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HYDATID DISEASE: SPECTRUM OF ATYPICAL LOCATIONS AND COMPLICATIONS ON IMAGING. A PICTORIAL REVIEW

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ABSTRACT

Hydatid disease, or cystic echinococcosis, is a parasitic zoonosis caused by the larval stage of *Echinococcus granulosus* and remains endemic in Morocco. Although the liver and lungs account for most cases, the parasite may lodge in any organ or soft tissue, where it mimics a wide range of benign and malignant lesions. This review illustrates the imaging spectrum of hydatid disease in atypical locations and its main complications, and details, organ by organ, the features that distinguish it from its differential diagnoses. Cases of hydatid disease in atypical or complicated locations managed in the Department of Radiology of Hassan II University Hospital, Fez, Morocco, were retrospectively reviewed and complemented by a PubMed and ScienceDirect search. Imaging modalities included ultrasound, computed tomography (CT) and magnetic resonance imaging (MRI). Twenty-one illustrated observations document involvement of the spleen, kidney, pancreas, adrenal gland, peritoneum and retroperitoneum, interventricular septum, diaphragmatic crus, pulmonary artery, brain, spine and spinal cord, soft tissues, testis and ovary, together with biliary rupture, bacterial superinfection, exophytic growth, peritoneal seeding and abdominal wall invasion. Two findings proved discriminating across all sites: the parasitic signs (daughter vesicles, detached membranes, mural calcification and the peripheral T2-hypointense rim) and the absence of enhancement of the cyst contents and septa. Hydatid disease should be included in the differential diagnosis of any cystic lesion, whatever its site, particularly in endemic regions. Familiarity with these appearances helps avoid diagnostic error and potentially life-threatening complications.

Keywords: Cystic Echinococcosis; Hydatid Disease; Atypical Locations; Computed Tomography; Magnetic Resonance Imaging; Differential Diagnosis

1 INTRODUCTION

Hydatid disease is a major public health problem in Morocco, particularly in the northern part of the country, where Hassan II University Hospital of Fez acts as a referral centre. While hepatic and pulmonary involvement is well

recognised, atypical locations represent a small but clinically important proportion of cases and are a frequent source of diagnostic error.

Radiological appearances vary with the stage of the cyst, the organ involved and the presence of complications, ranging from a purely cystic lesion to an entirely solid-appearing mass [2]. Failure to recognise these atypical presentations may considerably delay diagnosis and expose the patient to severe, occasionally fatal complications. This pictorial review, based on cases collected in the radiology department of Hassan II University Hospital of Fez and on the literature, illustrates the spectrum of unusual locations and complications of hydatid disease and details, organ by organ, the imaging features that distinguish it from its main differential diagnoses.

2 MATERIAL AND METHODS

The iconography presented in this review was collected in the Department of Radiology and the Department of Mother and Child Radiology of Hassan II University Hospital, Fez, Morocco. Cases were selected on the basis of the atypical site of the cyst or of the complication illustrated, and were retained when the imaging findings were of sufficient quality to be demonstrative of the entity described.

In every case the diagnosis rested on the concordance of the imaging findings with hydatid serology and, in operated patients, with histopathological examination of the surgical specimen.

Ultrasound was performed with curvilinear and linear transducers. Computed tomography was acquired on a multidetector scanner before and after intravenous administration of iodinated contrast medium, with multiplanar reformatted images. Magnetic resonance imaging included T1-weighted, T2-weighted, diffusion-weighted and contrast-enhanced T1-weighted sequences adapted to the anatomical region studied.

All images were anonymised before use and informed consent was obtained from the patients. The present work is a pictorial review intended for educational purposes and not a comparative or statistical study; no quantitative analysis was therefore performed.

3 RESULTS AND DISCUSSION

3.1 General features of hydatid disease

Hydatid disease results from infection by the larval stage of *Echinococcus granulosus*. The closely related *Echinococcus multilocularis* causes alveolar echinococcosis, an infiltrative, pseudo-tumoural condition with entirely different imaging features, which is beyond the scope of this review. Cystic echinococcosis remains endemic in the Mediterranean countries, Africa, South America, Australia and New Zealand, mainly in rural sheep-raising areas [1,3]. Canids, chiefly the dog, are the definitive hosts; sheep and cattle act as intermediate hosts, and humans are accidental hosts. Ingested eggs release oncospheres that cross the duodenal mucosa and reach the liver through the portal system, then the lungs and potentially any other organ [1]. In Morocco, hydatid disease is a genuine public health problem: a national retrospective survey identified 23,512 cases between 1980 and 2008, with a progressively rising incidence and a marked rural predominance [6]. Although the liver and lungs remain the most frequent sites, the parasite may develop anywhere in the body, where it readily mimics a benign or malignant tumour, an abscess or a simple cyst, making radiological diagnosis particularly challenging [4,5].

Ultrasound remains the first-line investigation for abdominal locations, demonstrating floating membranes, daughter vesicles and hydatid sand. Computed tomography (CT) better defines extension, calcification and complications, whereas magnetic resonance imaging (MRI) is superior for neurological, cardiac and soft-tissue involvement, where the peripheral T2-hypointense rim ("rim sign") is almost pathognomonic [2,3]. Two complementary ultrasound classifications guide management: the Gharbi classification (1981), which recognises five types, and the WHO-IWGE classification (2003), which distinguishes active or fertile cysts (CE1-CE2), transitional cysts (CE3a-CE3b) and inactive cysts (CE4-CE5) [10,11]. CT and MRI correlate reliably with these stages and are particularly useful when ultrasound is limited or when the lesion lies outside the abdomen [12].

Serology is an indispensable adjunct in atypical locations: ELISA provides first-line screening and Western blot confirmation, but a negative result, common in pulmonary forms and in inactive stages, does not exclude the diagnosis [7]. Management depends on the stage and comprises surgery, percutaneous treatment by PAIR (puncture, aspiration, injection, re-aspiration) under imaging guidance, albendazole, or simple surveillance of inactive cysts [8]. PAIR is an effective alternative to surgery for uncomplicated hepatic cysts but is contraindicated when a cysto-biliary communication is present [9]. For atypical locations, surgery remains the treatment of reference and is planned on the basis of multimodality imaging [1,2,4,5].

3.2 Atypical locations

3.2.1 Spleen

Splenic involvement is relatively uncommon and represents the third most frequent site after the liver and lungs. Primary splenic echinococcosis is very rare, accounting for less than 2% of cases; involvement usually follows systemic dissemination or intraperitoneal spread from a ruptured hepatic hydatid cyst [1,2].

Splenic hydatid cysts are generally solitary and their imaging features are similar to those of hepatic cysts. The differential diagnosis includes epidermoid cysts, pseudocysts, abscesses, haematomas and neoplasms. Daughter vesicles, internal septa or mural calcification strongly favour hydatid disease; conversely, enhancement of septa or of a soft-tissue component should suggest a cystic neoplasm, and restricted diffusion an abscess [1,5].

