ORIGINAL RESEARCH PAPER

Pathology

HISTOPATHOLOGICAL SPECTRUM OF HYDATID DISEASE AT USUAL AND UNUSUAL SITES: A CASE SERIES OF FIVE CASES

KEY WORDS: Hydatid cyst, Echinococcosis, Liver, Spleen, Urinary bladder, Daughter cyst, Histopathology

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ABSTRACT

Background Hydatid disease (echinococcosis) is a zoonotic parasitic infestation caused by the larval stage of Echinococcus granulosus. The liver and lungs are the most commonly involved organs; however, unusual anatomical sites may create diagnostic challenges. **Materials and Methods** This retrospective descriptive case series included five histopathologically confirmed cases of hydatid disease received in the Department of Pathology, Index Medical College Hospital and Research Centre, Indore. Clinical presentation, gross morphology, microscopic findings, and involved anatomical sites were reviewed and analyzed. **Results** The patients ranged from 27 to 68 years of age with female predominance. The liver was the most commonly affected organ, while unusual involvement of the spleen and urinary bladder was also observed. Gross examination revealed pearly white membranous cyst walls, daughter cysts, jelly-like material, and calcification in some cases. Histopathological examination demonstrated characteristic features including laminated acellular ectocyst, inner germinal layer, brood capsules, daughter cysts, and variable host inflammatory response. **Conclusion** Hydatid disease demonstrates a wide histomorphological spectrum and may involve both common and rare anatomical sites. Histopathological examination remains the gold standard for definitive diagnosis, especially in uncommon presentations where clinical and radiological findings may be inconclusive.

INTRODUCTION

Hydatid disease, also known as cystic echinococcosis, is a zoonotic parasitic infestation caused by the larval stage of Echinococcus granulosus. It remains an important public health problem in endemic regions including India, the Middle East, South America, Africa, and parts of Asia where livestock farming and close contact with dogs facilitate transmission. Humans act as accidental intermediate hosts and acquire infection through ingestion of parasite eggs via contaminated food, water, or direct contact with infected animals.

Following ingestion, the embryos penetrate the intestinal mucosa and enter the portal circulation. The liver acts as the primary filter and is therefore the most commonly involved organ, accounting for approximately 50–70% of cases, followed by the lungs (20–30%). However, hydatid disease may involve virtually any anatomical site including the spleen, kidney, urinary bladder, brain, bone, omentum, and soft tissues, often posing significant diagnostic challenges due to atypical clinical and radiological presentations.

Clinical manifestations depend on the size, location, and complications of the cyst. Many patients remain asymptomatic for prolonged periods, while others present with abdominal pain, mass lesions, pressure symptoms, secondary infection, rupture, or anaphylactic reactions. Radiological investigations such as ultrasonography and computed tomography play an important role in detection; however, definitive diagnosis is often established by histopathological examination.

Histopathological examination remains the gold standard for diagnosis and demonstrates characteristic features such as laminated acellular ectocyst, germinal layer, brood capsules, daughter cysts, and host inflammatory response.

Histopathologically, hydatid cysts demonstrate characteristic trilaminar architecture comprising an outer fibrocollagenous pericyst formed by host tissue reaction, a laminated acellular ectocyst, and an inner germinal layer containing brood capsules and daughter cysts. Variable inflammatory response, fibrosis, calcification, and giant cell reaction may also be observed depending upon the chronicity and viability of the lesion.

The present case series highlights the histomorphological spectrum of hydatid disease involving both usual and unusual anatomical sites encountered at a tertiary care center. The study emphasizes the importance of histopathological evaluation in establishing definitive diagnosis, particularly in rare presentations where clinical and radiological findings may mimic neoplastic or inflammatory lesions.

MATERIALS AND METHODS

This retrospective descriptive study included five histopathologically confirmed cases of hydatid disease received in the Department of Pathology, Index Medical College Hospital and Research Centre, Indore, over a period of one year.

