third or fourth decade of life while the disease is mostly acquired in childhood and that 21% were younger than 20 years old at the time of diagnosis is in agreement with previous reports.[1,9] Cysts grow faster in the easily compressible organs such as lungs or brain, this may explain the higher frequency of involvement of these organs in childhood.[9] The most common presenting symptoms in our patients were abdominal pain (73.5%), sensation of right upper quadrant fullness (52%) or both (34%). History of fever and jaundice were each present in a quarter of our patients. Our findings are very similar to two reports from North America.[5,6] Symptoms usually occur when the cyst is large enough to compress or stretch pain-sensitive structures or interfere with their function, or when there is a complication such as rupture of the cyst into the biliary tree or superinfection. In about one third of our patients serum alkaline phosphatase was elevated. This is similar to 30-38% elevated levels in the two North American reports which also documented elevated total bilirubin in 9-20%, GOT in 15-21%, GPT in 27% and high eosinophil counts in 24-42% of patients.[5,6]

Plain radiographic features of hydatid cyst of the

TABLE IV. Surgical Findings in 126 Cases of Hepatic Hydatid Cyst

Single Cyst	73%
Multiple Cysts	27%
Ritht Lobe	68%
Left Lobe	19%
Both Lobes	13%
Other Intraabdominal Cysts	6%
Complicated Cysts (Fistula Tract, Ruptured to Biliary Tree or Pleura)	9.5%

lungs have been described in detail by Vessal, et al.[10] Hydatid cyst of the liver can be suspected if there is evidence of a space occupying lesion (SOL) in the liver. Plain abdominal radiographs may show calcification, hepatomegaly or pressure signs over the adjacent organs. Indirect evidence for presence of a SOL in the liver are elevated right hemidiaphragm, right lung base atelectasis/infiltrate or right pleural effusion. Incidental finding of a hydatid cyst in the lung is very suggestive that the SOL in the liver is most probably of the same nature. A curvilinear or ring-like calcification in the liver was present in 22.5% of the plain abdominal radiographs of our patients. This radiographic sign was noted in 20-85% of reported cases.[5,6,11-13] Daughter cysts may also calcify, producing multiple small rings of calcification. Generally it is believed that calcification indicates death of the cyst and scolices,[1] however, in one report viable scolices were obtained in all of three operated patients with calcified cysts.[12] Hepatomegaly was demonstrated in 24% of the plain radiographs of the abdomen in our series. This finding has been reported in 15% in other series and is of diagnostic value only when it is localized, with a rounded border corresponding to the protruding part of the cyst.[13] Gas bubbles or air fluid level within the liver, due to infectious complication with gas-producing organisms or incompetence of the sphincter of Oddi following passage of daughter cysts, were present in 2.5% of our patients and 5% of the others.[13] Floating daughter cysts and undulated detached endocyst on the surface of the fluid level can create the "water-lilly sign". "White-lines sign" (rounded, thin-walled images describing almost the full circumference of the cyst, probably due to a highly compressed pericyst) has been described in 15% of the patients.[13]

Elevation and deformation of the right hemidiaphragm by the growth of the hepatic cyst occurred in 22% of our patients and 48% of others.[13] Rupture of the cyst through the diaphragm can produce pleural effusion or bronchobiliary fistula, which is best shown by hepatobiliary scintigraphy (99mTc-HIDA).[14] Pleural effusion was present in 13% of our patients and 3% of Gonzalez' series.[13] The concomittant presence of pulmonary hydatid disease has been reported in 27% of a series of 59 patients.[15] Gastrointestinal barium studies demonstrated evidence of extrinsic pressure on the stomach and/or duodenum in 40% and on the hepatic flexure of the colon in 67% of our patients. Hydatid cysts produce focal defects in liver-spleen scintigraphy in over 90% of the cases.[16,17] Despite the non-specific nature of such defects, they are highly suggestive of hydatid disease in epidemic areas.[1] Although liver scintigraphy was abnormal in 96% of our patients, in only 83% it showed focal defect(s) suggestive of SOL and there was a 25% discrepancy in the number or location of cysts(s) when compared with operative findings. All 12 patients who had hepatic arteriogram demonstrated the typical, although not pathognomonic, angiographic features. These included vessels displaced around an avascular mass with a thin halo due to accumulation of contrast material in the more vascular pericyst. The halo indicated viability but its absence does not imply death of the cyst.[11] The cyst can also be shown by intravenous viscerogram. This utilizes the total body opacification effect of an intravenous bolus of contrast. The avascular cysts stand out on tomographic images as lucencies in the otherwise opacified liver. A halo of contrast similar to that seen in angiography may be seen around the cyst. This technique has been shown to have a diagnostic accuracy of 83%.[13] Endoscopic retrograde cholangiopancreatography (ERCP) or percutaneous transhepatic cholangiography (PTC) may be used when a patient presents with intermittent obstructive jaundice due to rupture of hepatic hydatid cyst and intermittent passage of daughter cysts and other cyst contents into the biliary system. This complication occurs in 5-15% of patients with hepatic hydatid cysts,[18,19] and contrary to the reports which emphasize the relative rarity of this condition, in a recent series from Kuwait, it accounted for 10% of cases of obstructive jaundice.[20] These procedures may show bile duct displacement around a cyst, contrast material inside a ruptured cyst or daughter cysts in the cyst cavity or in the bile ducts.[21,22] Despite the reports of uncomplicated accidental or intentional puncture of the hydatid cyst,[23-29] the general trend among physicians experienced in treating this pathology is to avoid PTC, biopsy or cyst puncture whenever the possibility of hydatid cyst exists. There are reports of anaphylactic reaction, fatality and disseminated peritoneal hydatidosis following accidental cyst puncture or rupture.[12,26,30]