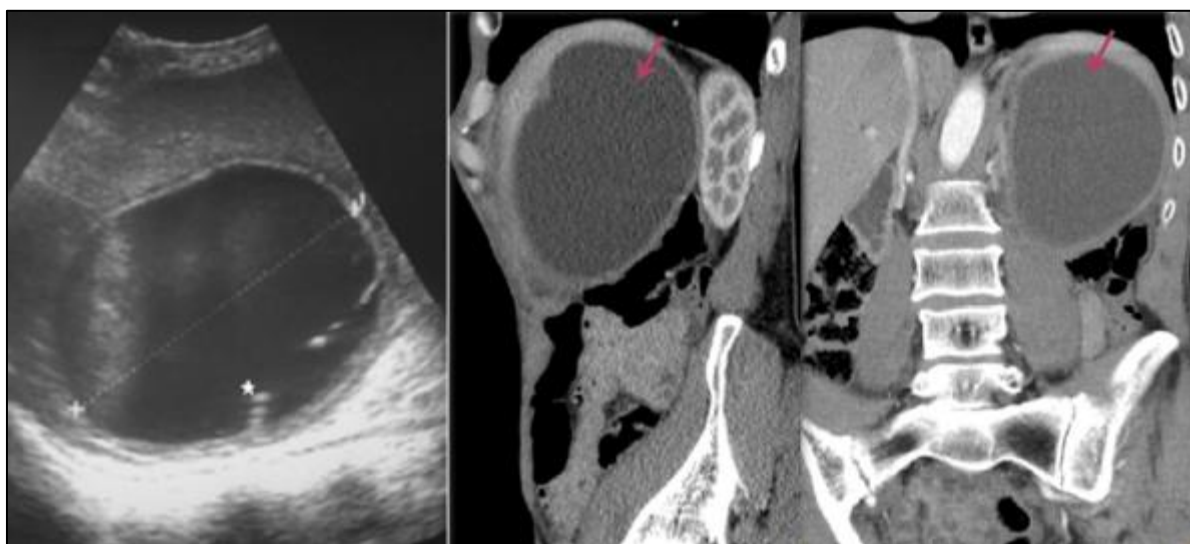


Figure 1: Splenic hydatid cyst in a 28-year-old man presenting with flank pain. (a) Axial ultrasound image of the spleen showing a cystic lesion containing detached membranes (asterisk). (b, c) Coronal and sagittal contrast-enhanced CT images showing a large, low-attenuation, non-enhancing mass occupying almost the entire spleen (arrows).

3.2.2 Kidney

Renal involvement is rare, occurring in about 3% of cases. Cysts are usually unilateral and located at the upper or lower pole. Complications of renal hydatid cysts include infection and rupture, either into the renal sinus or into the perinephric tissues [1,2].

Imaging shows a unilocular or multilocular polar cyst, usually containing daughter vesicles of lower attenuation on CT. Mural calcification may also be present. The differential diagnosis includes a simple or infected renal cyst, an abscess and a necrotic tumour. The key discriminating feature is the absence of enhancement of the contents and septa: septal or nodular enhancement is the strongest predictor of malignancy (cystic renal cell carcinoma), whereas a heterogeneous multilocular lesion containing non-enhancing daughter vesicles favours hydatid disease. Multilocular cystic nephroma nevertheless remains difficult to distinguish on imaging alone [1,2].

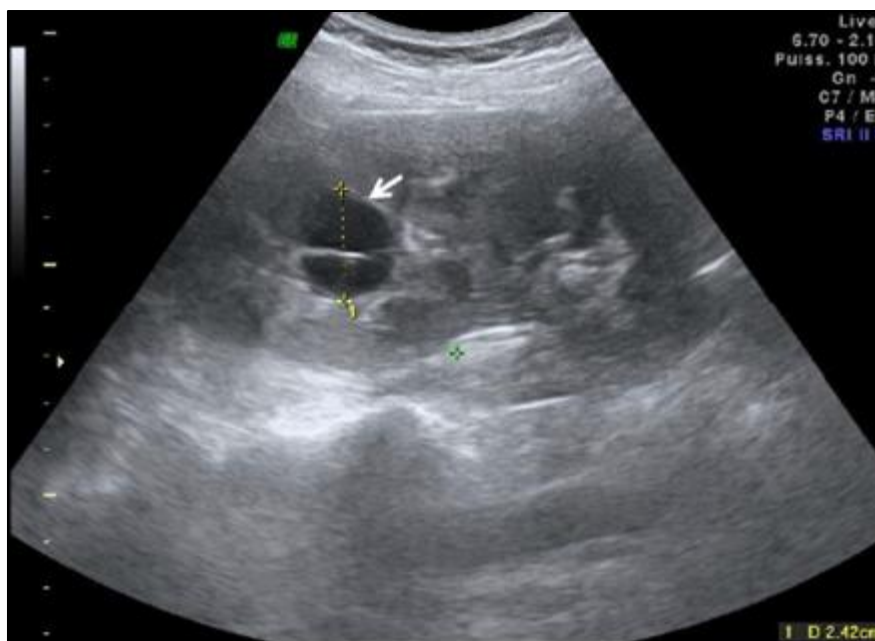


Figure 2: Renal hydatid cyst in a 34-year-old man with a history of surgery for hepatic hydatid disease. Ultrasound image showing an anechoic lesion with internal septa at the upper pole of the left kidney (arrow).

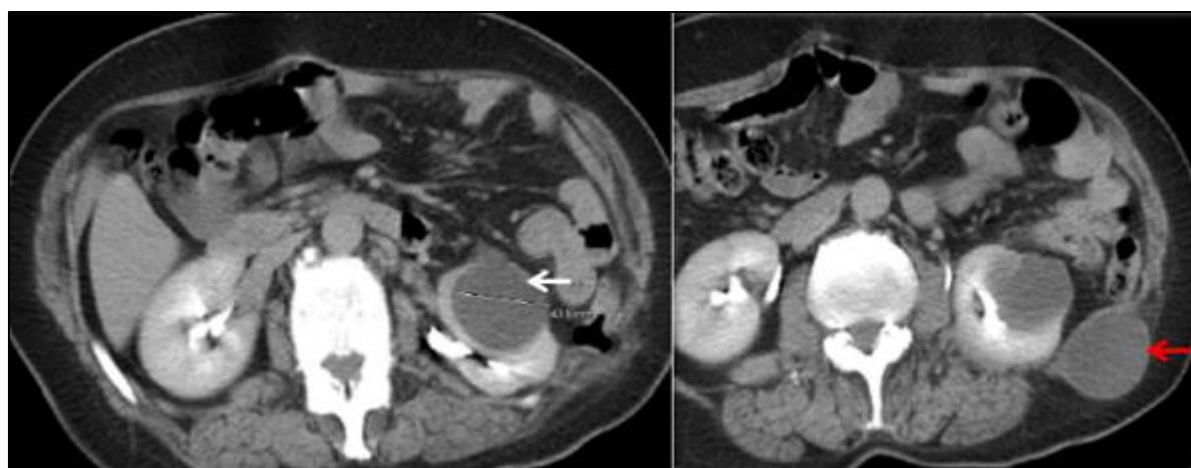


Figure 3: Hydatid cyst of the left kidney in a 44-year-old woman. Axial contrast-enhanced CT images showing a cystic lesion in the mid-portion of the left kidney (white arrow) associated with a simple cyst of the lateral abdominal wall (red arrow).

3.2.3 Pancreas

Primary pancreatic involvement is very rare (0.25% of cases) and is often associated with hepatic disease. The diagnosis of a pancreatic hydatid cyst is extremely difficult on imaging alone, and the lesion may easily be mistaken for a pancreatic pseudocyst [1,2].

A wall that is thickened and more laminated than that of a simple cyst, a thin layer of calcification and an association with hepatic hydatid disease should suggest the diagnosis. The differential diagnosis includes pseudocyst, serous cystadenoma and mucinous cystic neoplasm. The absence of a history of pancreatitis (versus pseudocyst) and the absence of enhancing septa or of a solid mural component (versus mucinous and serous cystadenomas), together with a finely calcified laminated wall and concomitant hepatic cysts, favour hydatid disease [2,5].