Clinical details, gross morphology, and microscopic features were reviewed from departmental records. All specimens were routinely processed and stained with hematoxylin and eosin (H&E stain). Histopathological findings were analyzed with emphasis on cyst morphology, inflammatory response, and unusual site involvement.

Ethical clearance for the present study was obtained from the Institutional Ethics Committee of Index Medical College Hospital and Research Centre, Indore. Written informed consent was obtained from all patients prior to inclusion in the study, and confidentiality of patient information was strictly maintained throughout the study period.

The clinicopathological features of all five cases included in the present study are summarized in **Table 1**.

Case	Age/Sex	Site	Clinical Presentation	Gross Findings	Microscopic Findings	Final Diagnosis
1	38/F	Liver	Abdominal discomfort	Calcified cyst with cheesy material	Laminated ectocyst, degenerated germinal layer, daughter cysts, giant cell reaction, calcification	Calcified hepatic hydatid cyst
2	68/F	Liver & Gall bladder	Right hypochondrial pain	Multiple pearly white daughter cysts with gallstones	Classical hydatid cyst with chronic cholecystitis and Rokitansky–Aschoff sinuses	Hepatic hydatid cyst with cholelithiasis and chronic cholecystitis
3	51/F	Spleen	Abdominal pain, splenomegaly	Multiloculated cyst with grape-like daughter cysts	Hydatid cyst wall with brood capsules, daughter cysts, Gamma-Gandy bodies, calcification	Splenic hydatid cyst
4	35/F	Urinary bladder	Incidental bladder mass	Pearly white membranous bladder wall cyst	Acellular laminated ectocyst with germinal layer and inflammatory infiltrate	Hydatid cyst of urinary bladder
5	27/F	Liver	Abdominal distension	Soft jelly-like cyst wall with daughter cysts	Trilaminar cyst wall with brood capsules and mild inflammation	Hydatid cyst of liver

CASE SERIES:

Case 1

A 38-year-old female presented with complaints of dull and persistent abdominal discomfort for an unspecified duration. There was no history of fever, jaundice, or significant weight loss. Physical examination revealed mild tenderness in the right upper quadrant

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Radiological imaging demonstrated a well-defined cystic lesion in the liver, raising suspicion of a parasitic cyst. The patient underwent surgical excision.

Clinical Diagnosis

Calcified hepatic hydatid cyst.

Specimen

Hydatid cyst.

Gross Histopathology: The specimen received was labeled as cyst and consisted of a single, globular cystic structure, reddish-white in colour, soft to firm in consistency measuring 4.9x3.5x2.6cm. The external surface was smooth with focal areas of calcification.

On sectioning, the cyst was found to contain cheesy, pultaceous material. The cyst wall appeared thickened and partially calcified.

Microscopic examination: Histopathological examination revealed: A laminated ectocyst (acellular, eosinophilic outer layer), An inner germinal layer, though largely degenerated in areas. Presence of daughter cysts, confirming hydatid origin, Extensive calcification within the cyst wall Surrounding tissue showed fibrous capsule formation. Prominent foreign body giant cell reaction and chronic inflammatory infiltrate. These findings are consistent with a long-standing, calcified hydatid cyst.

Figure 1. Gross photograph of calcified hepatic hydatid cyst

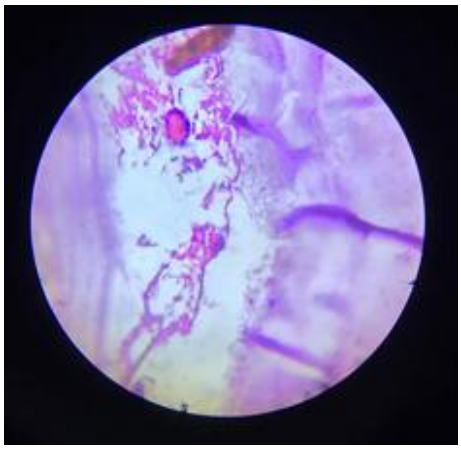

Figure 2. Photomicrograph showing laminated ectocyst and inflammatory infiltrate (H&E stain, 40×)

Case 2

A 68-year-old female presented with complaints of right hypochondrial pain of insidious onset. The pain was intermittent and non-radiating, with no significant history of fever or jaundice. There was no prior history of similar complaints or known liver disease.On clinical examination, mild tenderness was noted in the right upper abdominal quadrant. Radiological investigations suggested a cystic lesion in the liver along with features suggestive of gallstones.

