

# Pictorial review: Imaging features of unusual patterns and complications of hydatid disease

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## ABSTRACT

Hydatid disease is a worldwide zoonosis produced by the larval stage of the Echinococcus tapeworm. We demonstrate rare locations and unusual complications of this entity during past 6 years. Rare locations during our observation included lumbar spine, sacral spine, spleen, ovary, abdominal wall, diaphragm, pelvis and right kidney. Unusual complications included formation of bronchopulmonary fistula, complete collapse of left lung secondary to hilar location of Hydatid cyst and hydatiduria.

## REVIEW ARTICLE

### INTRODUCTION

The two main types of hydatid disease are caused by E. granulosus and E. multilocularis. Hydatid disease primarily affects the liver and typically demonstrates characteristic imaging findings. However, there are many potential local complications (e.g. intrahepatic complications, exophytic growth, transdiaphragmatic thoracic involvement, perforation into hollow viscera, peritoneal seeding, biliary communication, portal vein involvement and abdominal wall invasion). Furthermore, secondary involvement due to hematogenous dissemination may be seen in almost any anatomic location (e.g. lungs, kidney, spleen, bone, brain) (1).

Although liver and lung are the most commonly involved organs, Hydatid disease can occur in all viscera and soft tissues (2). In humans, hydatid disease involves the liver in approximately 75% of cases and the lung in 15%.

Secondary involvement due to hematogenous dissemination may be seen in almost any anatomic location (3).

### CASE DESCRIPTIONS

#### Case 1. Hepatic Hydatid cyst with rupture into the right pleural cavity. (Fig 1a-c)

A 55 years old female patient presented with progressively worsening dyspnea and pain in the right hypochondrium for 7 months. There was history of severe cough with expectoration of sputum containing grape like structures as well as membranes. Computed Tomography (CT) scan showed a large hydatid cyst replacing the right lobe of liver with complete collapse of right lung secondary to the transdiaphragmatic rupture. Per-operatively, a bronchopleural fistula was also identified and repaired.

### Case 2. Multifocal Hepatic Hydatid cysts with an exophytic component. (Fig 2a-d)

We demonstrate an unusual pattern of Hydatid involvement of liver in a 42 year old male. Initially an ultrasound was performed which revealed two Hydatid cysts in the left and right lobes. The right sided cyst was multiloculated and extended into the sub-hepatic space surrounded by mesenteric fat.

### Case 3. Solitary large hepatic Hydatid cyst with an exophytic component (Fig 3 a-b)

This 42 years old male presented with abdominal pain. A solitary Hydatid cyst was seen in the liver replacing the left lobe. The cyst was producing mass effect on the lesser curvature of the stomach. It extended in the pre-vertebral region with no surrounding liver tissue.

### Case 4. Calcified Splenic Hydatid cyst. (Fig 4 a-d)

This fifty five years old female patient complained of left sided fullness and pain. An ultrasound revealed calcified Hydatid cyst. It was further confirmed with CT Scan. Patient underwent splenectomy.

### Case 5. Sacral Hydatid Cyst (Fig 5 a-f)

A 32 years old male soldier was referred with complaint of backache for 5 months. CT scan of pelvis and MRI of the lumbo-sacral spine were performed which revealed multiple small cystic structures in the lower lumbar and sacral spinal canal. Sacral foramina were enlarged and posterior scalloping of the sacral vertebrae and L5 was also seen. Multiple Hydatid cysts were seen in the pelvis involving right psoas muscle and destroying the right sacro-iliac joint.

### Case 6. Lumbar and paraspinal Hydatid cysts. (Fig 6 a-e)

A 30 years old female presented with a 2 months history of severe low back pain with weakness, walking difficulty, numbness and urinary incontinence. Examination was suggestive of flaccid paralysis of lower limbs with tenderness in lower back on local examination. Clinical diagnosis of cord compression was made. MRI scan of the spine showed a large multi-loculated fluid containing mass in the adjacent paraspinal musculature extending into the epidural space and causing compression of the theca. Based on these findings, the diagnosis of spinal hydatid disease with involvement of the spinal canal and adjacent paraspinal soft tissues was made, and the patient was managed surgically.

### Case 7. Omental, Splenic and Pelvic Hydatidosis. (Fig 7 a-g)

A 65 years old female presented with large abdominal swelling involving epigastium, left hypochondrium and pelvis. An ultrasound was performed initially which revealed multicystic Hydatid cysts in the omentum, mixed cystic and solid lesions in the markedly enlarged spleen and solid Hydatid cyst in the pelvis. CT Scan and MRI confirmed our diagnosis of diffuse abdominal hydatidosis.

### Case 8. Left sided pulmonary Hydatid cyst causing complete collapse of the lung. (Fig 8 a-d)

A 37 years old male presented with history of cough for 7 months. He had an episode of hemoptysis 2 months ago and recent onset of gradually worsening dyspnea. His chest X-Ray revealed a rounded mass occupying the left hilum with complete collapse of the left lung and no evidence of lung tissue in the left hemithorax. Patient underwent thoracotomy and pneumonectomy with removal of the cystic structure which turned out to be a large Hydatid cyst.

### Case 9. Renal Hydatid Cyst Presenting with Hydatiduria. (Fig 9 a-d)

We report a case of renal Hydatid cyst in a 25-year-old male who presented with hydatiduria. Intravenous pyelography revealed presence of a space occupying lesion in the lower pole of right kidney with curvilinear calcifications. Ultrasound, computed tomography and MRI were suggestive of hydatid cyst in the right kidney. Patient underwent right sided nephrectomy revealing Hydatid cysts.

### Case 10. Ovarian hydatid cyst in a case of diffuse abdominal and pelvic hydatidosis. (Fig 10 a-b)

This thirty nine year old female presented with abdominal swelling; had involvement of liver, diaphragm, pelvic cavity, ovary and abdominal wall. Hydatid cysts were morphologically different from each other including calcified, uniloculated and multiloculated cystic lesions. This case is rare as ovary and abdominal wall involvement is described in less than 1 % cases of hydatid disease.

## DISCUSSION

On reviewing our cases of hydatid disease seen over a period of 06 years (2003-2009), we encountered a number of unusual radiological appearances and sites, which are demonstrated in this pictorial review. A basic cause for most of these advanced stages of hydatidosis diagnosed by us is lack of proper diagnostic facilities in our country. Patients don't seek medical advice until late during the course of their illness. Diagnostic facilities are also few and far between causing a delay in diagnosis.

Endocyst detachment within hydatid cyst is seen at cross sectional imaging as floating membranes within the cyst (4,5). It may be related to cyst degeneration, trauma, or response to therapy. This sign was seen in our case No. 1.

The criteria for hepatic hydatid cyst with an exophytic component is demonstration of not more than 1mm of combined pericyst and liver tissue surrounding the portion of the cyst and bulging of part of the cyst beyond expected liver edge (6). Both our cases no.2 and 3 fulfilled these criteria.

The most valuable diagnostic method in pulmonary hydatid disease is the plain chest radiograph (7). Pulmonary cysts may range between 1 and 20 cm in diameter (8). Typical chest radiographic appearances of uncomplicated pulmonary hydatid disease are one or more homogeneous round or oval masses with smooth borders surrounded by normal lung tissue. Large cysts can shift the mediastinum, induce a pleural

reaction or cause atelectasis of adjacent parenchyma. Impingement on relatively rigid anatomical structures can lead to irregularity, indentation or lobulation of the cyst. The fluid contents of the cyst may be identified by the finding of a change in the shape of the cyst on serial radiographs obtained during inspiration and expiration or with the patient erect and then supine (9).

Hydatid disease occurs in humans as a result of faeco-oral contamination. Hydatid disease of bone is rare. It affects the bones in 0.5-2% of cases, of which spine is involved in approximately 45% of cases. In the vertebral column it affects the lumbar, thoracic and cervical region, in decreasing order of frequency. It begins as a single primary cyst which contains daughter cysts. Rupture of such cysts into the muscle is followed by formation of secondary cysts (10).

A lucent expansile lesion with cortical thinning is the most common radiological pattern of osseous Hydatid cyst. Pathological fractures are also common in such cases. In descending order, the vertebrae, long bone epiphyses, pelvis, skull and ribs are most frequently affected (11).

Extrahepatic abdominal Hydatid lesions have nearly identical imaging features, including the presence of cyst wall calcification, daughter cysts, and membrane detachment. The combinations of radiologic and serologic tests especially in patients living in the endemic areas contribute to the diagnosis (12).

In the medical literature, reports about isolated splenic hydatidosis are quite rare. Splenic Hydatid cyst should be treated surgically due to the high risk of a rupture. Ideal procedure in adults is standard splenectomy (13).

The differential diagnosis of splenic hydatidosis includes epidermoid cysts, pseudocysts, abscess, hematoma and neoplasms (14).

Peritoneal hydatidosis can either be due to disseminated primary peritoneal echinococcosis or secondary to hepatic or splenic lesions. Such cases can be treated with a preoperative course of antihelminthics followed by surgery, which consists of removal of the peritoneal cysts along with de-roofing and omentoplasty for the hepatic lesions and splenectomy for the splenic Hydatid (15).

Involvement of kidney by Hydatid cysts is rare (3%). Cysts are usually unilateral and located in the upper or lower pole. Eighteen percent of renal hydatid cysts have been reported to rupture into the collecting system, leading to acute colic and hydatiduria. However, primary HD of these structures is extremely rare (16). Imaging findings consist of a polar-located unilocular or multiloculated cyst usually with a daughter cyst showing lower attenuation on CT. Mural calcification may also be present. The differential diagnosis of renal hydatidosis includes simple or infected renal cyst, abscess, and necrotic neoplasm (17).

On MRI the Hydatid cyst wall shows a rim of low signal intensity on both T2- and T1-weighted imaging. This capsule is more easily identified by MR than by CT (18). On MRI, daughter cysts may appear slightly hypointense or isointense relative to the maternal matrix on the T1-weighted images and hyperintense on the T2-weighted images. When present, floating membranes are seen as low signal intensity linear structures within the cyst on both the T1- and T2-weighted images (19).

Hydatid disease may occur anywhere in the body. In endemic areas, a high index of suspicion is required for correct diagnosis when it presents in an unusual site or with an atypical radiological appearance.

#### TEACHING POINT

Hydatid cysts can be seen at unusual locations and any cystic or partly cystic lesion especially if multiloculated should be suspicious of hydatid cyst in areas where it is endemic.

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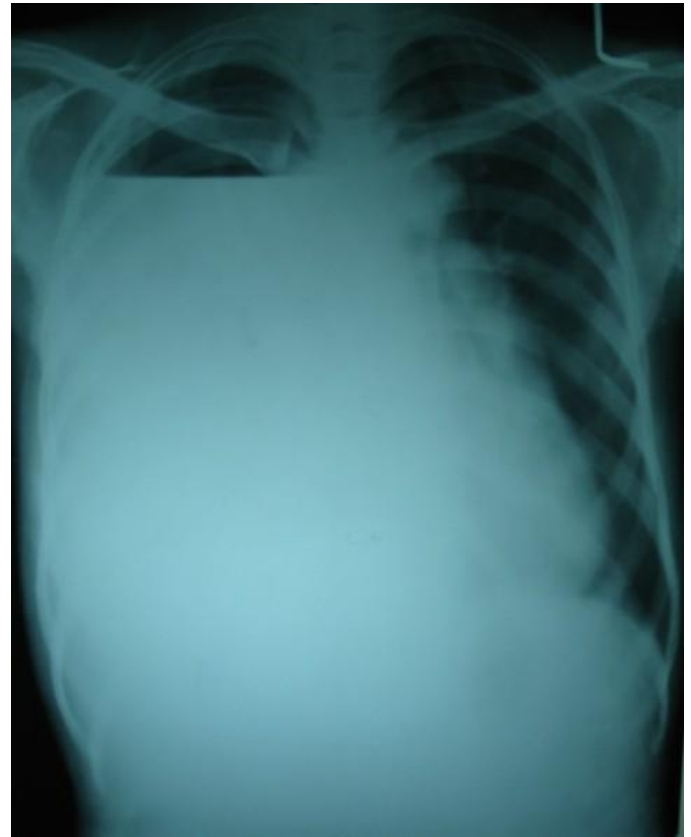