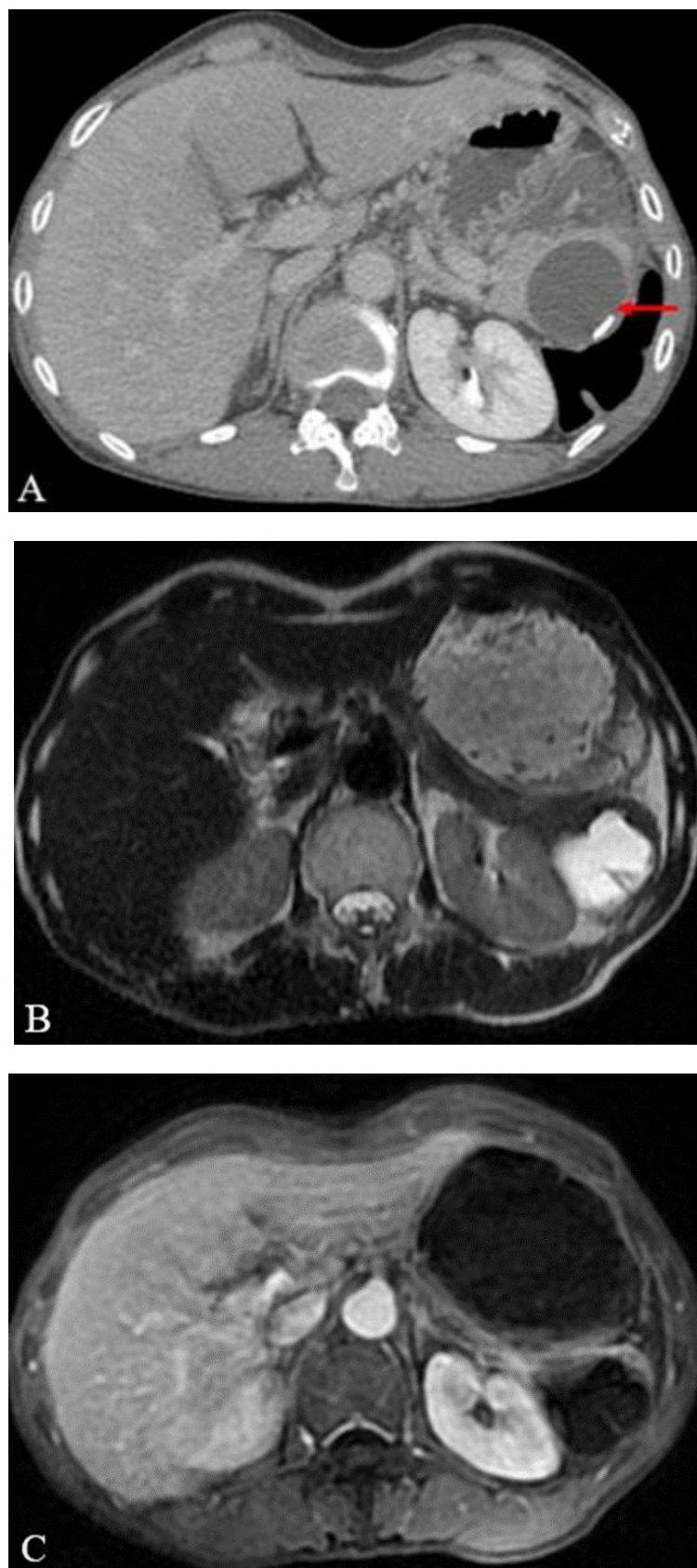


Figure 4: Pancreatic hydatid disease in a 42-year-old woman with a 6-month history of epigastric pain. (a) Axial contrast-enhanced CT showing a unilocular cystic mass with thin peripheral calcification in the pancreatic tail (arrow). (b) T2-weighted MRI showing the cystic lesion with internal septa. (c) Contrast-enhanced T1-weighted MRI showing no enhancement of the lesion. The diagnosis was confirmed by serology and surgery.

3.2.4 Adrenal Gland

Adrenal hydatid cysts are also rare, with a reported incidence at autopsy of 0.06-0.18%. Involvement is usually part of disseminated disease. Early lesions appear as simple cysts; with time, daughter vesicles, floating membranes or calcification may be seen [1,2].

The differential diagnosis includes endothelial cysts, lymphangiomatous and angiomatous cysts, pseudocysts, cystic degeneration of benign or malignant adrenal neoplasms, and epithelial cysts. Daughter vesicles, floating membranes or mural calcification are the most discriminating findings against endothelial cysts and pseudocysts; conversely, an enhancing soft-tissue component should suggest cystic degeneration of a neoplasm such as pheochromocytoma or adrenocortical carcinoma [1].

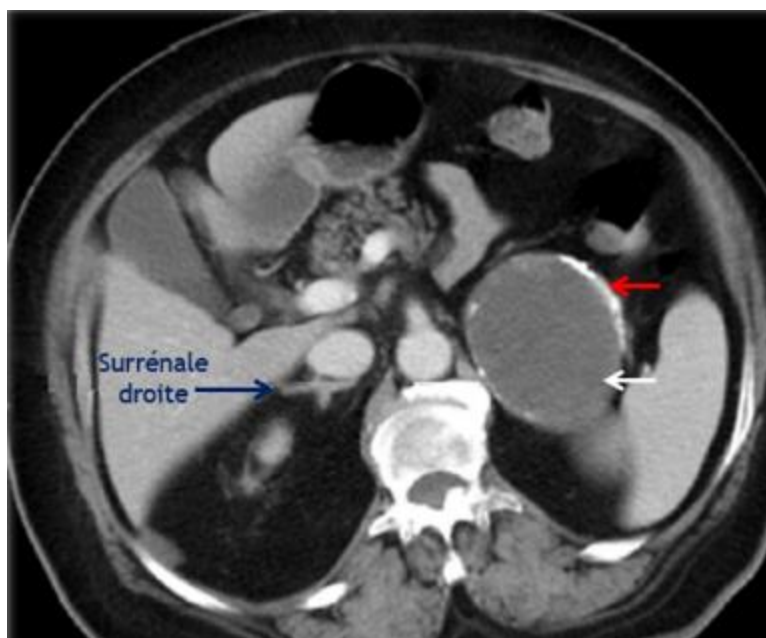


Figure 5: Adrenal hydatid disease in a 54-year-old man with chronic left flank pain. Axial contrast-enhanced CT showing a cystic mass arising from the left adrenal gland (white arrow) with peripheral calcification (red arrow).

3.2.5 Peritoneum and Retroperitoneum

Intraperitoneal hydatid disease accounts for 13% of all abdominal hydatid disease. Cysts develop secondary to spontaneous or iatrogenic rupture of hepatic, splenic or mesenteric cysts and may lie anywhere within the peritoneum. Primary peritoneal involvement is extremely rare [1,2].

Isolated retroperitoneal hydatid disease is equally rare and usually secondary to hepatic involvement. Solitary unilocular peritoneal hydatid cysts may be difficult to distinguish from other peritoneal cysts, such as mesenteric or duplication cysts, on imaging alone. Other differential diagnoses include cystic lymphangioma, cystic mesothelioma, peritoneal carcinomatosis and necrotic metastases; the identification of daughter vesicles, membranes and mural calcification, together with the absence of nodular enhancement, points to a hydatid origin [1,3].



Figure 6: Primary intraperitoneal hydatid disease in a 56-year-old man presenting with a progressively enlarging abdominal mass. Axial contrast-enhanced CT showing a large multilocular intraperitoneal cystic mass (arrows). The diagnosis was confirmed at surgery.

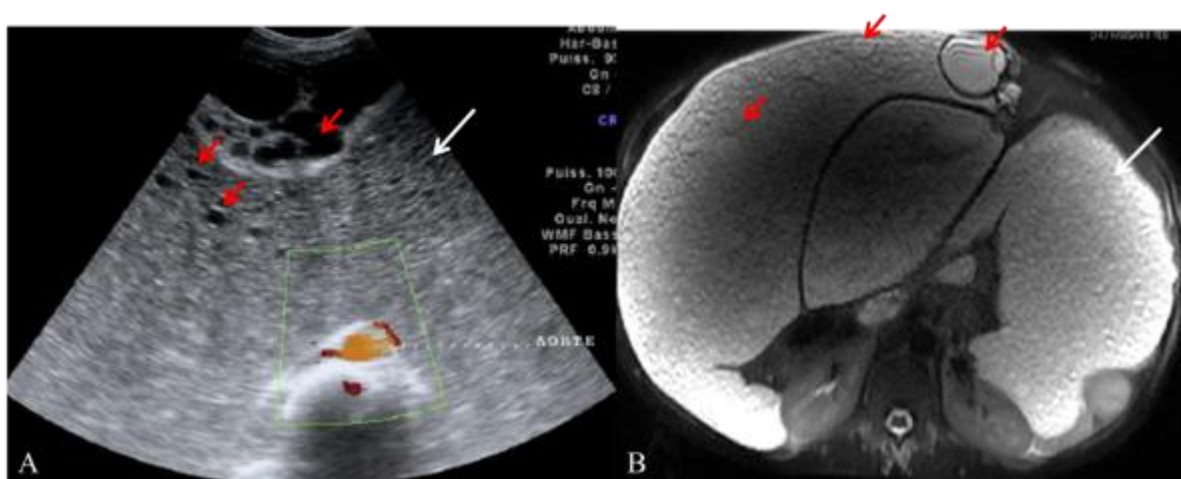


Figure 7: Intraperitoneal and retroperitoneal hydatid disease in a 56-year-old man with abdominal distension and bilateral flank pain. (a) Ultrasound and (b) T2-weighted MRI showing intraperitoneal fluid (white arrows) containing small daughter vesicles (red arrows), with no solid organ involvement. The diagnosis was confirmed at surgery.