The patient subsequently underwent surgical intervention (likely cholecystectomy with hepatic cyst management), and the specimen was sent for histopathological examination.

Figure 3. Gross Histopathology Specimen of daughter cyst.

Figure 4. Gross Histopathology Specimen of gall bladder.

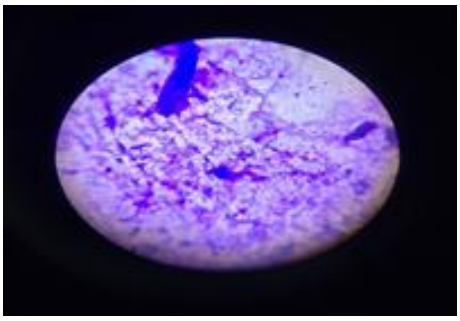

Figure 5. Photomicrograph showing calcification and giant cell reaction (H&E stain, 40×).

Clinical Diagnosis: Hepatic hydatid cyst with cholelithiasis and chronic cholecystitis.

Specimen: Daughter cysts and gall bladder.

Gross Histopathology: Received specimen consists of: Liver cyst specimen: A cystic lesion containing multiple pearly white daughter cysts. Largest measuring 4.0cm in diameter and smallest measuring 0.8cm in diameter. The cyst wall appears thickened and laminated. The internal contents are colorless gelatinous with characteristic hydatid material. Gall bladder specimen: Measures approximately 7.6x3.1x2.8cm. External surface appears smooth to mildly congested. On cut section, the mucosa shows red velvety appearance. Multiple stones identified, brownish-black in color. The mucosa is irregular and thickened.

Microscopic examination: Liver (Hydatid Cyst)Sections show a classical hydatid cyst composed of: Outer laminated ectocyst (acellular, eosinophilic layer) Inner germinal layer Presence of multiple daughter cysts within the main cyst cavity Surrounding host tissue shows fibrous capsule formation with chronic inflammatory infiltrate Occasional foreign body giant cell reaction may be present Gall Bladder Features consistent with chronic cholecystitis: Mucosal lining showing chronic inflammatory infiltrate Muscular hypertrophy Presence of Rokitansky–Aschoff sinuses Associated with cholelithiasis (gallstones).

Case 3

A 51-year-old female presented with complaints of abdominal pain and progressive abdominal fullness. Clinical examination revealed splenomegaly. There was no significant past history of trauma or known chronic illness.

Radiological evaluation suggested a cystic lesion in the spleen. The patient underwent splenectomy for definitive management.

Clinical Diagnosis: Chronic venous congested Spleen with Hydatid Cyst.

Specimen: Spleen, Excised Hydatid cyst and Daughter Cysts.

Gross Histopathology: Labelled as Spleen: Received multiloculated cystic membranous structure attached to spleen measuring 15.0 × 14.8 × 11.4 cm. Outer surface is grey in color, irregular attached with fibrofatty tissue, on which congested blood vessels is seen. On cut, many grape like daughter cyst along with serous fluid oozed out.

Cyst wall thickness range from 0.1 – 1.0 cm.

Labelled as Excised Hydatid cyst (Daughter Cyst) from spleen: Received multiple daughter cysts, pearly white in color, soft in consistency, largest measuring 2 cm in diameter, smallest measuring 0.1 cm in diameter.

Microscopic examination:

Multiple sections studied from spleen show thick fibrous capsule and trabeculae enclosing proliferation of red pulp and white pulp. Red pulp is consisting of sinusoids with numerous congested and dilated blood vessels. White pulp is showing aggregates of lymphoid follicles. At places gamma gandy bodies and calcification is also noted. The presence of laminated acellular hydatid cyst wall is also noted.