Fig. 1a

FIGURES

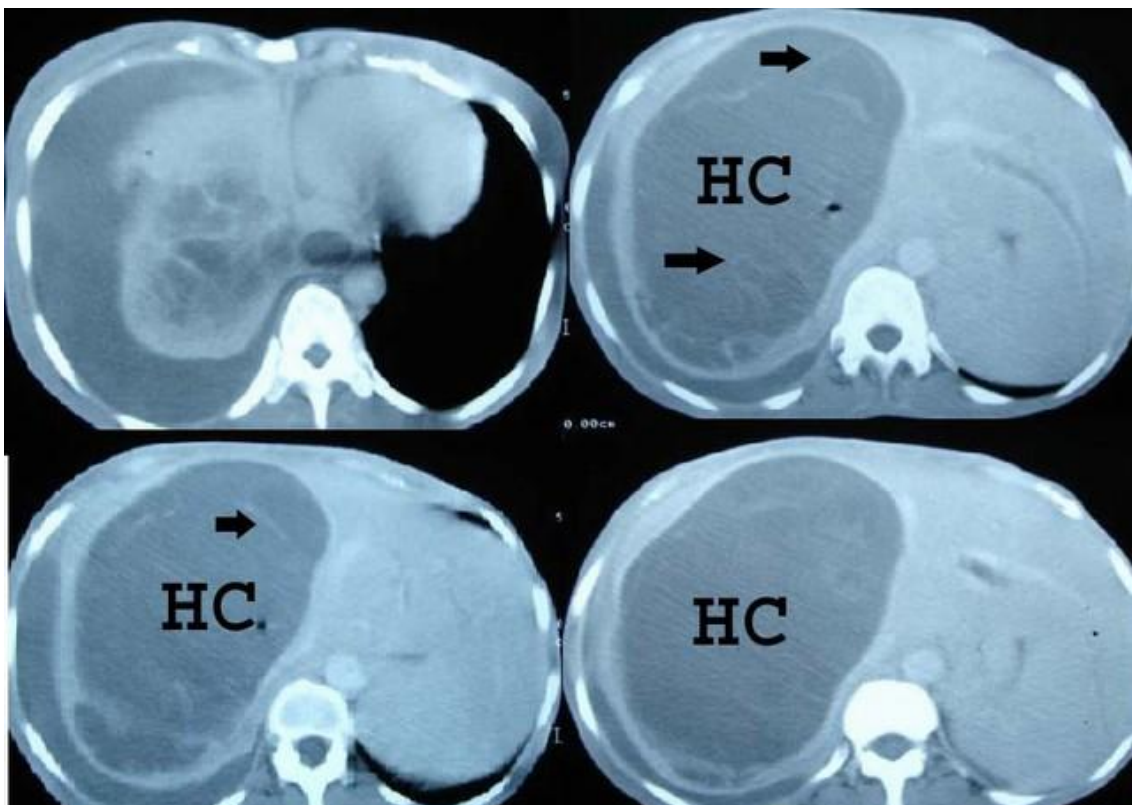


Figure 1b

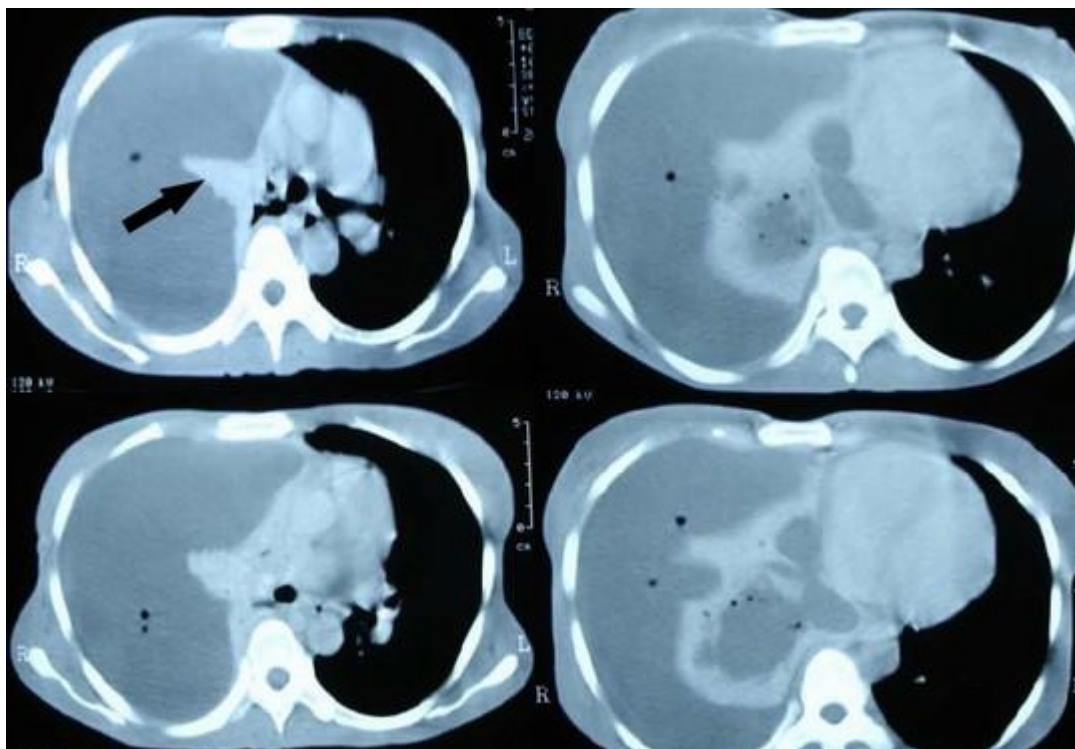


Figure 1c



Figure 1d

**Figure 1.** Hepatic Hydatid cyst in a 55 years old female with rupture into the right pleural cavity. (a) X-ray chest showing opaque right hemithorax with air fluid level. (b) CT scan of the liver and lower chest showing a large Hydatid cyst (HC) replacing right lobe of liver. Note detached endocyst (black arrows). (c) Massive Right sided pleural effusion. Collapsed Right lung (black arrow). Air bubbles can be seen within pleural fluid. (d). Pathological specimen of operatively removed Hydatid cyst. Thick Hydatid membranes mixed with blood and inflammatory debris can be seen.

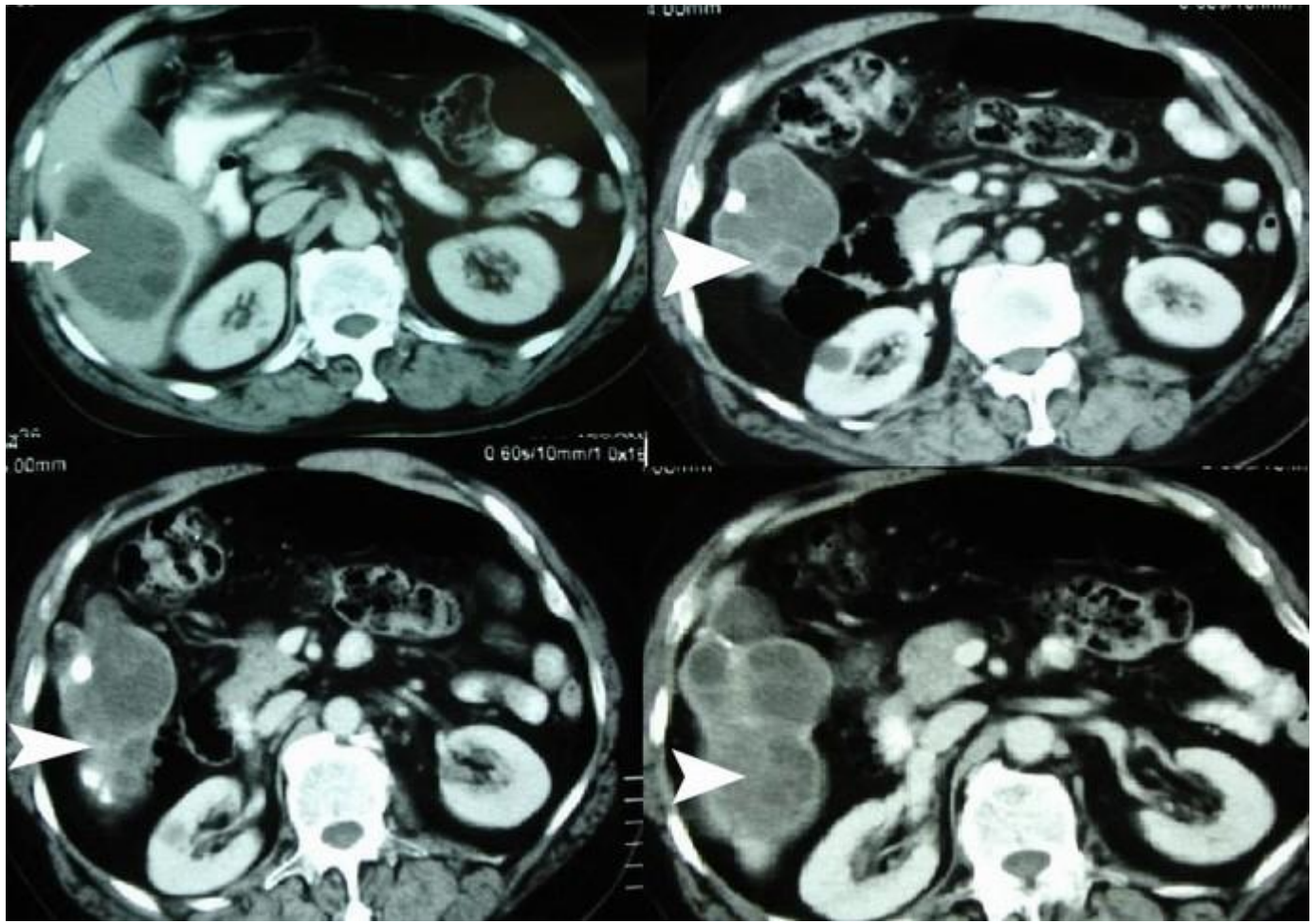


Figure 2a

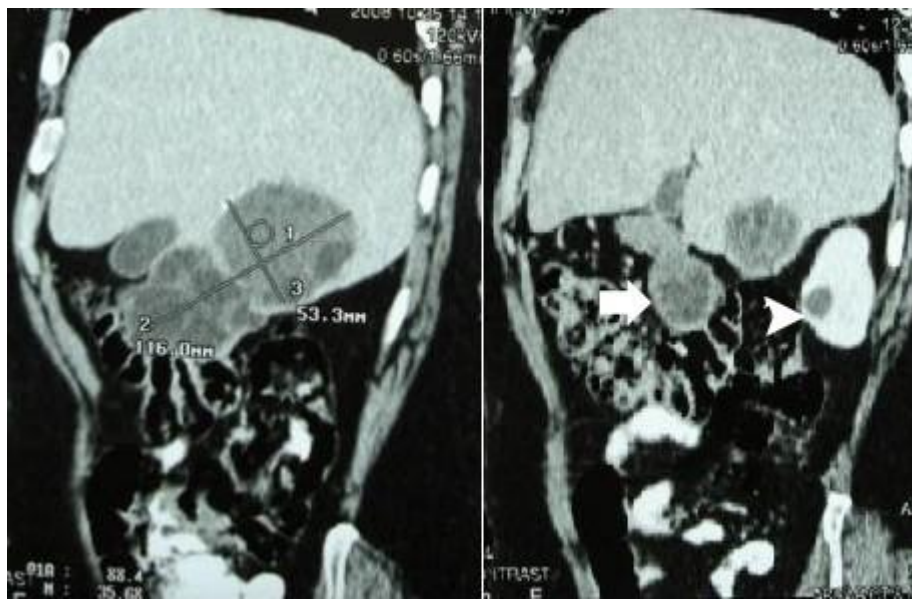


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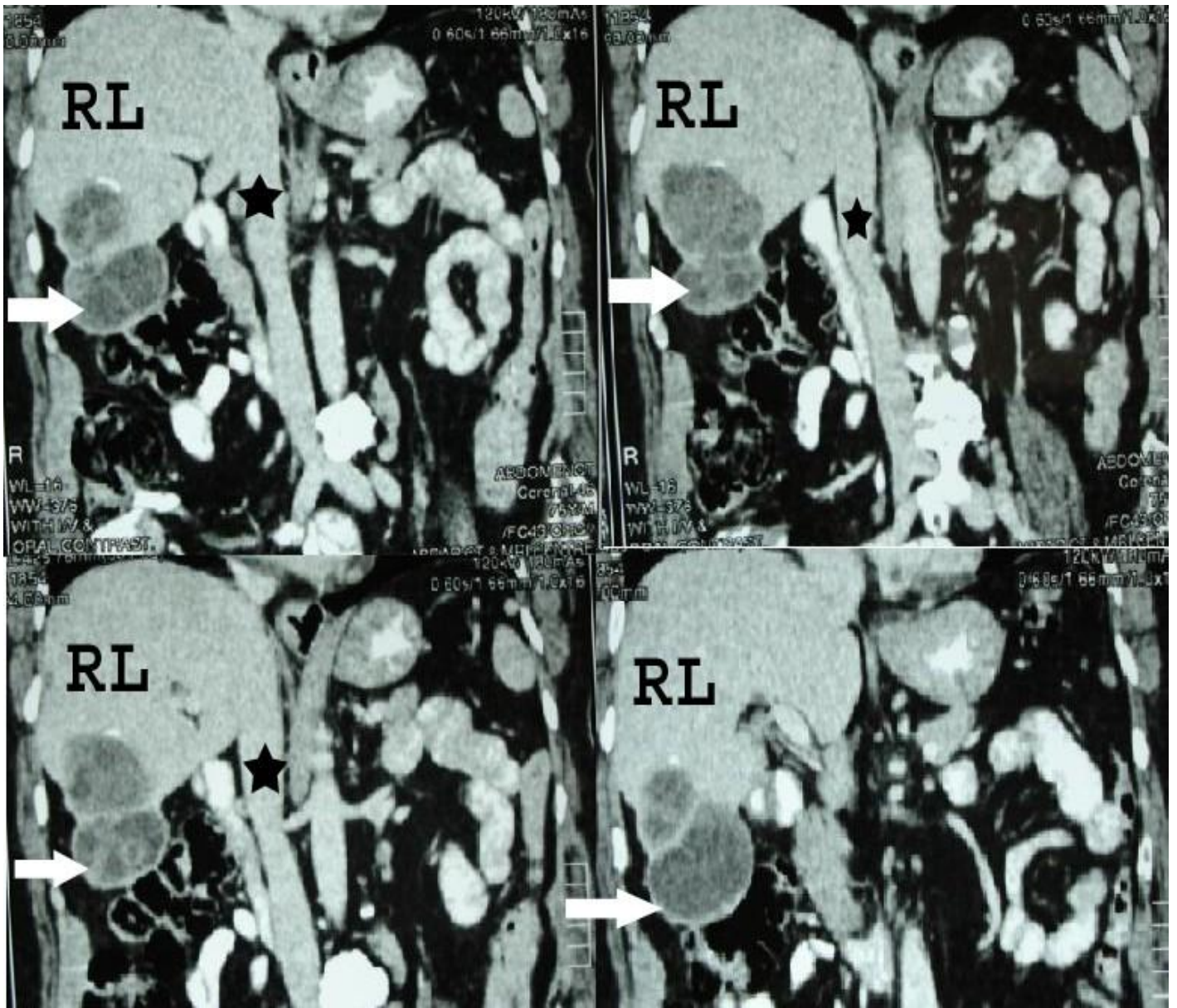