3.2.6 Interventricular Septum

Cardiac hydatid disease is very rare (0.02-2% of cases) and may result from haematogenous dissemination or from rupture of a pulmonary cyst. In decreasing order of frequency, the sites involved are the left ventricle (50-60%), the interventricular septum (10-20%), the right ventricle (5-15%), the pericardium (10-15%) and the atria (5-8%) [2].

Transthoracic echocardiography, CT and MRI demonstrate the cystic nature of the mass and its relationship to the cardiac chambers. Cardiac hydatid cysts are of low signal on T1-weighted and high signal on T2-weighted images. The main differential diagnosis is myxoma, particularly when a cyst degenerates and acquires a solid appearance, together with thrombus and ventricular aneurysm. Dynamic gadolinium-enhanced MRI is decisive: a cardiac hydatid cyst does not enhance, whereas a myxoma enhances homogeneously; floating detached membranes and a peripheral T2-hypointense fibrous rim further support the diagnosis [13].

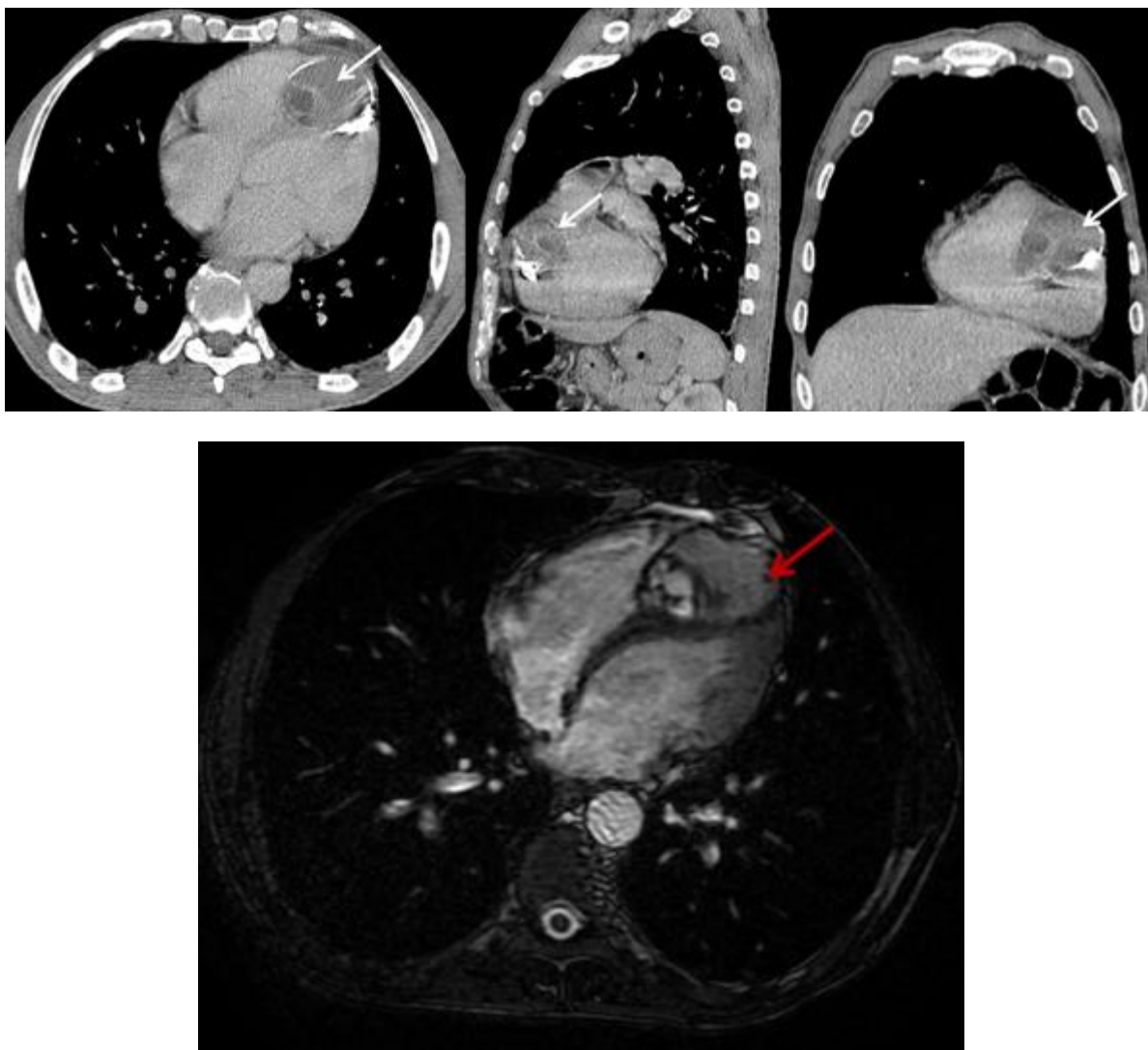


Figure 8: Hydatid cyst of the interventricular septum in a 43-year-old man presenting with dyspnoea. Contrast-enhanced CT images showing a multilocular cystic lesion with mural calcification within the interventricular septum (white arrow). The 2D FIESTA sequence confirms the cystic nature of the mass (red arrow).

3.2.7 Diaphragmatic Crus

Diaphragmatic involvement is very rare, with a reported incidence of 1%, and is usually associated with hepatic disease. Multiplanar thoraco-abdominal CT and reformatted images demonstrate the topographic relationships and any associated pulmonary and hepatic involvement. CT typically shows a thickened, lobulated diaphragm containing unilocular or multilocular cysts [1].

The differential diagnosis includes a subphrenic abscess, a bronchogenic or mesothelial cyst, a diaphragmatic haematoma and, when the lesion appears solid, a diaphragmatic tumour. Continuity with a hepatic hydatid cyst, a multivesicular pattern, mural calcification and, above all, the absence of enhancement of the contents allow the diagnosis to be established; a subphrenic abscess shows a thick enhancing wall and restricted diffusion [1,5].