Sonographic features of hepatic hydatid disease have been described in detail.[15,31,32] Since ultrasound examination is easy, relatively cheap, noninvasive, and involves no radiation, it is considered by some to be the primary diagnostic technique in the investigation of hepatomegaly in epidemic areas.[31] The most common finding is an anechoic space with well-defined borders and marked enhancement of the back-wall echoes indicating pure fluid collection (univesicular, uncomplicated hydatid cyst). There may be localized thickenings of the wall due to early stages of daughter cyst formation. There may also be a layer of fine echoes at the bottom of the cyst cavity that exhibits free movement with change in the patient's position. This sign may be present when a large amount of free floating hydatid sand (hydatid scolices and brood capsules) are present in the cyst. The other sonographic feature of hydatid disease is fluid collection within a split wall. This happens when the endocyst (laminated membrane) is rup-

tured and separated from the outer pericyst layer with hydatid fluid in between. When the separation is more complete the ruptured endocyst may appear as a "floating membrane'' that is loose inside the cyst. This sign is highly suggestive of hydatid disease. Multivesicular hydatid cyst (daughter cysts present inside the mother cyst) appears as fluid collection with well-defined contour, divided by septa which are more or less thick and complete. The most typical cases may show a "honey comb'' picture. The multicystic appearance or "cyst-within-a-cyst'' pattern is accepted as characteristic of hydatid disease. Another echo pattern is a roughly rounded mass with irregular countour and echo patterns. This mixture of irregular hypo- and hyper-echoic structures is a pattern seen when a multivesicular cyst is infected; daughter cysts may still be identifiable in the larger cyst. When the hydatid cyst is complicated by rupture into the biliary tree or gas formation secondary to bacterial infection the detached, undulating endocyst (laminated membrane) and daughter cysts floating on the fluid surface give rise to the ultrasonic "water-lilly sign''.[32] Biliary obstruction may be visualized as intrahepatic biliary dilatation with dense echoes due to obstructing daughter cysts or fragments of the endocyst. The other feature which is rarely seen is a very hyperechoic contour with a cone-shaped shadow that is usually outlined to some degree, indicating thick walls. The cysts which are totally calcified produce a non-specific ultrasound pattern of massive acoustic shadowing. Ultrasound can also identify the presence of other hydatid cysts in the peritoneum and other intra-abdominal organs. In 6% of our patients and 27% of those described by Lewall,[15] other intra-abdominal cysts in addition to those in the liver were identified during surgery.

Like sonography, computed tomography (CT) scan is highly accurate in detecting hepatic hydatid cyst.[11-13,33-35] It clearly and precisely demonstrates the existence, number, size and location of the cysts, as well as clues to the presence of cyst related complications (i.e., superinfection or rupture into the biliary system). The CT scan features of hepatic hydatid cyst include well-defined single or multiple cysts (uni- or multivesicular due to the presence of daughter cysts). Calcification in the pericyst layer (curvilinear or nodular) not detectable on plain abdominal film may be shown on the CT scan. Contrast medium accentuates the difference in density between the hydatid cyst and normal hepatic parenchyma. Rim enhancement due to hypervascularity of the pericyst is similar to the halo seen around the cyst on angiogram or intravenous viscerogram. Cysts that are complicated by infection or intrabiliary rupture become ill-defined and may contain air or have layering[12,35] with evidence of regional dilatation of the adjacent biliary ducts. Contrast enhancement of the surrounding parenchyma makes it easier to identify the degree of dilatation.[35] In a study of 50 patients with hydatid cyst of the liver, CT scan had a sensitivity of 98%.[35] In the only case missed there was coexistence of hydatid cyst and fatty liver infiltration. The isodensity of both structures did not permit an accurate diagnosis even with contrast enhancement.