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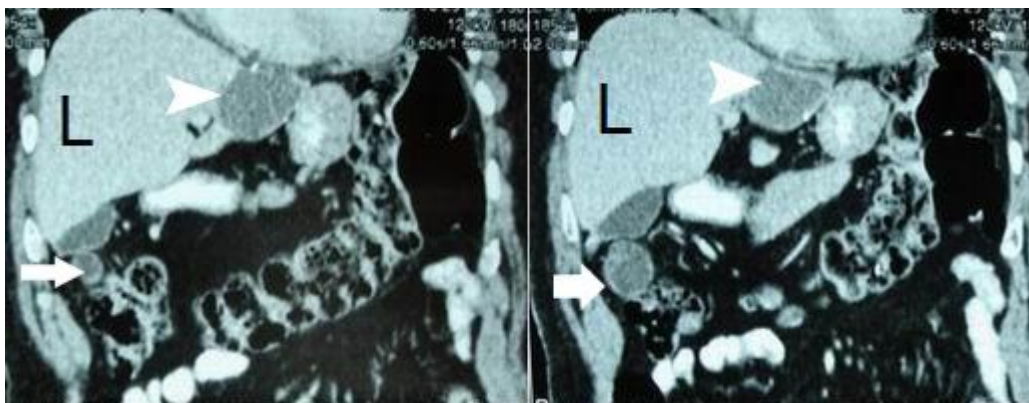


Figure 2d

**Figure 2.** Multifocal Hepatic Hydatid cysts in a 42 years old male with an exophytic component. a. Axial contrast enhanced axial CT scan done on 16 slice MDCT showing hydatid cyst within the right lobe of liver (white arrow). The sub-hepatic exophytic component (arrowhead) seen surrounded by mesenteric fat. Calcified foci are also seen in the hydatid cyst b. Sagittal reformatted multi- detector row CT shows exophytic component (arrow). Arrowhead= simple left renal cyst. c and d. Coronal reformatted multi- detector row CT image of the liver showing sub-hepatic component of the Hydatid cyst (white arrow).arrow head = Hydatid cyst in the left lobe. L=Liver. Asterisk =IVC

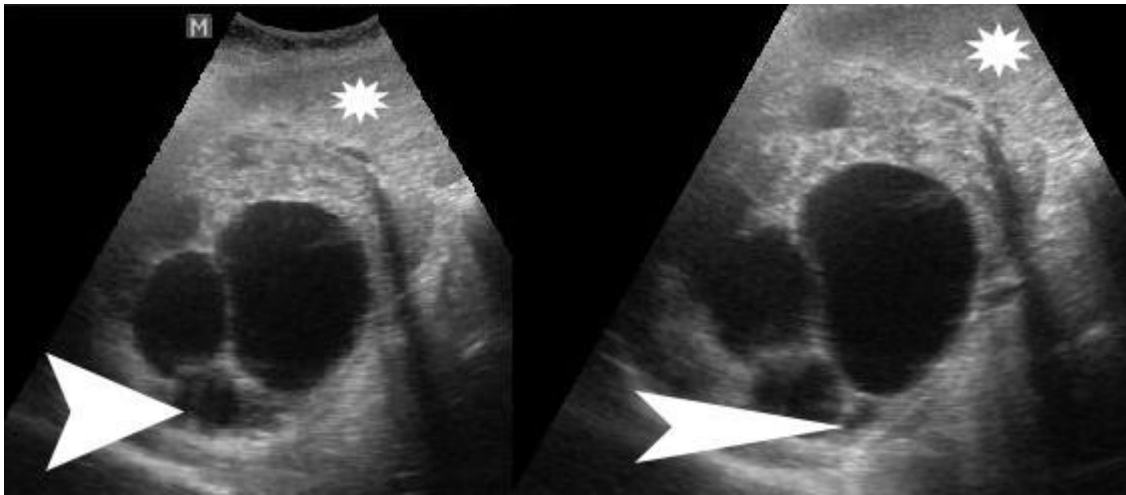


Figure 3a

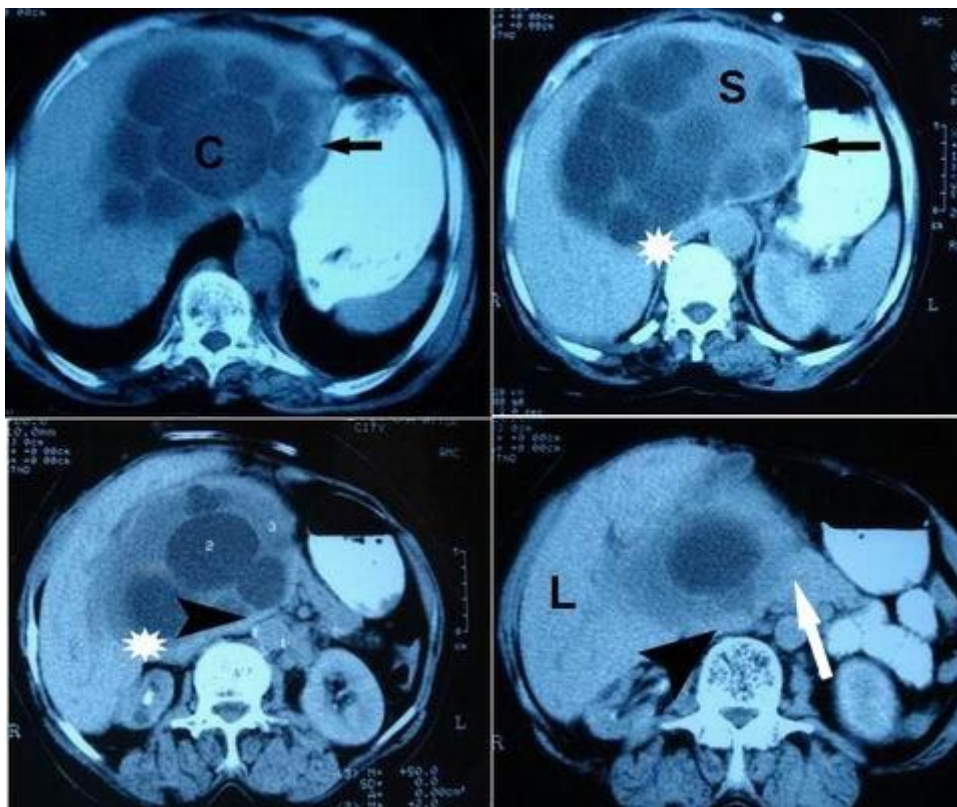


Figure 3b

**Figure 3.** Solitary huge hepatic Hydatid cyst in a 44 years old male with an exophytic component. a. ultrasound done with 3.5 MHZ probe (SONOACE -MEDISON) Liver shows a large multicystic structure measuring 12.7 x 16.5 cm in the antero-inferior segment of the right lobe of the liver. b. Axial Contrast enhanced CT scan. Most of the cysts are arranged in a radial fashion. No solid component is seen within the cysts. Solid tissue in between the cysts is seen. The cyst is extending down in the subhepatic space and is in contact with the head of the pancreas.



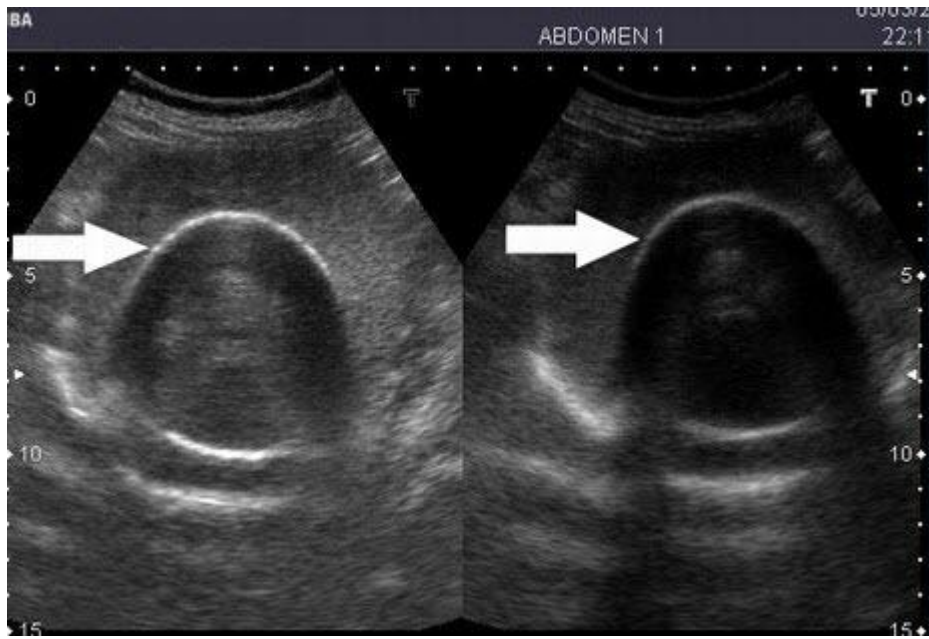


Figure 4a



Figure 4b

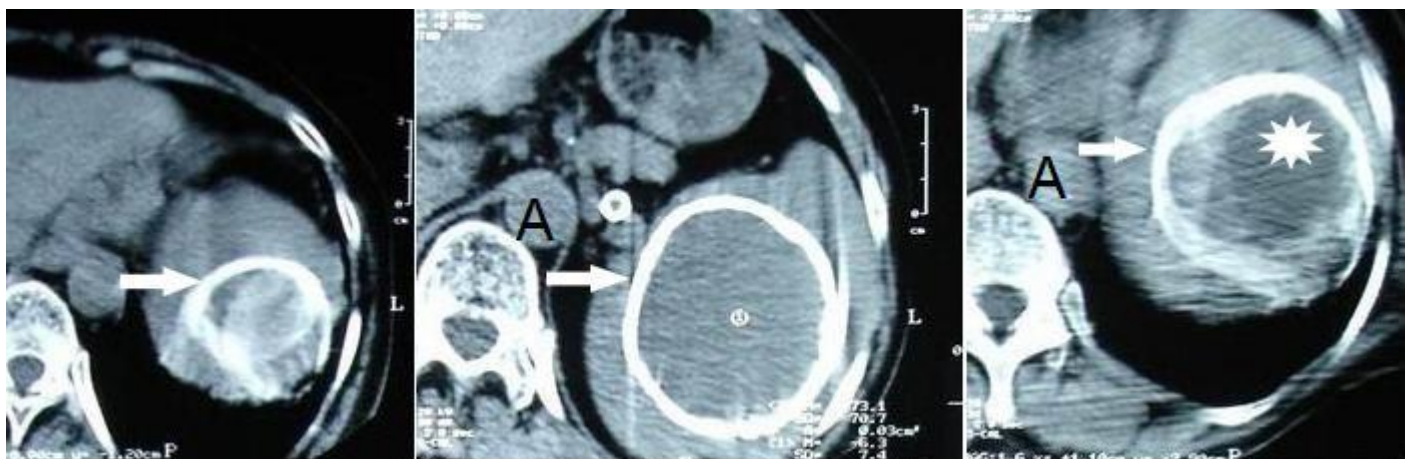


Figure 4c



Figure 4d

**Figure 4.** Calcified Splenic Hydatid cyst in a 55 years old female. (a) Ultrasound scan of the spleen done with 3.5 MHz probe (Nemio -Toshiba) showing a cystic structure with calcified wall (arrow). (b) Scout view of the CT exam shows an oval shaped structure with calcified walls. (c). Axial CT scan through the spleen shows the Hydatid cyst with calcified wall (arrow). Asterisk = cystic contents, A = Aorta. (d) Pathological specimen shows spleen (arrow) with calcified Hydatid cyst (arrow head)