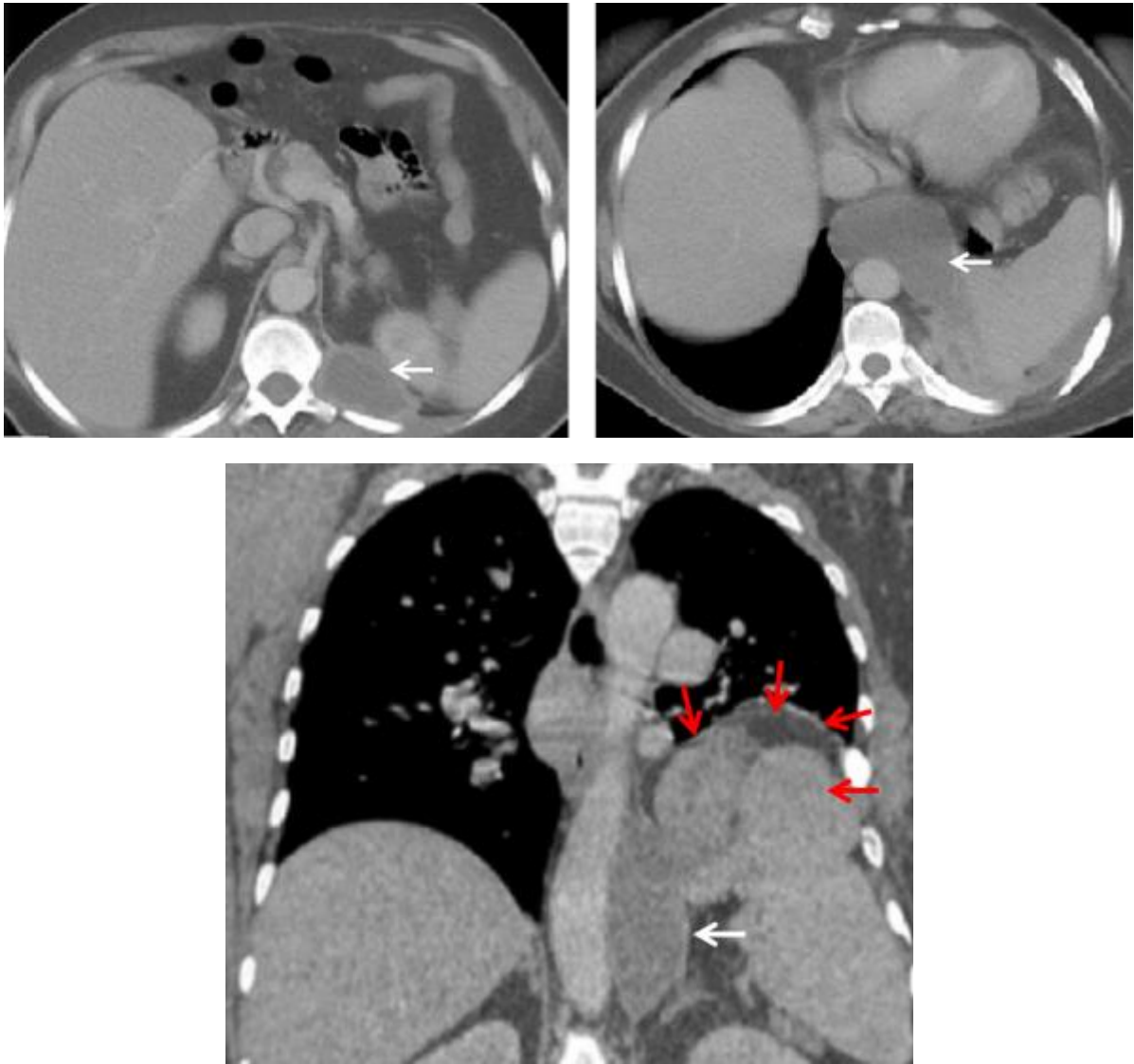


Figure 9: Primary hydatid cyst of the left diaphragmatic crus in a 54-year-old woman presenting with cough and dyspnoea. Axial contrast-enhanced CT images showing a simple cystic lesion of the left diaphragmatic crus (white arrows) associated with a diaphragmatic hernia (red arrows).

3.2.8 Pulmonary Artery

Hydatid involvement of the pulmonary artery is very rare. It may follow embolisation of a cardiac cyst, or passage of a hepatic cyst through the inferior vena cava and the right heart chambers into the pulmonary artery. The differential diagnosis of an intra-arterial pulmonary lesion includes pulmonary thromboembolism and primary arterial neoplasm [2]. Continuity with a cardiac or hepatic hydatid cyst, a multivesicular cystic appearance and the absence of enhancement of the contents distinguish hydatid disease from bland thromboembolism and from pulmonary artery sarcoma, the latter typically showing enhancement and expansion of the vessel lumen [2].



Figure 10: Pulmonary artery involvement by hydatid disease in a 30-year-old man presenting with dyspnoea. Contrast-enhanced CT images showing multiple cystic lesions in both lungs with hypoattenuating material within the lower lobe pulmonary artery (white arrow) and the inferior vena cava (red arrow).

3.2.9 Brain

Cerebral hydatid cysts are extremely rare, accounting for only 2% of all intracranial masses, and are more frequent in children than in adults. They are most often located in the middle cerebral artery territory and are usually supratentorial, with a predilection for the parietal lobe [2].

On imaging, a cerebral hydatid cyst is typically unilocular and isointense or isoattenuating to cerebrospinal fluid. It characteristically exerts a marked mass effect while producing no perilesional oedema, a combination that helps to distinguish it from abscesses and cystic tumours, in which oedema is usually prominent. A peripheral T2-hypointense rim is characteristic, and calcification is seen in fewer than 1% of cases. The main differential diagnoses are arachnoid and porencephalic cysts (non-spherical, without mass effect), cystic tumours (enhancing mural nodule and surrounding oedema) and pyogenic abscess (intense rim enhancement, perilesional oedema and restricted diffusion). By contrast, a typical hydatid cyst shows neither rim enhancement, nor oedema, nor restricted diffusion, and the presence of daughter vesicles is pathognomonic [2,3].

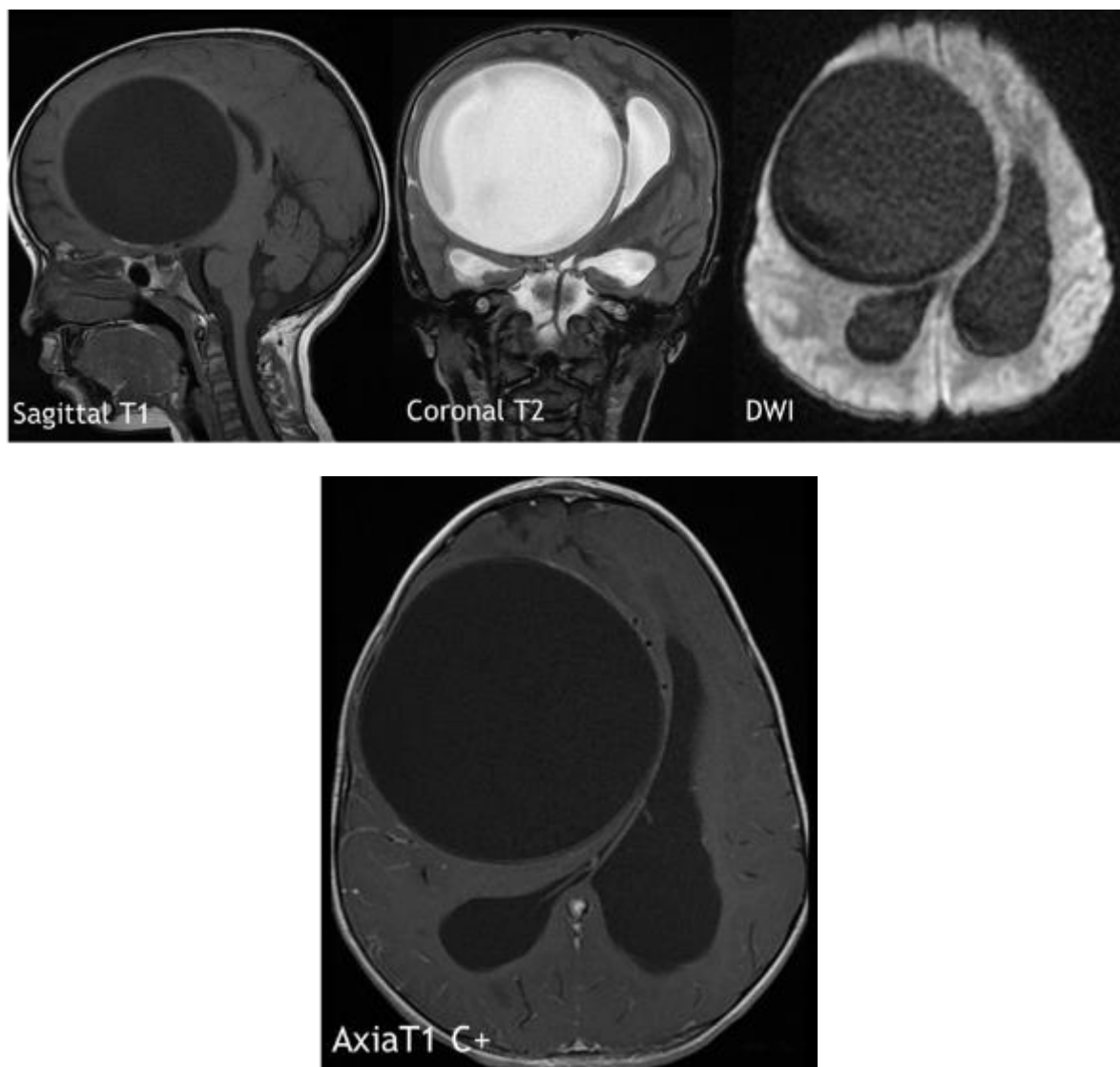


Figure 11: Cerebral hydatid cyst in a 4-year-old boy with a 5-month history of raised intracranial pressure. MRI shows a well-defined cyst in the right temporoparietal region, isointense to cerebrospinal fluid on all sequences (sagittal T1, coronal T2, DWI, axial contrast-enhanced T1), with a marked mass effect.