Differentiation of hydatid cyst from simple (epithelial) cysts of the liver may be very difficult.[33] The latter are rare, often asymptomatic and most frequently found at post-mortem examination. They are thought to be congenital, arising from aberrant bile ducts and have a columnar or cuboidal epithelial lining. In a study comparing clinical and radiologic features of these two entities, historical and physical examination findings did not differentiate the two.[33] Ultrasound and CT scan showed no significant differences in the cyst size. In those with hydatid cyst, daughter cysts were identified in 65%. On the other hand, only 55% of the simple (epithelial) cysts had the typical ultrasound and CT scan appearances, the remaining 45% showed considerable intracystic debris which could simulate the presence of daughter cysts. The typical ultrasound and CT scan features of hydatid cyst i.e., demonstration of daughter cysts, floating membrane, split-wall or "water-lilly sign" were present in only 65% of the patients with this disease. The presence of rim enhancement on CT scan and assessment of the attenuation values for the cyst fluid can also help to diagnose hydatid cyst, although simple epithelial cysts complicated with infection or containing intracystic debris due to old hemorrhage into the cyst can pose diagnostic difficulties. So, although a presumptive diagnosis of simple epithelial cyst or hydatid cyst can be made with noninvasive techniques, a definitive diagnosis can only be reached after surgery and histological examination of the cyst wall. Presence of the typical columnar or cuboidal epithelial lining of a simple cyst or laminated membrane (endocyst), hooklets and protoscolices of a hydatid cyst are needed to establish the diagnosis.

Immunodiagnostic tests for hydatid disease include intradermal Casoni test and several immunoserologic tests such as complement fixation test (CFT), latex agglutination test (LAT), indirect hemagglutination test (IHA), enzyme-linked immunosorbent assay (ELISA) and immunoelectrophoresis (IEP).[5,36-38] The serodiagnostic sensitivity of antiboby detection methods ranges from 60-90%. Probably all persons respond immunologically to the migrating oncospheres and early metacestodes but as the antigens become sequestered within the slowly growing cyst, by the time the cyst is large enough to produce symptoms, the antibodies may be no longer detectable.[38] Patients with hydatid cysts in their liver are more likely to have a positive serologic test than those with cysts in the lungs or other organs.[36]

Lowest diagnostic sensitivity has been observed in patients whose cysts were intact (univesicular), whereas recently broken cysts have been associated with the most consistently detectable immune response.[36] Children also have a lower incidence of sero-positivity than adults. A positive intradermal Casoni test (test for immediate hypersensitivity) has been reported in 86% of surgically-proven hydatid cysts of the liver.[5,36] Non-specificity is considered the major limitation of the test with a 2-45% incidence of false positive results.[36] The IEP based on visual identification of the *Echinococcus granulosus*-specific "arc 5" has a sensitivity of 79% and specificity of 100%.[36] The CFT at a dilution of 1/16 has a sensitivity of 84% and specificity of 37%, the corresponding figures for ELISA are 94% and 65%, respectively.[37] Others have reported sensitivity of 67% for CFT and 85% for IHA test.[5] In countries where parasitic diseases are more widely seen, cross antigenicity with other worms may give more false positive results. It is important to note that a negative serology does not exclude, and a positive serology does not confirm hydatid disease.