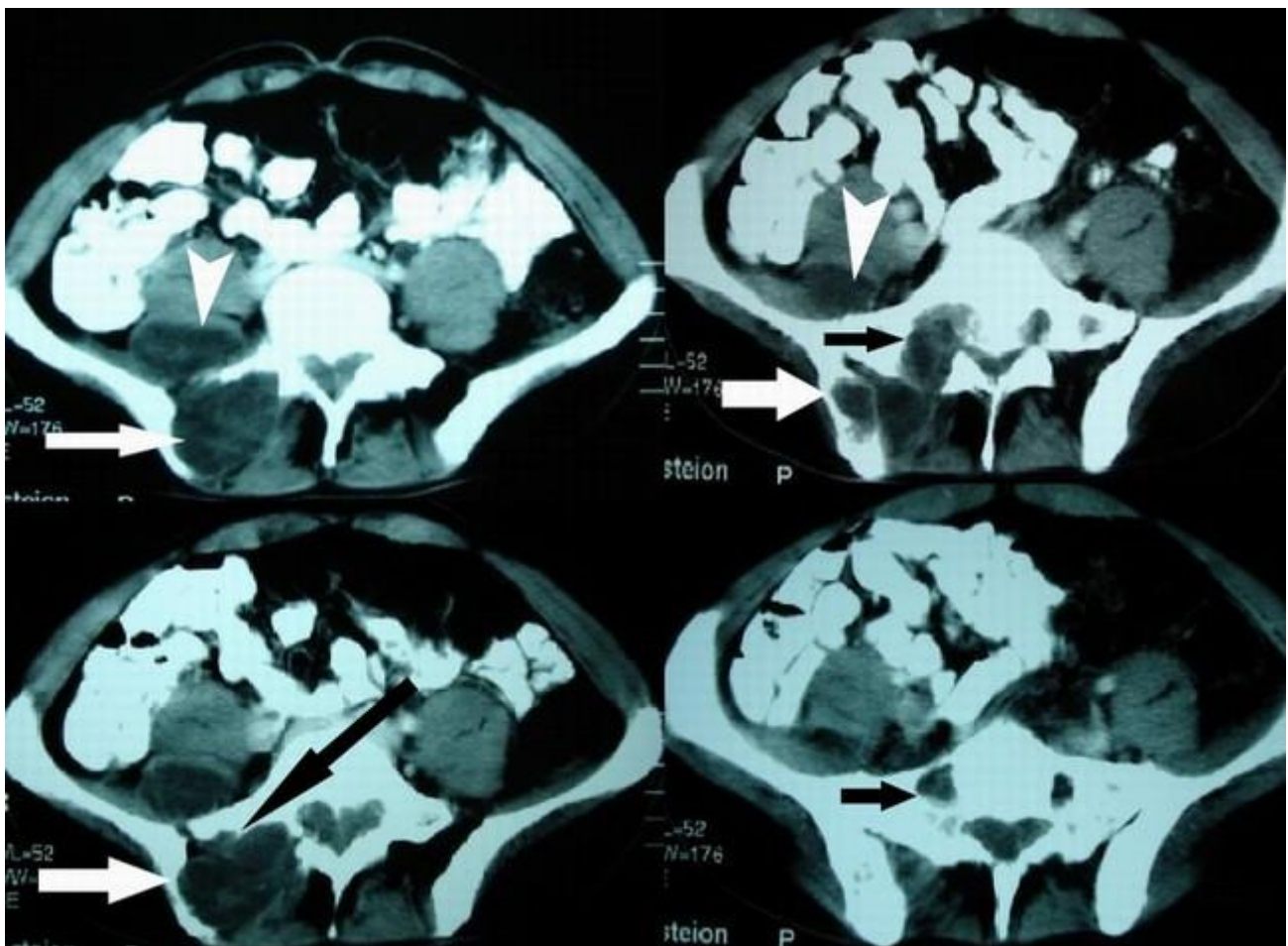


Figure 5a

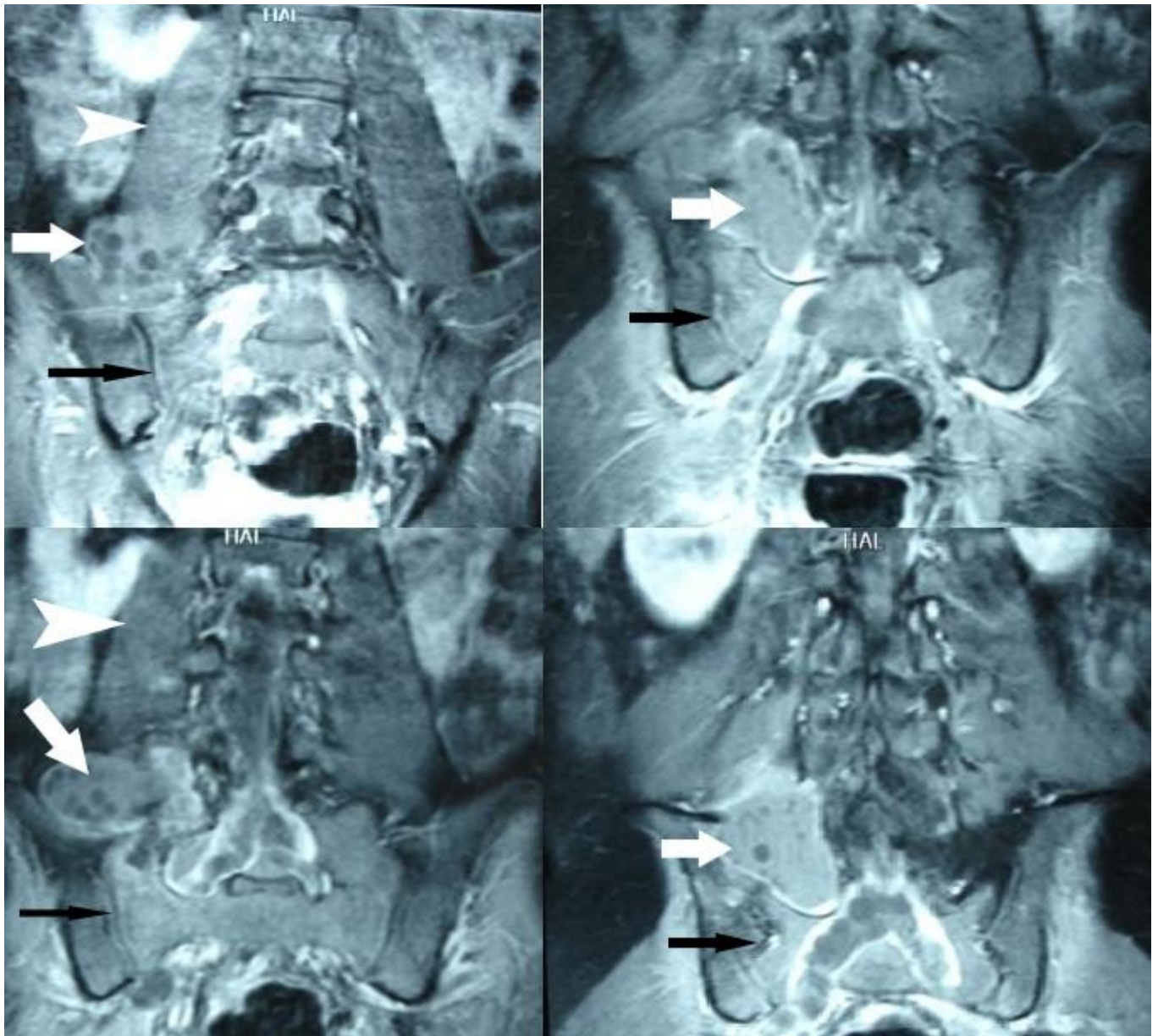


Figure 5b

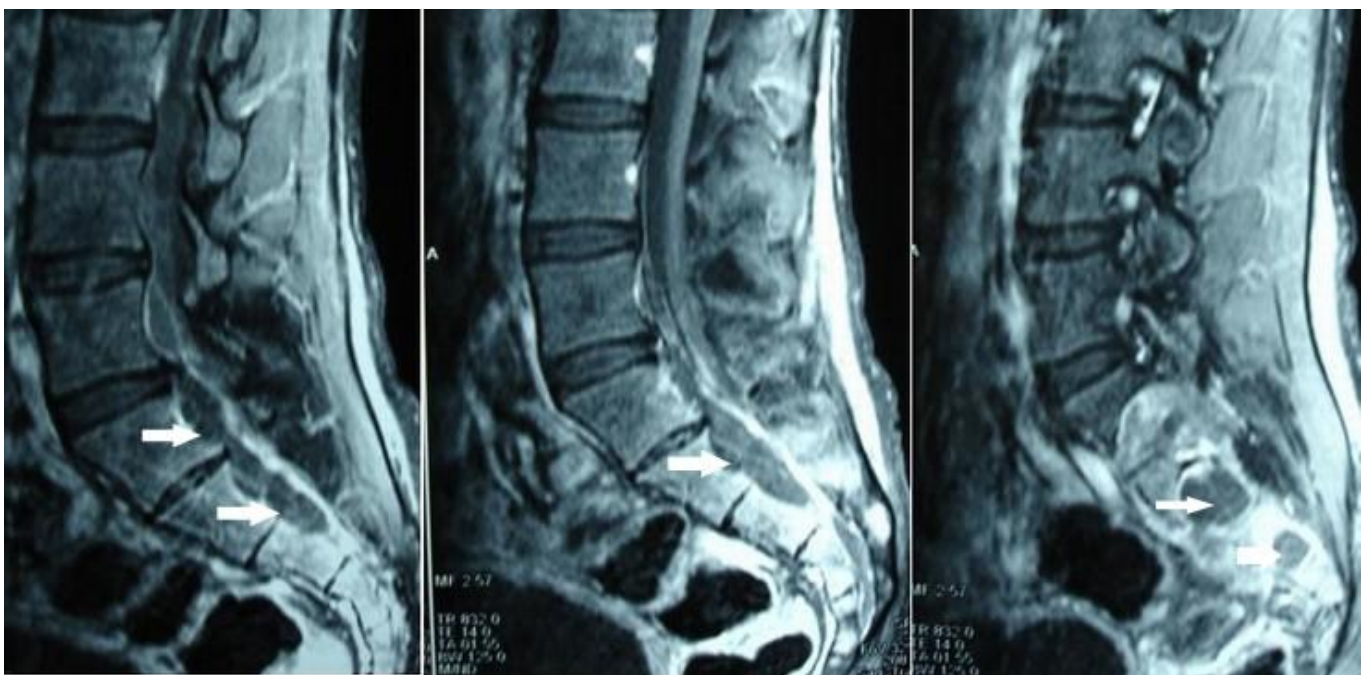


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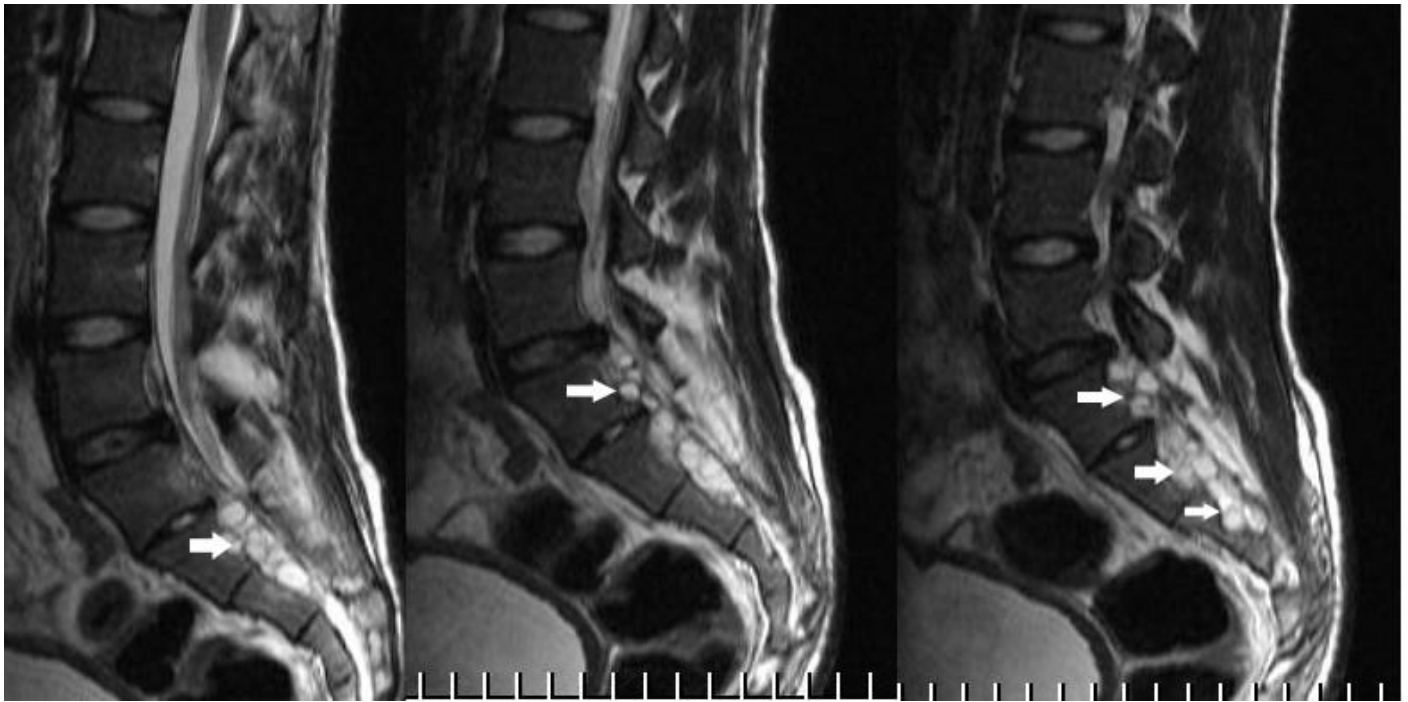


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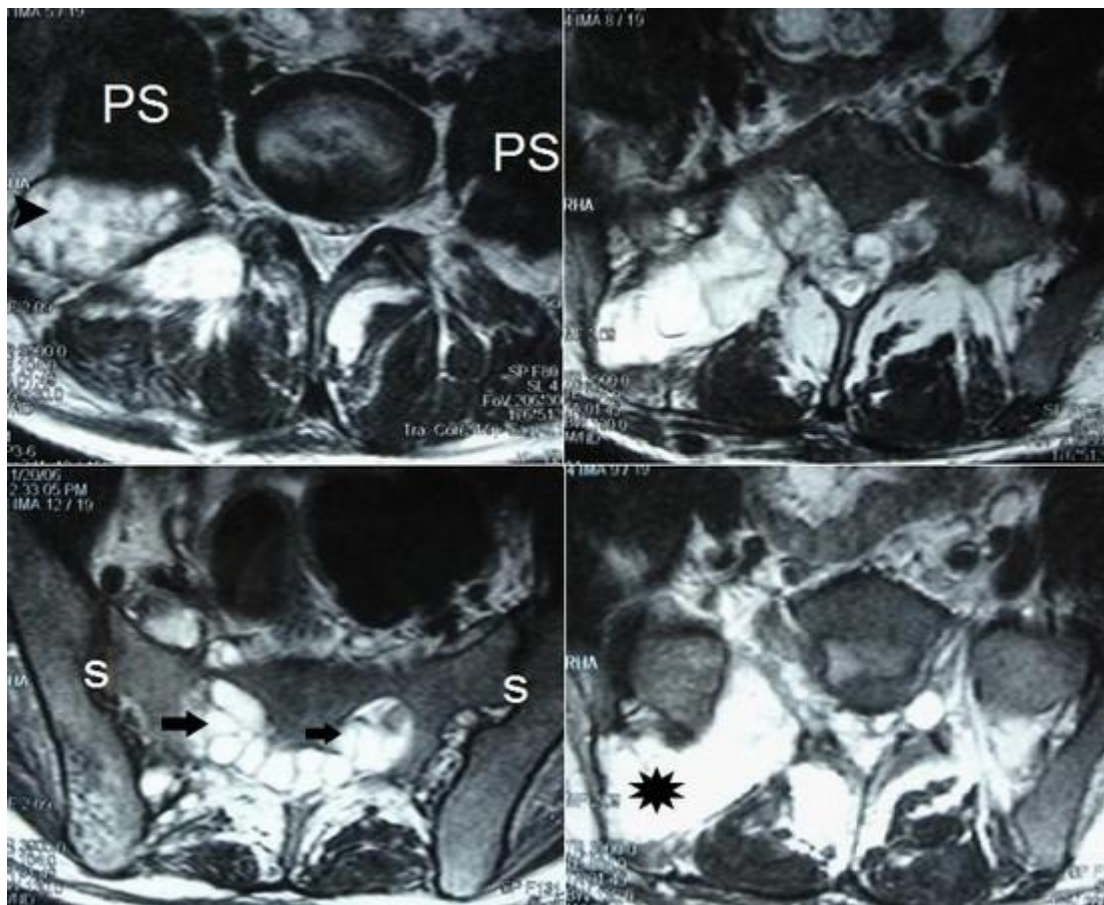