3.2.10 Spinal Cord and Spine

Spinal hydatid disease accounts for less than 1% of all cases. The thoracic spine is most frequently involved (50% of cases), followed by the lumbar (20%), sacral (20%) and cervical (10%) levels [2]. Spinal hydatid disease is classified into five groups: intramedullary, intradural extramedullary, extradural intraspinal, vertebral and paravertebral.

CT and MRI show a lesion with signal characteristics similar to cerebrospinal fluid. Unlike cerebral hydatid cysts, spinal cysts do not show rim enhancement after contrast administration, and calcification is likewise rare. Differential diagnoses include tuberculosis (Pott's disease), aneurysmal bone cyst, giant cell tumour and metastases; an expansile, multilocular lytic lesion with polylobulated margins and, above all, relative preservation of the intervertebral disc help to distinguish hydatid disease from tuberculous spondylodiscitis [2].

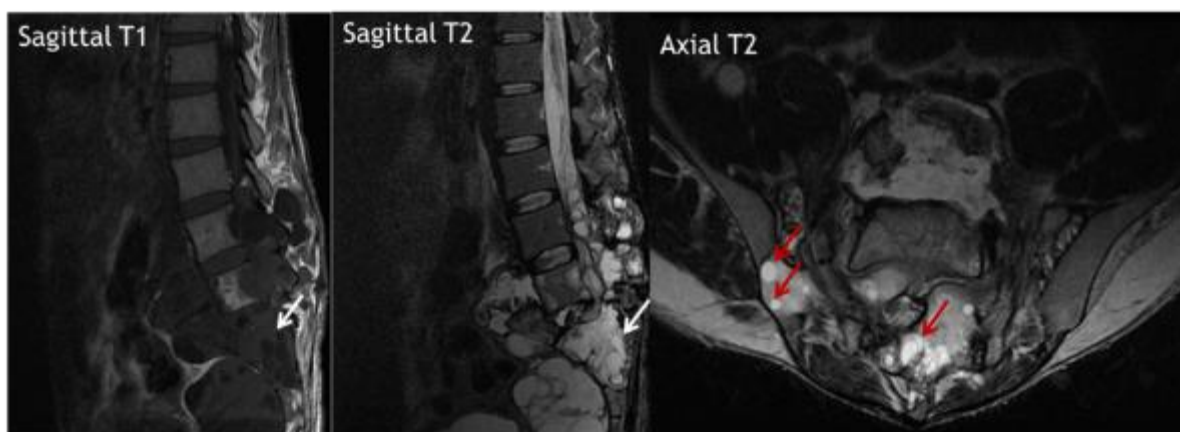


Figure 12: Sacral hydatid disease in a 30-year-old man presenting with cauda equina syndrome. MRI (sagittal T1, sagittal T2, axial T2) shows destruction of the sacrum, replaced by a multilocular cystic mass (white arrow) that also occupies the spinal canal and extends to the L5 vertebral body, containing multiple daughter vesicles (red arrows).

3.2.11 Soft Tissues

Primary soft-tissue hydatid disease is uncommon, even in endemic areas, and is reported in 0.5-4.7% of patients. A primary intramuscular focus without pulmonary or hepatic involvement is highly unusual [1,2].

Soft-tissue hydatid disease may take several appearances: a type I unilocular cyst, a unilocular cyst containing daughter vesicles or detached membranes, and a calcified type III cyst. On MRI, a T2-hypointense rim is conspicuous, a finding that is less common for hydatid cysts elsewhere in the body. The main differential diagnoses are abscess (enhancing wall, restricted diffusion of the contents), chronic haematoma, synovial cyst and necrotic soft-tissue tumours. A multivesicular pattern with daughter vesicles and a peripheral T2-hypointense rim (“rim sign”), together with the absence of enhancement of the contents, are the most suggestive features of hydatid disease [5].



Figure 13. Primary soft-tissue hydatid disease of the shoulder in a 34-year-old man presenting with swelling and pain of the right shoulder. Axial ultrasound images of the right shoulder showing a large hydatid cyst (white arrow) containing multiple daughter vesicles (red arrows), located within the right subacromial bursa.

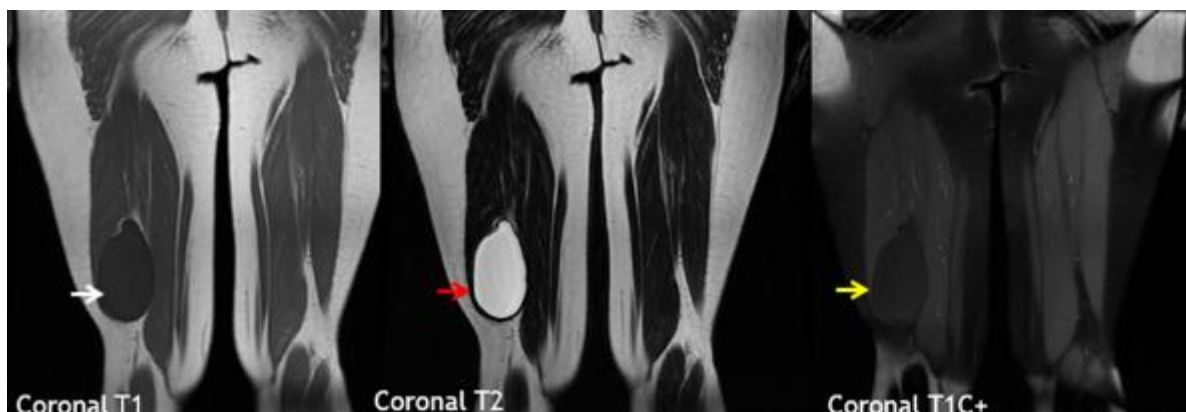


Figure 14: Primary soft-tissue hydatid disease of the right thigh in a 40-year-old man. MRI of the thighs shows a simple cystic mass within the right biceps femoris muscle, hypointense on T1-weighted images (white arrow), hyperintense on T2-weighted images (red arrow), with no enhancement after contrast administration (yellow arrow).

3.2.12 Testis

Scrotal hydatid disease is extremely rare and only a few cases have been reported in the literature. The differential diagnosis of an intrascrotal mass includes tumour, epididymitis, epididymal cyst, epididymo-orchitis, testicular torsion, hernia, hydrocele, spermatocele, varicocele, haematoma and haematocoele [5]. The identification of daughter vesicles producing a multivesicular appearance, sometimes associated with mural calcification, allows hydatid disease to be suspected among these lesions; unlike a testicular tumour, the lesion shows no internal vascularity on Doppler and no enhancement after contrast administration [5].