Sections studied from cyst wall show an acellular laminated external layer with congested blood vessels (ectocyst). The inner germinal layer (endocyst) along with brood capsule containing the daughter cyst. The outer layer (pericyst) is composed of fibrocollagenous tissue with mild inflammatory infiltrate

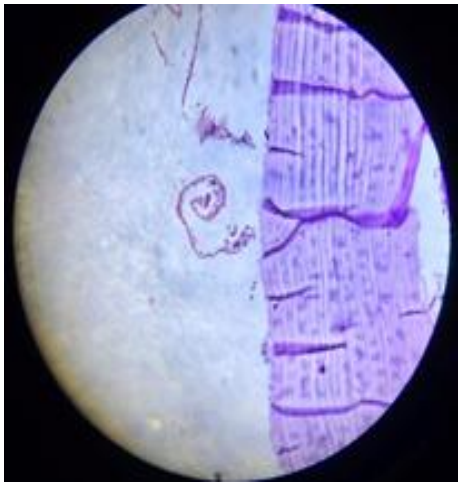

Figure.6 Photomicrograph showing laminated acellular ectocyst with brood capsules and daughter cyst formation in splenic hydatid cyst (H&E stain, 40×).

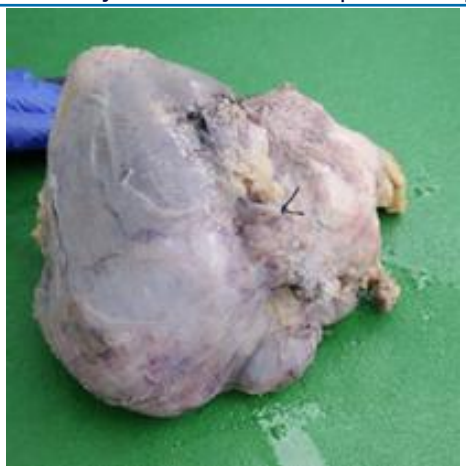

Figure 7. Gross photograph of splenic hydatid cyst.

Case 4

A 35-year-old female was evaluated for an incidental urinary bladder mass detected during radiological investigation. The patient had no significant urinary complaints such as hematuria, dysuria, increased frequency, or hydatiduria. There was no significant past medical or surgical history.

Radiological evaluation suggested a cystic lesion involving the urinary bladder wall. Surgical excision of the lesion was performed and the specimen was sent for histopathological examination.

Clinical Diagnosis: Hydatid Cyst – Bladder wall

Specimen: Bladder Cyst Wall.

Gross Histopathology: Labelled as Bladder Cyst Wall:- Received already cut, single cystic membranous structure attached to bladder wall measuring 5.9 × 3.2 × 2.2 cm. Pearly white membrane identified measuring 5 cm in volume.

Microscopic examination: Multiple sections studied from bladder wall show muscularis propria and serosa along with inflammatory infiltrate.

CYST: Sections studied from cyst show an acellular laminated external layer and a thin nucleated germinal inner layer with mild inflammatory infiltrate.

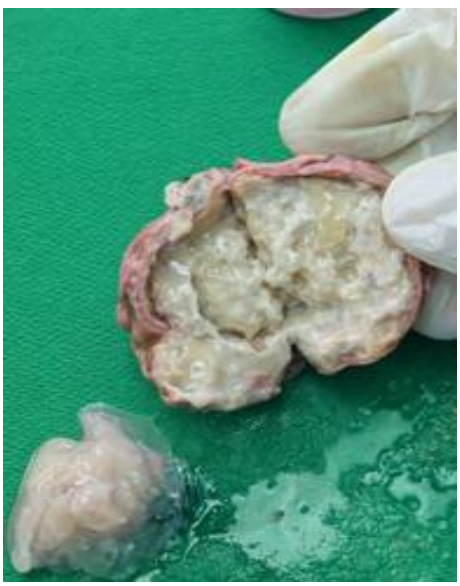

Figure 8. Gross Histopathology Specimen of Bladder cyst wall.