Figure 5e

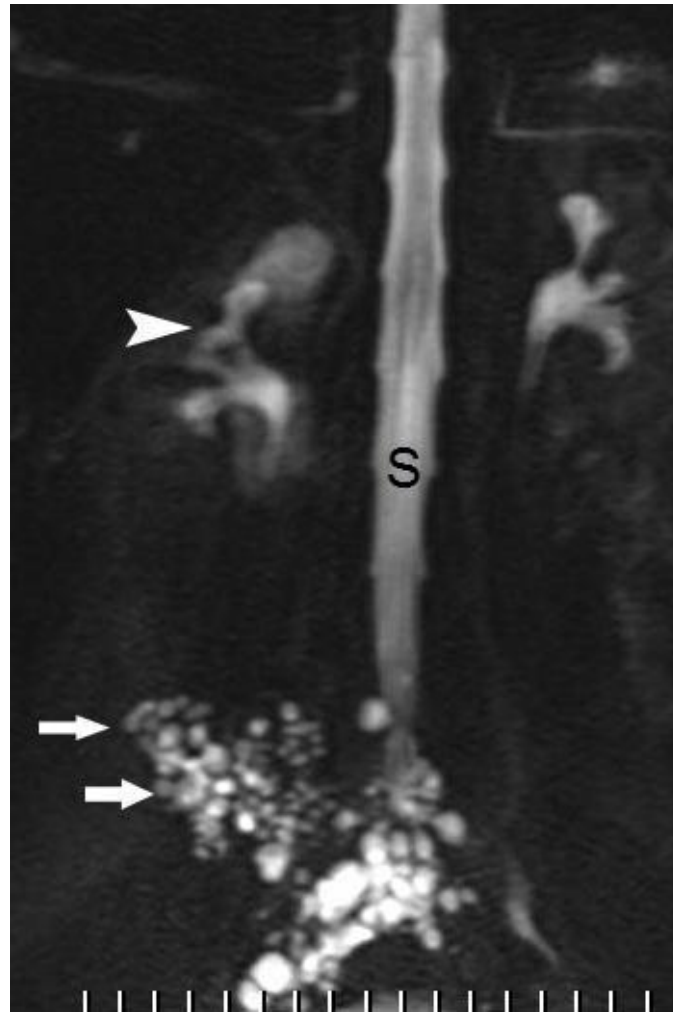


Figure 5f

**Figure 5.** Sacral Hydatid cyst in a 32 years old male. (a) Axial CT scan pelvis showing a multicystic right sided paravertebral mass extending into the right psoas muscle anteriorly (arrowhead) and paravertebral muscles posteriorly (white arrow). Extension of the cystic lesion within the right iliac bone is seen. Black arrow = Erosion of the vertebra. (b) Coronal T1 W (TR= 528, TE=12) MRI done on 1.5 tesla machine showing oval shaped hydatid cyst with multiple small daughter cysts (white arrow). Black arrow= Sacroiliac joint, arrowhead = psoas muscle. (c and d). Sagittal T1W (TR= 528, TE=12) and T2W (TR= 3900, TE=104) MR images showing multiple cysts (arrows) in the sacral spinal canal. (e). Axial T2W MRI showing multiple cysts extending into the paraspinal tissues. Black arrow= small hydatid cysts within sacral spinal canal, asterisk = hydatid cysts extending into the iliac bone. s= sacroiliac joint. Asterisk = Erosion of right iliac bone. s = Sacro-iliac joint. (f). MR myelogram (TR= 2900, TE=1100) showing multiple hyperintense small cysts (arrows) in the sacral spinal canal extending into the right sided tissues, arrowhead = kidney, s = spinal canal

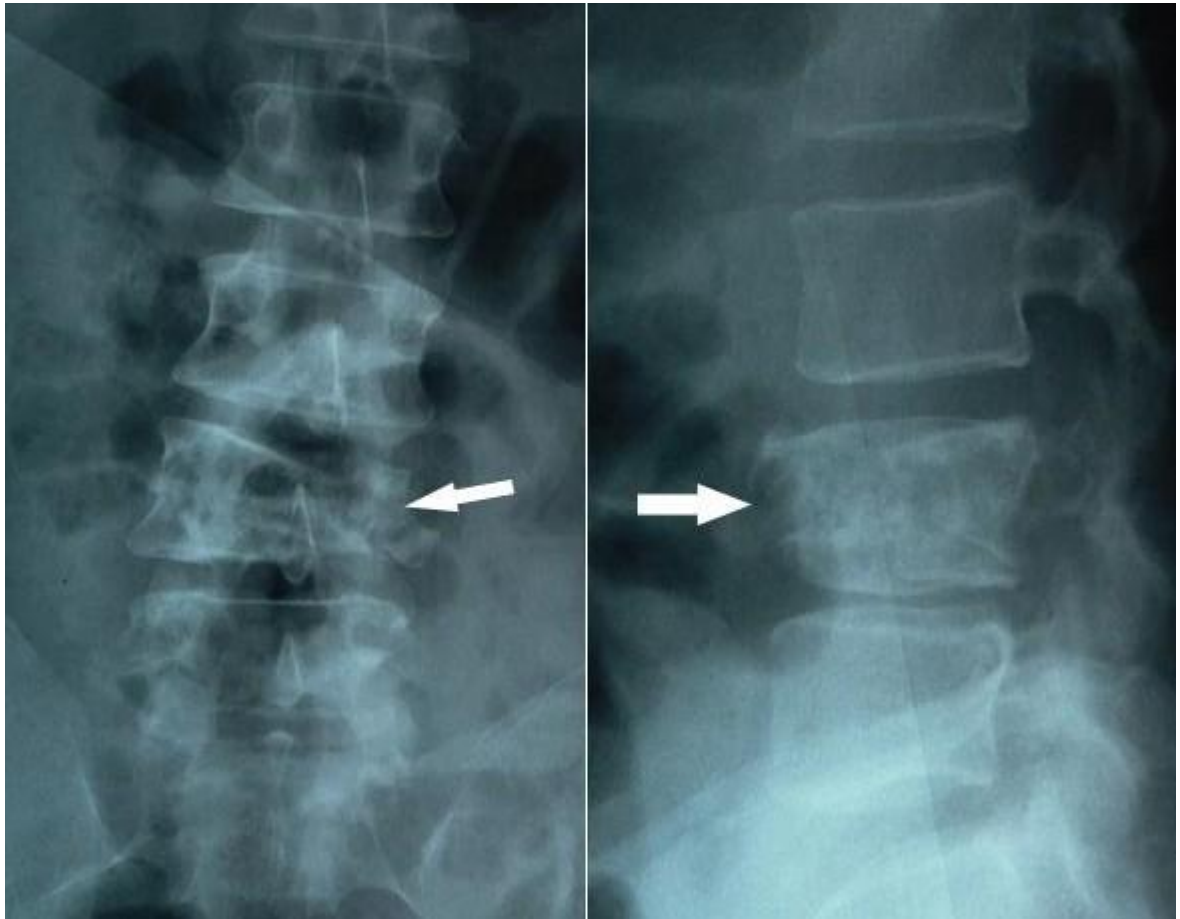


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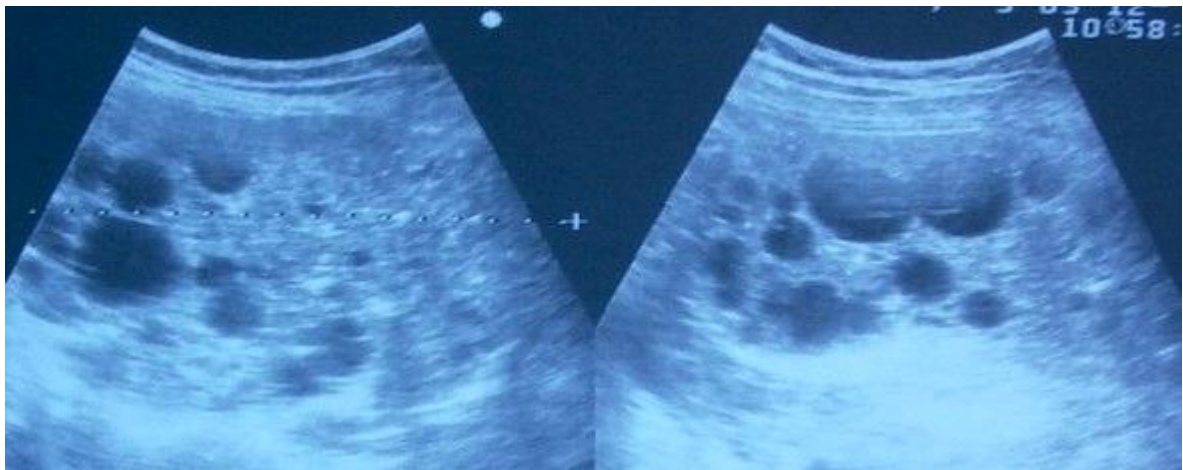


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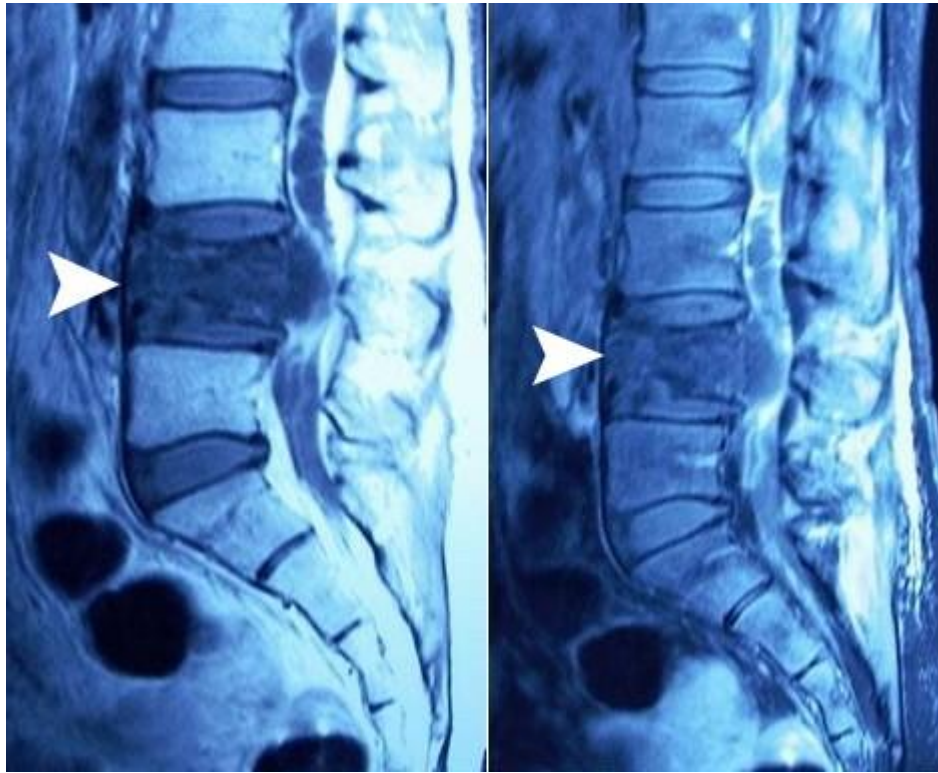