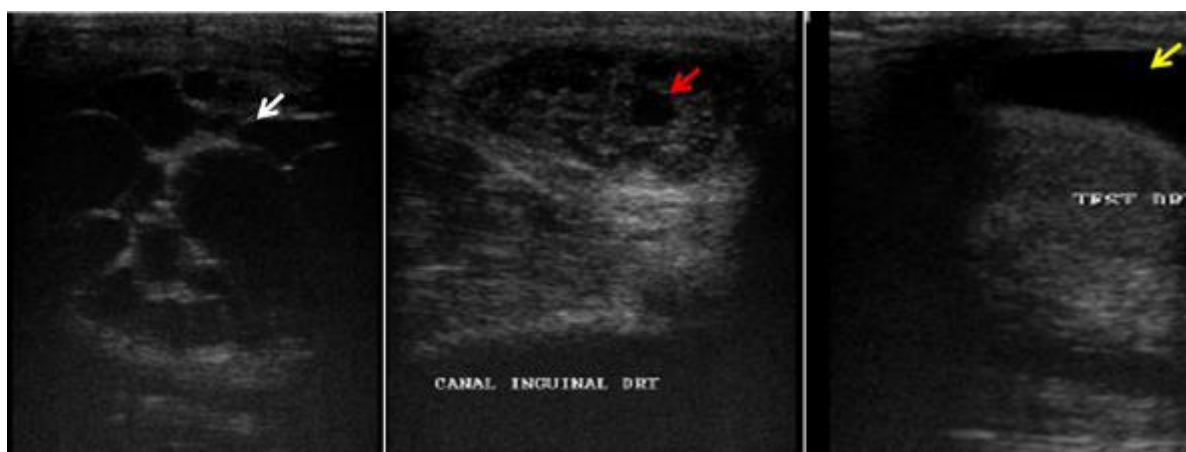


Figure 15: Scrotal hydatid cyst in a 29-year-old man presenting with a painless right testicular mass of 7 months' duration. Ultrasound images showing a large cyst within the tunica vaginalis containing daughter vesicles (white arrow), associated with a multilocular mass of the inguinal canal (red arrow) and a hydrocele (yellow arrow).

3.2.13 Ovary

Ovarian hydatid disease is rare, with few cases reported in the literature. Ovarian involvement is usually secondary to peritoneal dissemination of daughter vesicles following rupture of a hepatic cyst. It is very difficult to distinguish hydatid cysts from other predominantly cystic ovarian lesions, such as cystadenoma and cystadenocarcinoma, on imaging alone [1]. Nevertheless, a multivesicular appearance with daughter vesicles, mural calcification and the absence of enhancement point to the diagnosis; the absence of a fatty component excludes a mature teratoma, whereas the absence of enhancing mural nodules or papillary projections makes a cystadenoma or cystadenocarcinoma unlikely [2,5].

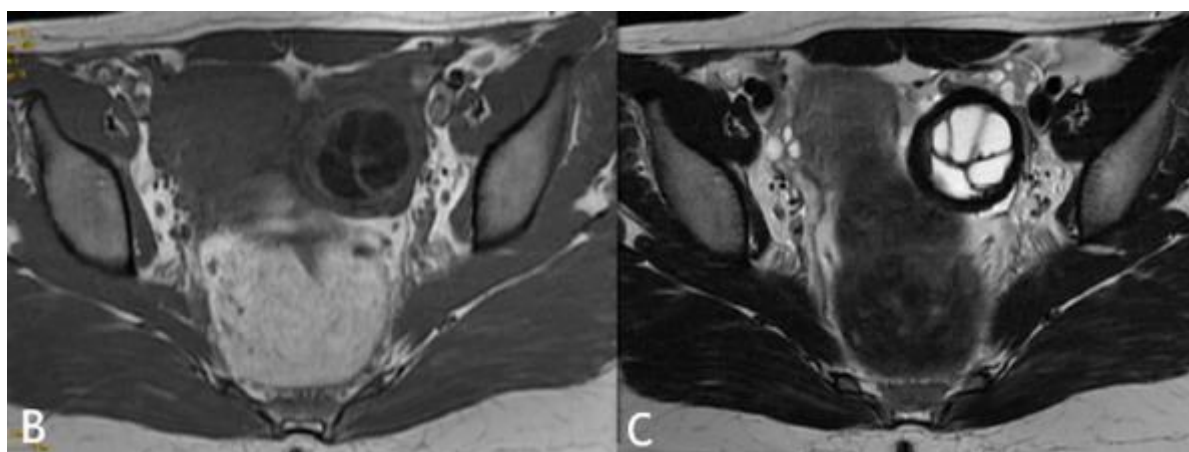
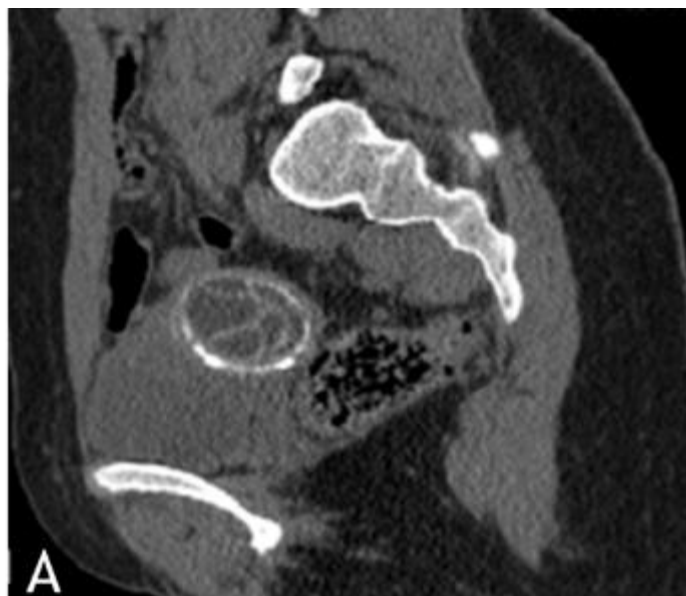


Figure 16: Hydatid disease of the left ovary in a 28-year-old woman with a 5-year history of pelvic pain. (a) Sagittal CT showing a multilocular cystic para-uterine mass with mural calcification. The mass is hypointense on T1-weighted images (b) and hyperintense on T2-weighted images, with internal septa (c).

3.3 Complications

3.3.1 Biliary Rupture and Cysto-Biliary Communication

Rupture of a hepatic hydatid cyst into the biliary tree is the most frequent complication of hepatic hydatid disease. It may lead to obstructive jaundice, pancreatitis, cholangitis and sepsis, with high mortality. Two types of communication with the biliary tree are described: frank biliary rupture and simple communication [3].

Ultrasound is particularly useful for detecting cyst membranes, septa and hydatid sand. CT demonstrates mural calcification and superimposed infection. Both CT and MRI can show the defect in the cyst wall and the passage of cyst contents through it. The main differential diagnosis is another cause of biliary obstruction, such as choledocholithiasis, cholangiocarcinoma or a hilar mass; the presence of membranes or daughter vesicles within dilated ducts, in continuity with a hepatic cystic lesion, is specific to hydatid disease [3].

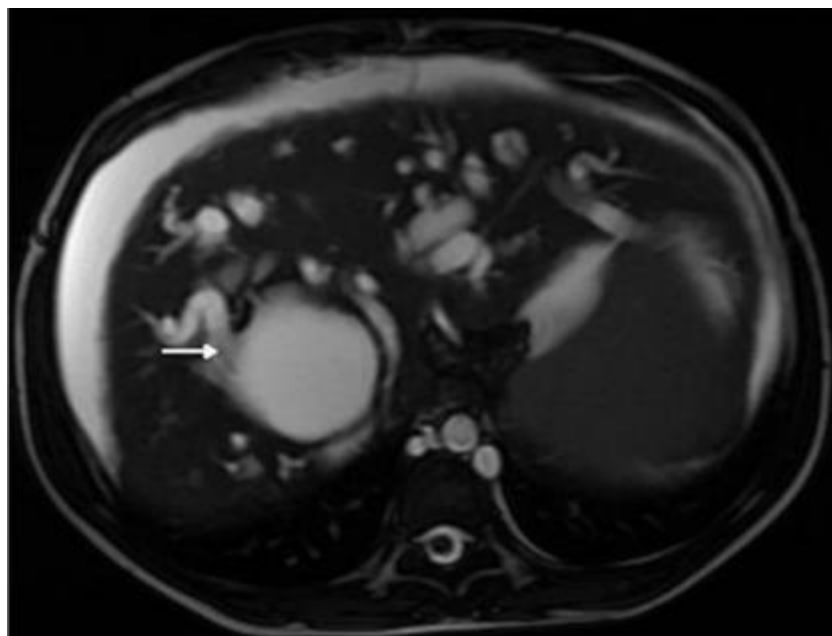


Figure 17: Cysto-biliary communication of a hepatic hydatid cyst. T2-weighted MRI shows dilatation of the biliary ducts communicating with a hilar cystic mass, with a defect in the cyst wall (arrow).