Surgery remains the gold standard in treatment of hydatid cysts. Several different approaches have been used to deal with the residual cyst cavity after evacuation of the cyst contents (including the endocyst) and use of scolicidal agents.[1,5,7,7,39-50] The best treatment for an uncomplicated hydatid cyst of the liver is evacuation, scolicidal irrigation (the scolicidal agents commonly used are: 0.5% silver nitrate, 15-20% hypertonic saline, 80% ethanol, and 0.5% cetrimide) and primary closure of the cyst after it is filled with normal saline. Because of the case reports of death from severe systemic toxicity,[51] it has been suggested not to use formaline as a scolicidal agent. External drainage is used for infected cysts or those communicating with the biliary tract. Cyst excision is reserved for extrahepatic or intrahepatic peripherally-located resectable cysts. There has been a recent trend favoring more radical surgical approach of total or subtotal cystopericystectomy.[52-54] The former may be performed with or without preliminary controlled evacuation of cyst contents ("open" or "closed" total cystopericystectomy). Closed total cystopericystectomy eliminates any risk of accidental fluid spillage or need for irrigation of the residual cyst cavity with scolicidal agents which have caused serious complications (sclerosing cholangitis, acute pancreatitis, air embolism, anaphylactic shock and severe acidosis).[1,55,57] It should be emphasized that no single operation will suit all patients with hydatid cysts. Operative strategy should be tailored to the individual patient, based on patient's age and general status, and after an accurate preoperative evaluation of size, number, and location of the supply of the liver and presence of extrahepatic disease. Unfortunately, surgical treatment of hydatid cyst is not without risks. The greatest threat is spillage of the cyst contents and dissemination of the hydatid cysts. Local recurrences have been reported in 13% of patients who were initially operated for multiple hepatic hydatid cysts containing daughter cysts.[50] All recurrences were diagnosed about five years after the initial surgery and required re-operation.[50]

There have been recent reports of successful percutaneous aspiration of the cysts followed by cyst irrigation with hypertonic saline or 95% ethanol.[27-9] All of these patients had received mebendazole from several days before the procedure and up to a month after the procedure in order to prevent possible complications from spillage of cyst fluid. Presently this method should be restricted to prospective studies of selected patients who either cannot undergo surgery or refuse it and who have uncomplicated univesicular cysts. Mebendazole and more recently albendazole have been reported to cause cyst shrinkage on serial ultrasound and CT scans, with improvement in serological tests.[58-63] These drugs, broad-spectrum benzimidazole antihelminthics, act by inhibition of tubulin which leads to blockage of glucose absorption, glycogen depletion, degenerative changes in the endoplasmic reticulum and in the mitochondria of the germinal layer and finally increase in lysosomes and cellular autolysis.[64-5] In a series of 37 patients treated with mebendazole, 35 showed evidence of cyst cavity obliteration and no clinical signs of recurrence, four of them had histological proof of cure.[60] On the other hand, in another report, a cyst which on mebendazole therapy had lost its daughter cyst and had become diffusely echogenic, regained its pretreatment appearances (all the daughter cysts reappeared) and started to regrow within four months after a three year course of therapy was completed.[66] Therefore, reduction in size of the cyst and disappearance of daughter cysts does not necessarily indicate death of all scolices. Contrary to mebendazole which is poorly absorbed after oral administration, and produces low plasma levels with an even lower concentration (10% of the blood level) in the cyst, albendazole is better absorbed and achieves serum levels 10 times higher than an equal dose of mebendazole.[67] Albendazole is quickly metabolized into albendazole sulfoxide which is also therapeutically active. The dosages of mebendazole used are 30-70 mg/kg per day in 3-4 divided doses, but doses as high as 200 mg/kg per day have also been used.[59] Albendazole has generally been given in doses of 10-14 mg/kg per day. Because of the higher efficacy and lower incidence of side effects, albendazole has replaced mebendazole in the treatment of the hydatid disease. In a recent study comparing albendazole with mebendazole, the percentage of treatment success was higher with albendazole (43.5%), while the

unsuccessful results for the same group was lower (13%) compared with the results for the patients treated with mebendazole (26.6% and 42.8%, respectively).[68] Recent reports with albendazole have been encouraging with cure rates of 8-33% and a total response rate of 53-86%.[67-71] The optimal duration of drug therapy has not been well established. Drugs have been continued from a few months to several years in different reports.

Drug therapy has also been used for prophylaxis preoperatively,[62,72] or pre- and post- therapeutic cyst aspiration.[27,28] In a large prospective study on 133 patients, preoperative treatment with mebendazole reduced the incidence of immediate postoperative complications (e.g., secondary spread, infection and fistula formation) from 14% in the untreated control subjects to 4% in the treatment group.[72] In another study, 10 of 11 patients treated with mebendazole for 25 days before surgery had no viable scolices in their hydatid fluid at the time of the surgery.[62]

Drug therapy should be considered as an adjunct rather than a replacement to surgery. It can be used prophylactically before surgery. In the case of inadvertent spillage during the operation, drug therapy should be continued for at least a few weeks post-operatively. Drugs should be used as the sole mode of therapy only when there is disseminated hydatidosis with no chance of cure by surgery, the patient is not a good candidate for surgery, the cysts are surgically unapproachable or no adequate surgical facilities are available.

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