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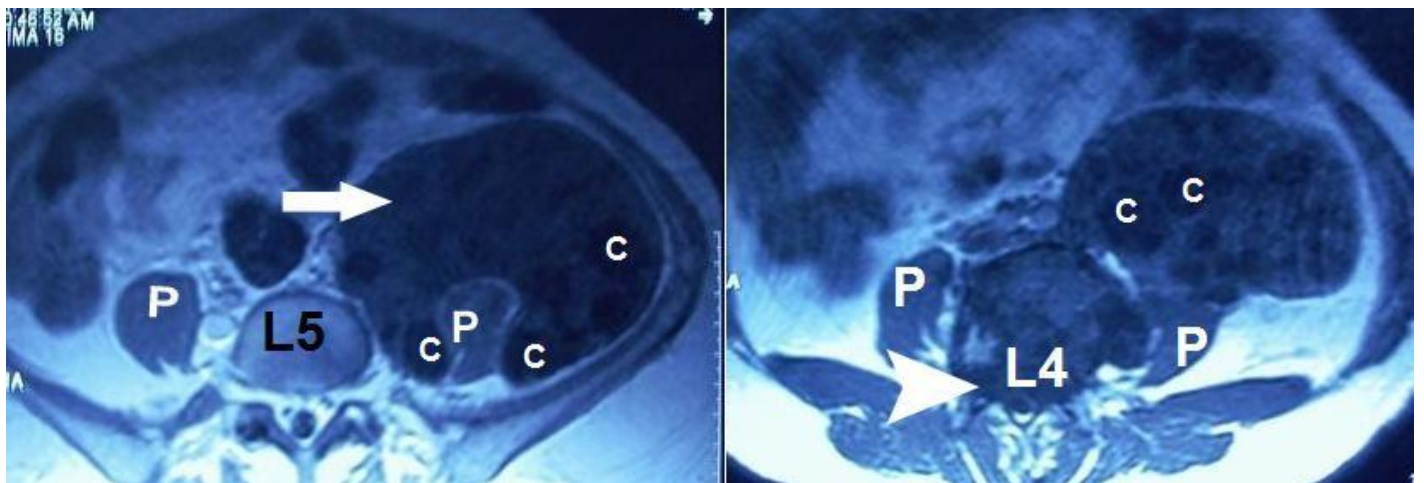


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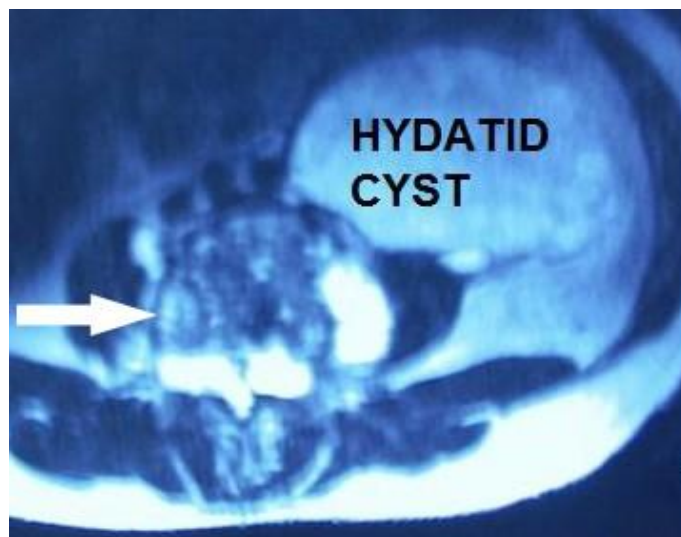


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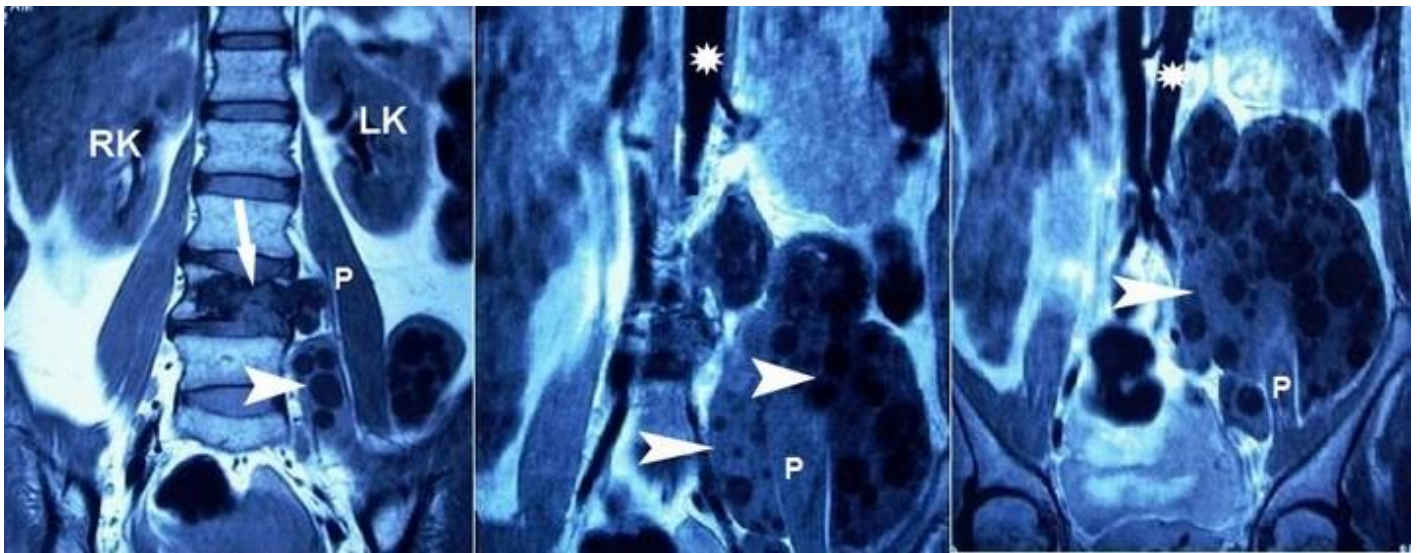


Figure 6f

**Figure 6.** Lumbar and paraspinous Hydatid cysts in a 30 years old female. (a) X-Ray lumbar spine (AP and Lateral views) shows destructive lesion involving LV4 with partial collapse of the vertebra (white arrow). (b) Ultrasound of the Left iliac fossa shows a large multiloculated cystic lesion. (c) MRI scan of the spine performed On 1.5 Tesla scanner. Sagittal T1W MRI. (TR= 979, TE=14) There was partial loss of the height of LV4 with diffuse low signal within the body (arrowhead) with well preserved adjacent intervertebral discs (d) Axial T1W MRI. (TR= 979, TE=14). Hydatid cyst (arrow) surrounding the left psoas muscle. P = psoas muscle. C = daughter cysts.L5= 5TH lumbar vertebra. Arrowhead = marked compression of spinal canal by Hydatid cyst. (e) Axial T2W MRI. (TR= 6080, TE=112). Arrow = replacement of 5th lumbar vertebra by large Hydatid cyst containing hyperintense components. (f) Coronal T1W MRI. (TR= 979, TE=14) Asterisk = aorta, P= Psoas Muscle.RK =Right kidney. LK =left kidney. Arrowheads = Hydatid cysts.

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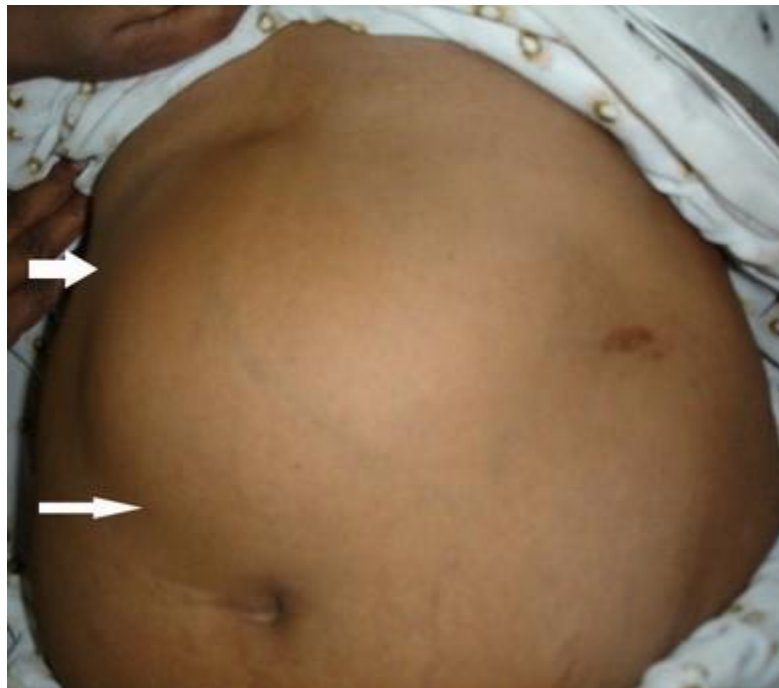


Figure 7a



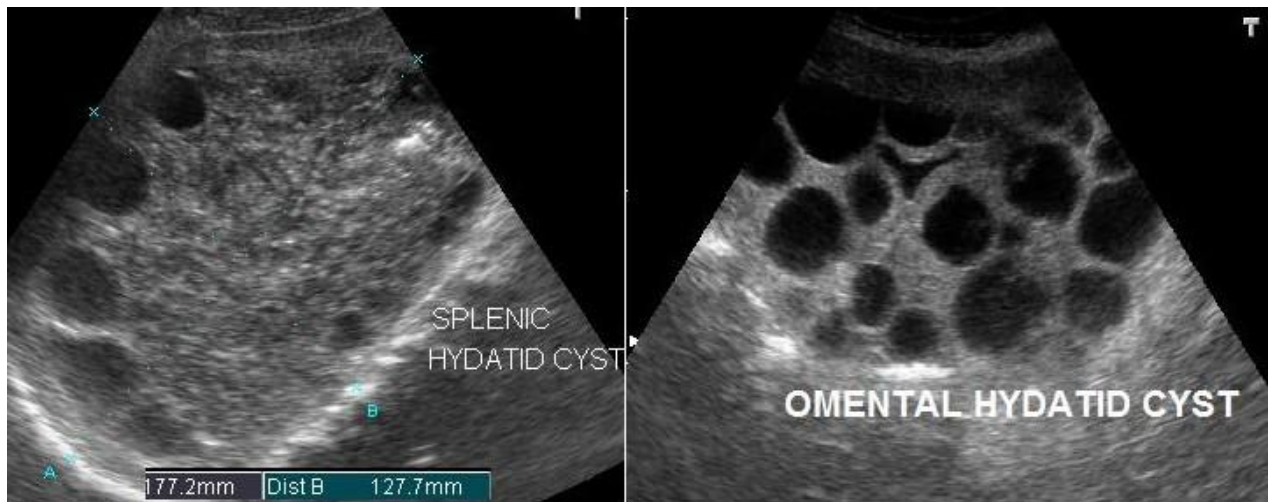


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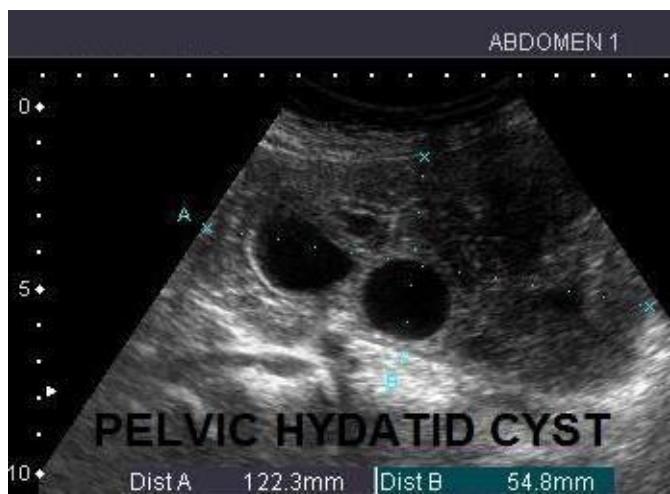


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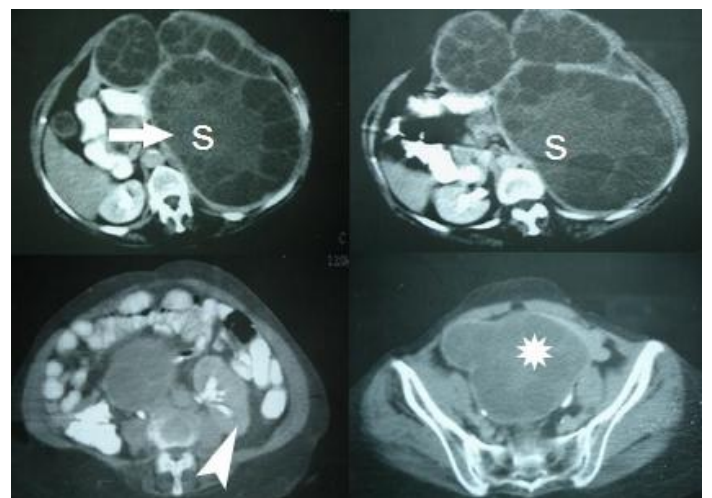