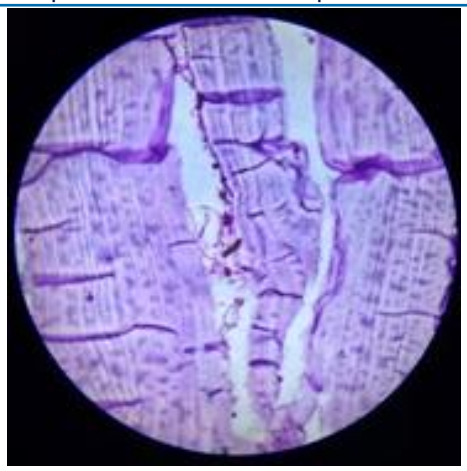

Figure9. Photomicrograph showing laminated cyst wall and brood capsules (H&E stain, 40×).

Case 5

A 27-year-old female presented with progressive abdominal distension. There was no history of fever, jaundice, significant weight loss, or prior liver disease. Physical examination revealed abdominal fullness without tenderness.

Radiological investigations demonstrated a cystic lesion involving the liver. The patient underwent surgical excision of the cystic lesion, and the specimen was submitted for histopathological examination.

Clinical Diagnosis: Hydatid Cyst.

Specimen: Hydatid cyst, Daughter cyst

Gross Histopathology: Received multiple soft tissue of hydatid cyst wall altogether measuring 12.1 × 11.1 × 2.5 cm which in appearance soft in consistency, some pieces are jelly like. Largest measuring 5.5 × 3.5 × 1.5 cm, smallest measuring 2.5 × 1.5 × 0.5 cm.

Received two small daughter cyst, largest measuring 1 cm in diameter, transparent in appearance, soft in consistency. Smallest measuring 0.1 cm in diameter, pearl like appearance, soft in consistency.

Microscopic examination: Sections studied show cyst wall composed of 3 layers. Acellular laminated external layer (ectocyst). The inner germinal layer (endocyst) along with brood capsule containing the daughter cyst. The outer layer (pericyst) is composed of fibrocollagenous tissue with mild inflammatory infiltrate.

Figure 10. Gross Histopathology Specimen of Daughter cyst.

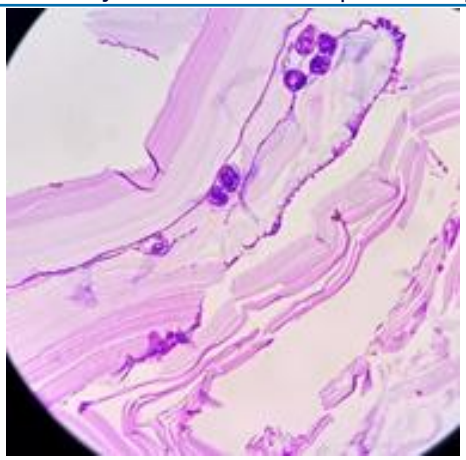

Figure11. Photomicrograph showing laminated cyst wall and brood capsules (H&E stain, 40×).

DISCUSSION

Hydatid disease is a zoonotic parasitic infestation caused by the larval stage of Echinococcus granulosus. Humans become accidental intermediate hosts following ingestion of parasite eggs through contaminated food, water, or direct contact with infected dogs. The disease remains endemic in developing countries including India, where livestock farming and close animal contact contribute significantly to transmission.

The liver is the most commonly involved organ because it acts as the first filter for portal venous circulation, followed by the lungs as the second filter. In the present study, hepatic involvement was observed in the majority of cases, which correlates well with existing literature reporting hepatic involvement in approximately 50–70% of cases. However, unusual sites such as spleen and urinary bladder were also identified, highlighting the diverse anatomical distribution and protean nature of hydatid disease.