3.3.2 Bacterial Superinfection

Superinfection occurs only after rupture of the pericyst and endocyst, which allows bacteria to enter the cyst; it is reported in 5-8% of cases. Ultrasound findings are non-specific. Features suggestive of infection include a solid appearance of the lesion, echogenic foci and air-fluid levels within the cyst [3].

On CT, an infected cyst usually appears as a mass with ill-defined margins, in contrast to the well-defined mass seen in uncomplicated cases. Contrast-enhanced CT may show the peripheral high-attenuation rim characteristic of an abscess surrounding the lesion. Distinguishing an infected hydatid cyst from a primary pyogenic abscess may be impossible on imaging alone; residual membranes, mural calcification and a known hydatid context are the most useful clues [3].

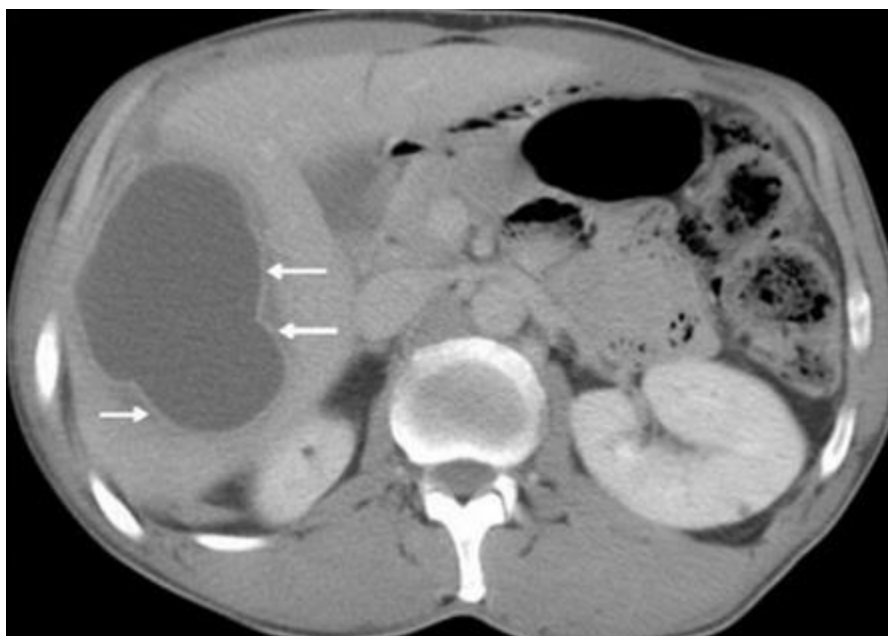


Figure 18: Bacterial superinfection of a hepatic hydatid cyst. Axial contrast-enhanced CT showing a cystic lesion of the right hepatic lobe with peripheral enhancement (arrows) indicating associated infection.

3.3.3 Exophytic Growth

Hydatid cysts may use the natural pathways provided by the hepatic capsule, the ligaments and the peritoneum to extend beyond the confines of the liver. The two most frequent routes of exophytic growth are the bare area of the liver and the gastrohepatic ligament [3].

Recognising exophytic growth matters before surgery, since the extrahepatic component may be mistaken for a primary lesion of the adjacent organ or space, such as an adrenal cyst, a lesser sac collection or a retroperitoneal cystic mass. Demonstrating continuity with the hepatic cyst on multiplanar reformatted images, together with the characteristic multivesicular content and the absence of enhancement, establishes the diagnosis [3].



Figure 19: Exophytic growth of hepatic hydatid cysts. Axial contrast-enhanced CT showing multiple hepatic hydatid cysts, some of which have extended through the hepatic capsule (arrows).

3.3.4 Peritoneal Seeding

Peritoneal hydatidosis is almost always secondary to hepatic disease. Most cases follow previous surgery for hepatic disease, although spontaneous, asymptomatic microruptures of hepatic cysts into the peritoneal cavity are not rare and are reported in 12% of cases. Cysts may be multiple and located anywhere within the peritoneal cavity [2,3].

The main differential diagnoses are peritoneal carcinomatosis, pseudomyxoma peritonei and cystic mesothelioma. Multiple, well-defined, non-enhancing cysts of similar appearance, some containing daughter vesicles or calcification, in a patient with a history of hydatid surgery, are highly suggestive; nodular or enhancing peritoneal thickening favours a neoplastic process [2,3].

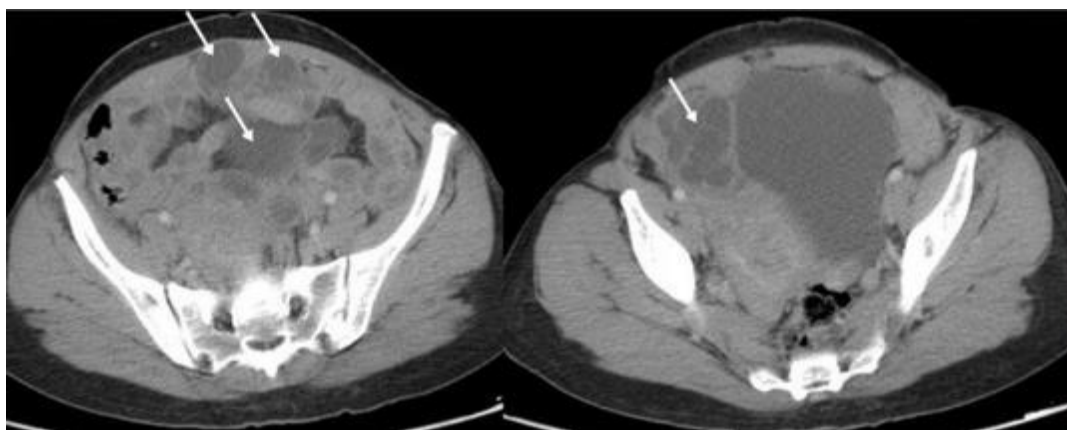


Figure 20: Peritoneal seeding in a patient with a history of surgery for hepatic hydatid disease. Axial contrast-enhanced CT images showing multiple cysts within the peritoneum (arrows).

3.3.5 Abdominal Wall Invasion

Cysts may invade the right anterolateral abdominal wall from the right hepatic lobe, and the anterior abdominal wall from the left lobe. They usually pass through a small orifice, adopting a dumbbell configuration. Imaging shows a cystic mass within the abdominal wall communicating with the hepatic component of the cyst [3].

The differential diagnosis includes an abdominal wall abscess, a post-operative collection, an incisional hernia containing fluid, and a soft-tissue tumour with cystic change. The dumbbell configuration, the continuity with an intrahepatic cyst and the absence of enhancement of the contents are the distinguishing features [3].



Figure 21: Abdominal wall invasion by hydatid disease. Contrast-enhanced CT reveals multiple hepatic cysts, one of which extends into the subcutaneous soft tissues of the anterior abdominal wall (arrow).

4 CONCLUSION

Hydatid disease displays a wide spectrum of atypical locations and complications, knowledge of which is indispensable for radiologists practising in endemic areas. Hydatid disease should be included in the differential diagnosis of any cystic lesion, whatever its site. Two elements recur across all locations: the parasitic signs, daughter vesicles, detached membranes, mural calcification and the peripheral T2-hypointense rim, and the absence of enhancement of the cyst contents and septa, which is the single most useful feature separating hydatid disease from cystic neoplasms and abscesses. Ultrasound, CT and MRI are complementary and, in the great majority of cases, allow an accurate and early diagnosis, thereby avoiding diagnostic error and ensuring optimal management.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

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Disclosure of conflict of interest

The authors declare that they have no conflict of interest.

Statement of ethical approval

This retrospective pictorial review is based on anonymised imaging acquired in the course of routine clinical care. No identifying patient information appears in any of the figures, and the work involved no intervention and no modification of patient management. It was conducted in accordance with the ethical standards of the institution and with the 1964 Declaration of Helsinki and its later amendments.

Statement of informed consent

Informed consent was obtained from the patients whose anonymised imaging is reproduced in this article.

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