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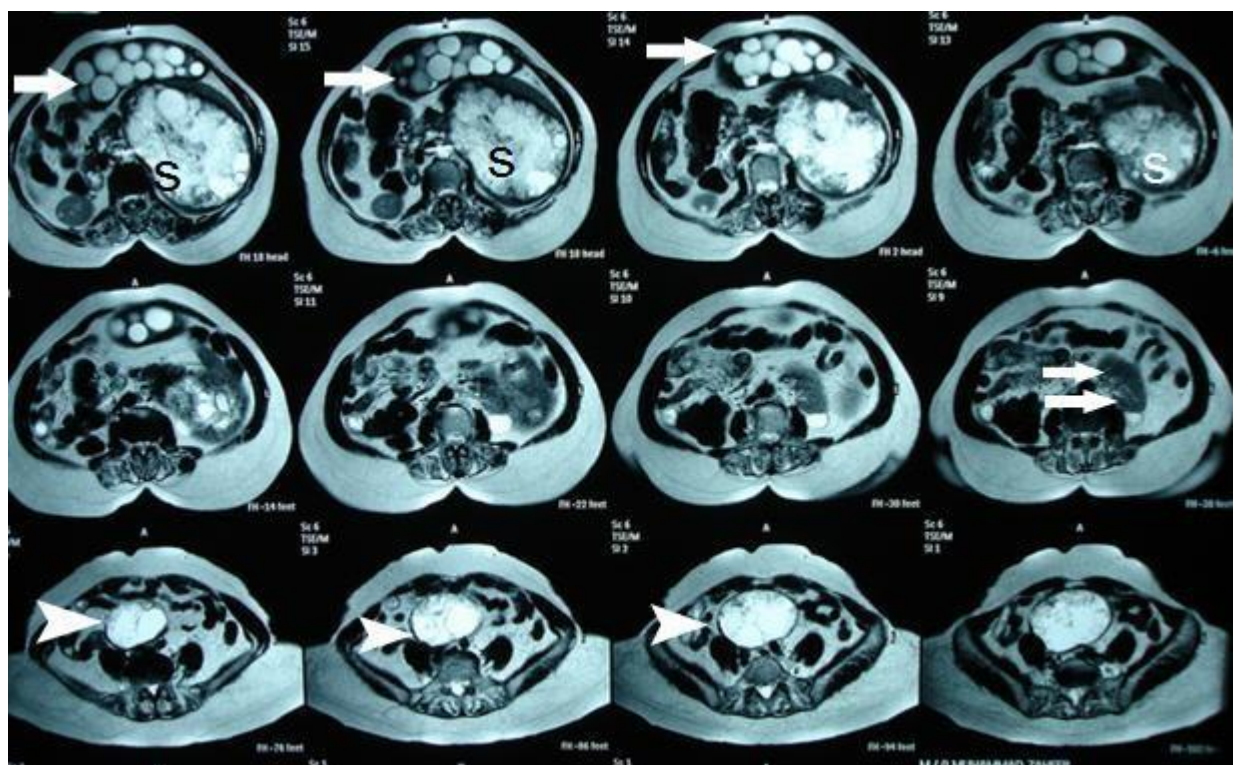


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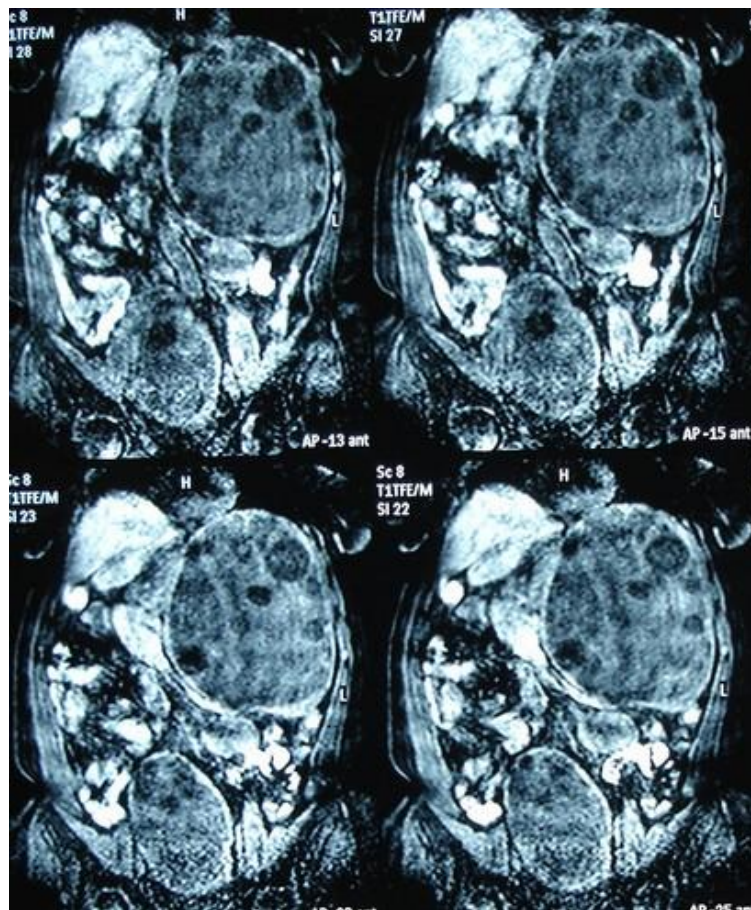


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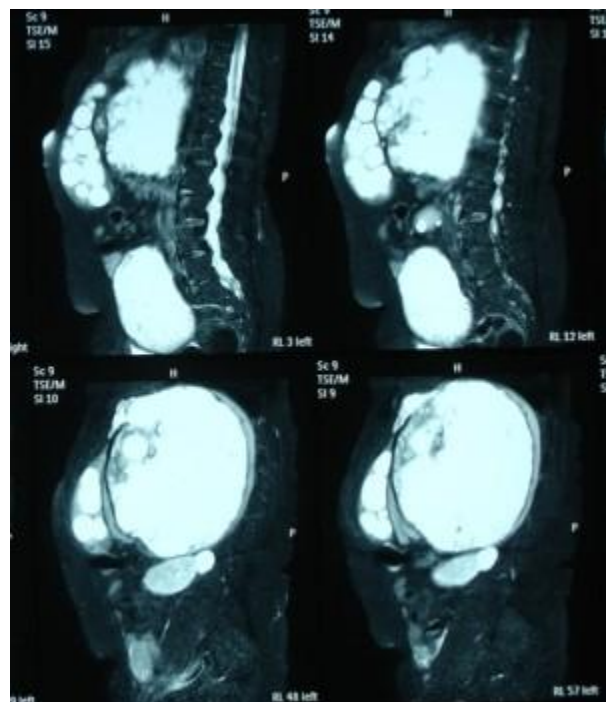


Figure 7g

**Figure 7.** Omental, Splenic and Pelvic Hydatidosis in a 65 years old female. (a) Large abdominal swelling (arrows) (b, c).Ultrasound scan done with 3.5 MHz probe (Nemio -Toshiba). It shows complete replacement of the spleen by Hydatid cyst. Omental Hydatid cyst and pelvic Hydatid cysts are also shown.(d) Axial CT scan of the abdomen showing large splenic, omental and pelvic hydatid cysts, Arrowhead = left kidney inferiorly displaced by the splenic Hydatid cyst. Asterisk = pelvic Hydatid cyst, s=splenic Hydatid cyst. (e) Axial T2W MRI scan of the abdomen and pelvis performed on 1.5 Tesla scanner shows hyperintense Hydatid cysts (f) TIW coronal MRI scan showing splenic and pelvic Hydatid cysts. (g) Sagittal T2 W MRI scan shows omental, splenic and pelvic hydatid cysts.

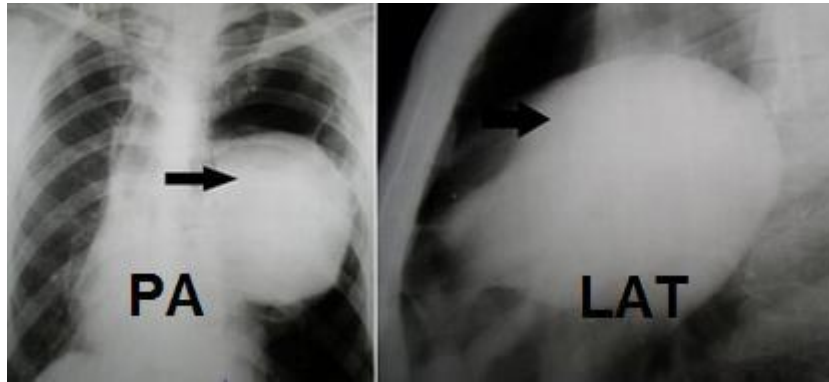


Figure 8a

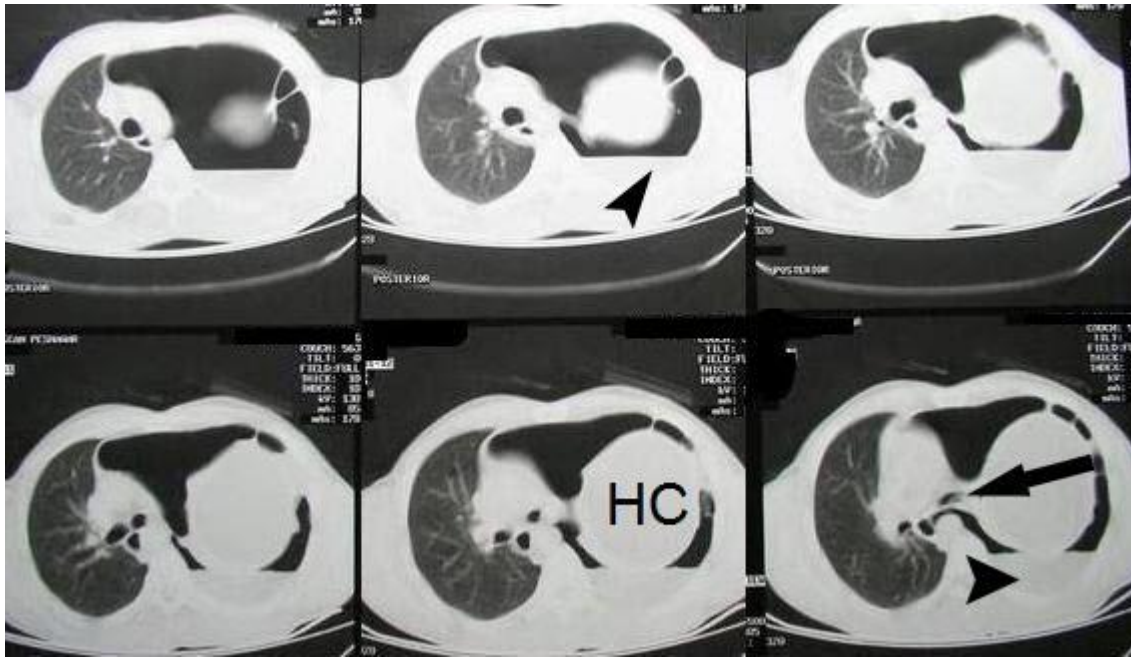
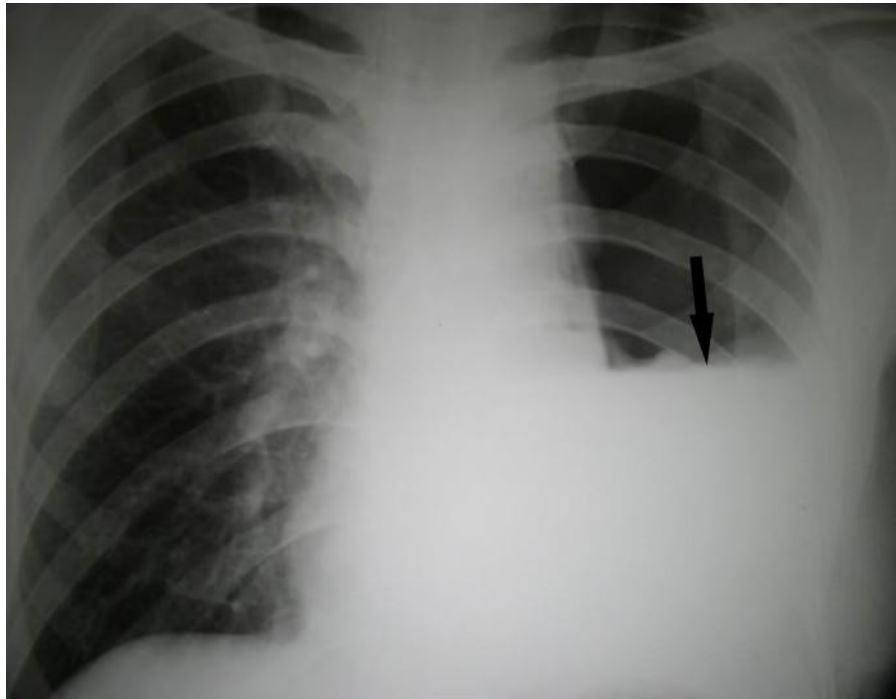


Figure 8b



Figure 8c



**Figure 8d**

**Figure 8.** Left sided pulmonary Hydatid cyst in a 37 years old male causing complete collapse of the lung. (a). PA and lateral chest radiograph showing a large well defined rounded cystic structure in the left hilum with no evidence of lung parenchyma in the left hemithorax. (b). Axial CT scan. Lung window. Large left sided Hydatid cyst seen occupying the left hilum causing abrupt cut off of the left main bronchus (black arrow). No evidence of lung parenchyma on the left side. Left sided hemithorax shows only Hydatid cyst and a large air-fluid level due to hydropneumothorax. (c). Per-operative pictures showing thoracotomy and removal of the hydatid cyst. Pneumonectomy was performed in this case. (d). Post-operative X-Ray chest showing removal of hydatid cyst.