Clinically, hydatid cysts may remain asymptomatic for prolonged periods and are often discovered incidentally during radiological investigations. Symptomatic patients usually present with abdominal pain, abdominal distension, palpable mass, or organ-specific symptoms depending upon the site and size of the lesion. In our study, patients presented with abdominal discomfort, abdominal fullness, right hypochondrial pain, splenomegaly, and incidental urinary bladder mass. The bladder hydatid cyst was particularly noteworthy due to its rarity and absence of classical urinary symptoms such as hydatiduria.

Grossly, hydatid cysts demonstrate characteristic findings including pearly white membranous cyst wall, gelatinous material, hydatid sand, and daughter cysts. Long-standing lesions may show degenerative changes such as fibrosis and calcification, as observed in one of the hepatic cases in the present series.

Histopathological examination remains the gold standard for definitive diagnosis. Classical microscopic features include a trilaminar cyst wall composed of:

1. Outer fibrocollagenous pericyst formed by host tissue response
2. Laminated acellular ectocyst
3. Inner germinal layer (endocyst) containing brood capsules and daughter cysts

Variable inflammatory response including chronic inflammatory infiltrate, fibrosis, foreign body giant cell reaction, and calcification may also be observed depending on cyst duration and complications.

Splenic hydatid cysts are relatively uncommon and account for less than 5% of abdominal hydatid disease cases, which is comparable to findings reported by Moro and Schantz as well as Pedrosa et al. Similar to previously published studies, the present case demonstrated characteristic daughter cyst formation and laminated cyst wall architecture on histopathological examination. Due to its rarity, splenic involvement may mimic other cystic lesions of the spleen and therefore requires careful clinicoradiological and pathological correlation for accurate diagnosis.

Urinary bladder involvement in hydatid disease is exceedingly rare and often presents a diagnostic challenge because radiological findings may mimic neoplastic or inflammatory lesions. Previous studies have emphasized that absence of classical symptoms such as hydatiduria may delay diagnosis. In the present study, the patient presented with an incidental bladder wall cyst without urinary complaints, highlighting the importance of considering hydatid disease in the differential diagnosis of cystic lesions in endemic regions. Such unusual locations emphasize the importance of considering hydatid disease in the differential diagnosis of cystic lesions, especially in endemic regions.

The differential diagnosis varies according to the site involved and includes simple cysts, pseudocysts, abscesses, chronic inflammatory lesions, and cystic neoplasms. Radiological investigations such as ultrasonography and computed tomography are useful in identifying daughter cysts, septations, and calcifications; however, histopathological confirmation is essential for accurate diagnosis and exclusion of malignancy.

Complete surgical excision remains the treatment of choice and is frequently combined with antihelminthic therapy such as albendazole to prevent recurrence and dissemination. Early diagnosis and appropriate management are important to avoid complications including rupture, secondary infection, anaphylaxis, and recurrence.

The present case series highlights the wide histopathological spectrum of hydatid disease involving both common and rare anatomical sites. Awareness regarding atypical presentations and characteristic histomorphological features is essential for clinicians and pathologists to ensure accurate diagnosis and timely management.

The present study is limited by its small sample size and retrospective single-center design. Lack of long-term follow-up and limited radiological correlation in some cases were additional limitations. However, the study highlights the diverse histopathological spectrum of hydatid disease, including rare anatomical presentations encountered in routine pathological practice.

CONCLUSION

Hydatid disease demonstrates a wide clinicopathological and histomorphological spectrum involving both common and rare anatomical sites. Although hepatic involvement remains the most frequent presentation, unusual locations such as spleen and urinary bladder should also be considered in the differential diagnosis of cystic lesions, particularly in endemic regions.

Characteristic histopathological findings including laminated ectocyst, germinal layer, brood capsules, and daughter cysts remain the cornerstone for definitive diagnosis. The present case series highlights the importance of careful gross examination and histopathological evaluation in identifying hydatid disease, especially in uncommon presentations where clinical and radiological findings may be misleading.

Awareness regarding atypical presentations of hydatid disease is essential for clinicians, radiologists, and pathologists to avoid diagnostic pitfalls, ensure timely management, and prevent complications such as rupture,

secondary infection, and recurrence.

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