**Figure 9a**

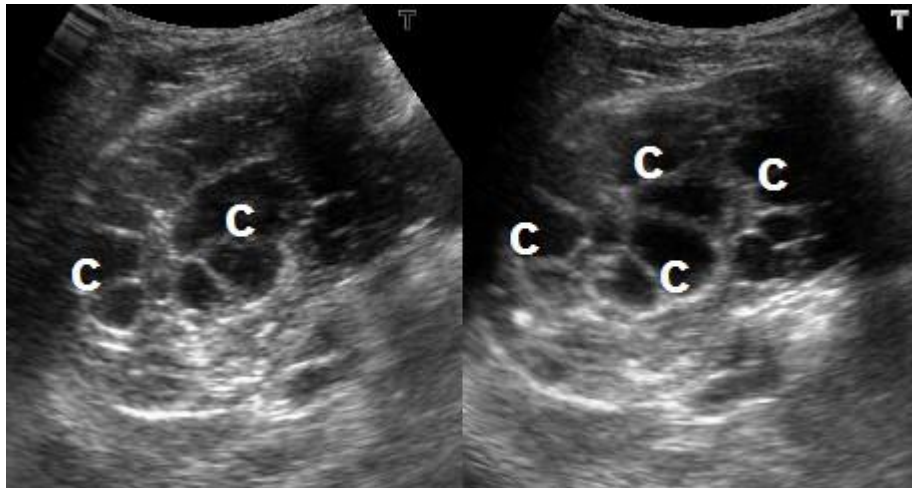


Figure 9b

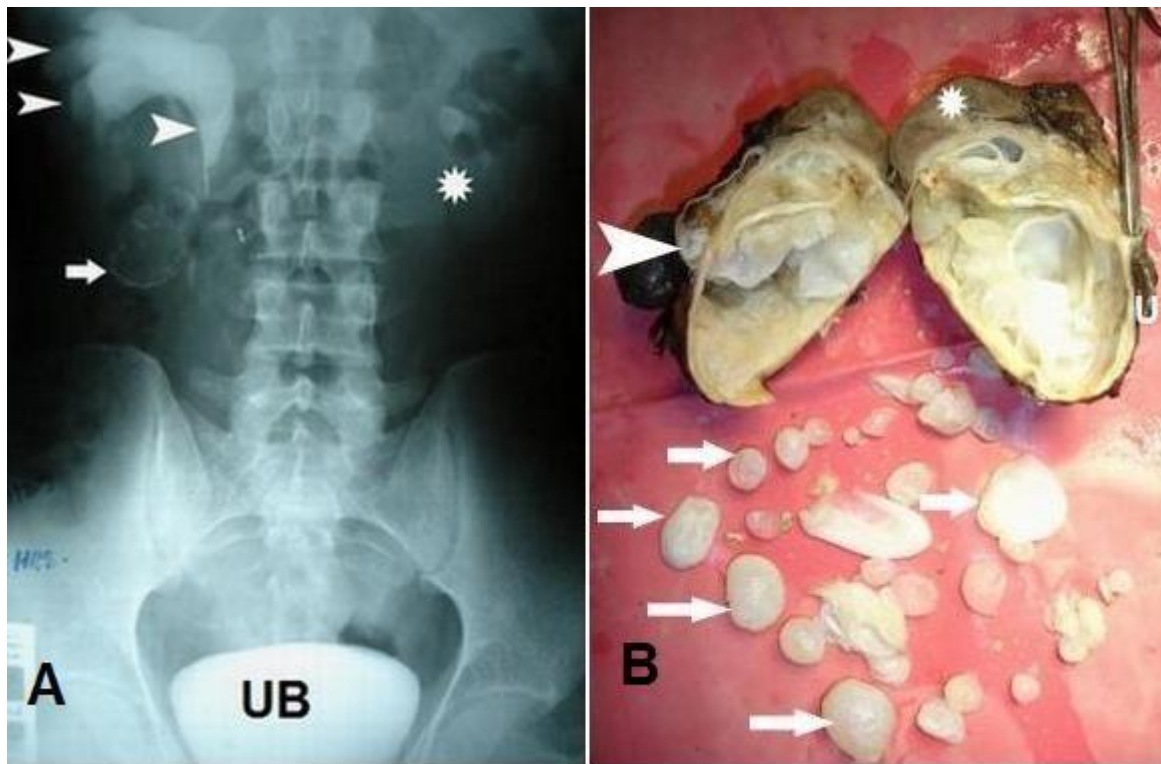


Figure 9c

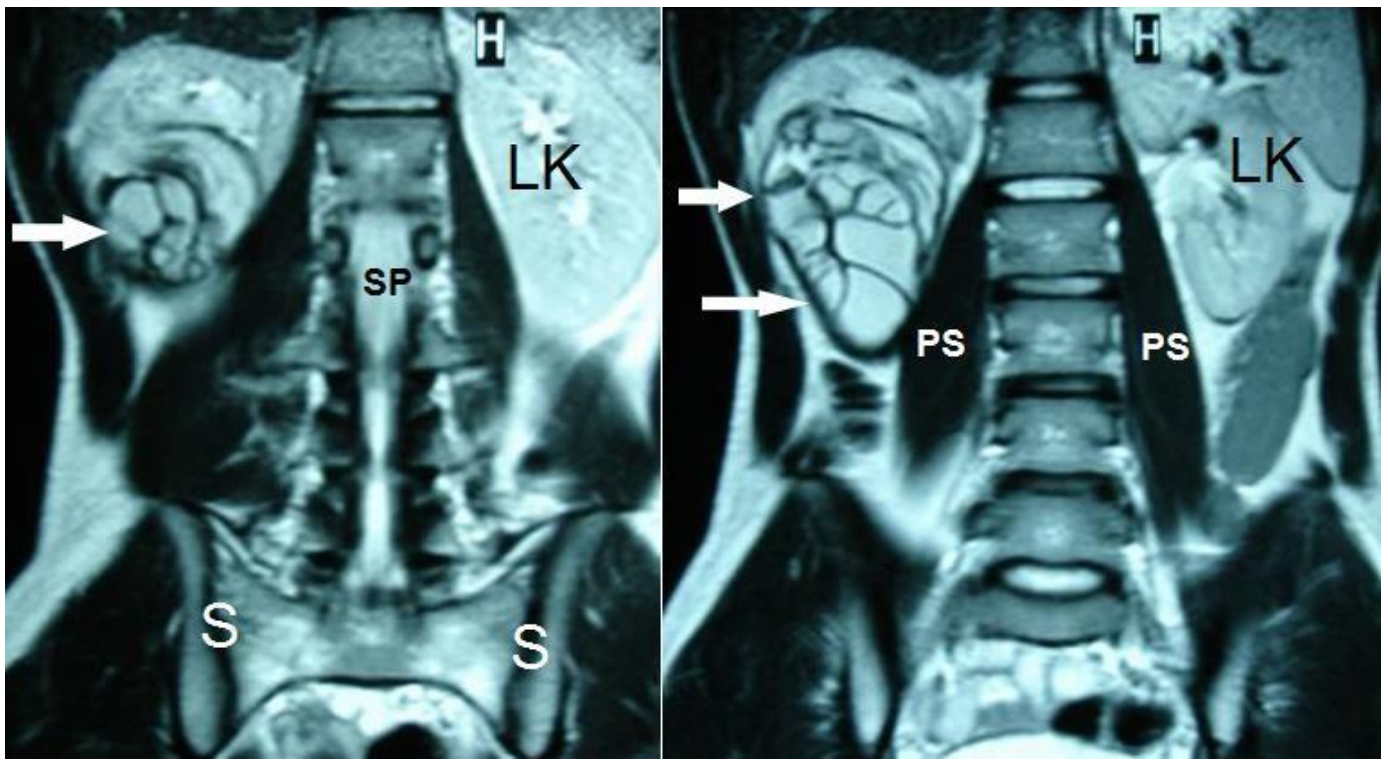


Figure 9d

**Figure 9.** Renal Hydatid Cyst in a 25 years old male presenting with Hydatiduria. a. Patient's urine sample revealed hydatiduria seen as whitish material partially dissolved in the urine. (Black arrowhead). (b). Ultrasound scan of the right kidney done with 3.5 MHz probe (Nemio -Toshiba) shows right kidney replaced by a multiseptated cystic structure. (c). IVU and nephrectomy specimen. IVU demonstrating the hydronephrotic upper pole (White arrowhead). Curvilinear calcification seen in the lower pole of the right kidney (white arrow). Additional calcifications are in the walls of the daughter cysts. Asterisk = normally functioning left kidney. Nephrectomy specimen. Arrow = daughter cysts. Arrowhead = Dilated renal pelvis containing small daughter cysts. Only upper pole of the kidney is spared (asterisk) (d). Coronal T2-weighted image obtained on a 1.5T MRI machine. White arrows = Hydatid cyst of right kidney. Observe hypointense septae due to formation of daughter cysts. LK= Left kidney, S = Sacroiliac joint, ps=psoas muscle, sp=spinal canal

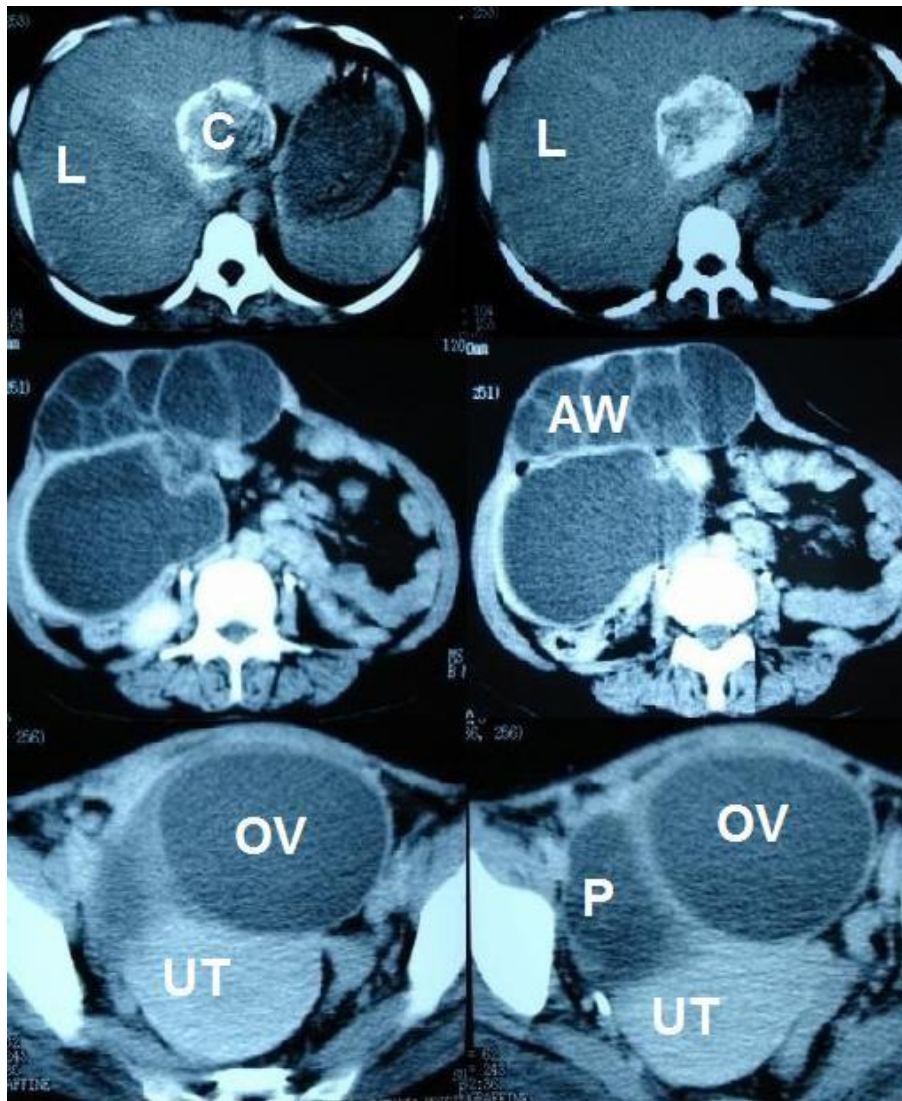


Figure 10a

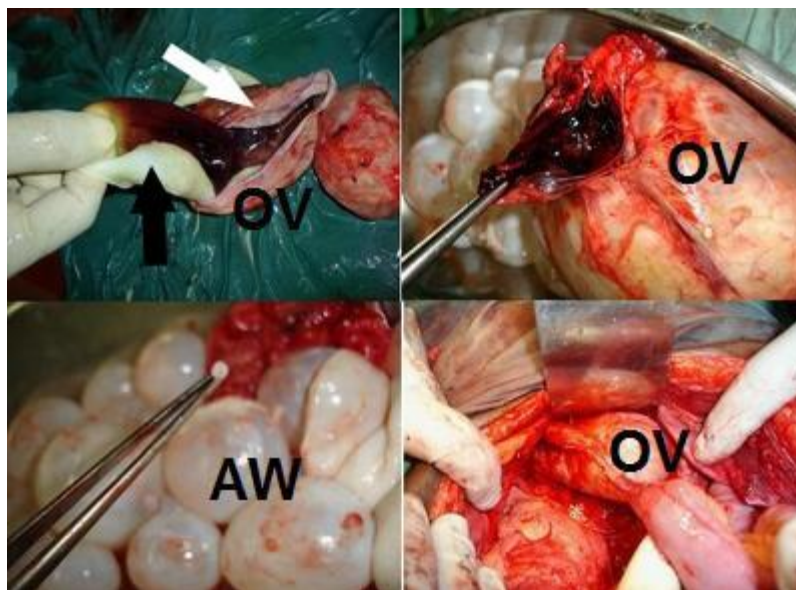


Figure 10b

**Figure 10.** Diffuse abdominal and pelvic hydatidosis in a 47 years old female a. Axial contrast-enhanced CT image shows a calcified Hydatid cyst in the liver (c) and multiloculated Hydatid cyst in the abdominal wall (AW). L = Liver. P= Pelvic Hydatid cyst. OV= ovarian Hydatid cyst. UT = Uterus. (b) Operative removal of ovarian Hydatid Cyst. OV= ovarian hydatid cyst, AW= hydatid cysts removed from the abdominal wall. Black arrow = wall of the Hydatid cyst, White arrow = wall of the ovary.

### ABBREVIATIONS

ERCP = Endoscopic Retrograde Cholangiopancreatography  
CT = Computed Tomography  
MRCP = Magnetic Resonance Cholangiopancreatography  
MRI = Magnetic Resonance Imaging  
MDCT= Multidetector Computed Tomography  
HC = Hydatid Cyst  
L.S spine = Lumbosacral Spine  
IVU = Intravenous Urography  
P = Psoas Muscle  
RK= Right Kidney  
LK = Left Kidney  
US = Ultrasound  
LV4 = 4th Lumbar Vertebra  
AP = Anteroposterior  
HD = Hydatid disease  
IVC = Inferior Vena Cava

### KEYWORDS

Hydatid cyst, Endocyst, Computed Tomography (CT) scan, swelling, spleen

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