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## Case Report

# Liver abscess with extension into the Inferior Vena Cava: Case series of a rare complication <sup>☆</sup>

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### ABSTRACT

Liver abscess is a common disease, however, it is a rare cause of venous thrombosis. The incidence of amoebic and pyogenic liver abscess in developing countries is high, however, the occurrence of inferior vena cava thrombosis secondary to liver abscess is a very rare and life-threatening complication. Computed tomography (CT) scan is an ideal investigation tool for diagnosing the various complications associated with liver abscess. Here we describe 3 cases of liver abscess in patients who developed a rare vascular complication of inferior vena cava. Liver abscesses should be considered as a rare cause of IVC thrombosis in the correct clinical context. All the patients were managed with ultrasound-guided pigtail insertion and antimicrobial agents.

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## Introduction

Amoebic liver abscesses are commonly encountered in developing countries. Poor sanitation and a lower socioeconomic status are the main causes [1]. In developed countries, liver abscess rarely affects healthy individuals. Majority of the cases occur when infections are imported from overseas. Bacterial is common in developed countries in the background of comorbidities such as immunocompromised, infections elsewhere in the body, trauma, etc. [2]. Various complications such as perforation of abscess, sepsis, and bleeding from colonic ulcers are routinely encountered. However, the occurrence of

inferior vena cava thrombosis secondary to liver abscesses is very rare. Sometimes it is a life-threatening complication.

## Case report

### Case 1

A 55-year-old male presented with fever and pain abdomen for 15 days. The pain was gradual in onset and moderate intensity. Clinical examination revealed hepatomegaly, tenderness in the right abdomen, and pedal edema. Amoebic serology re-

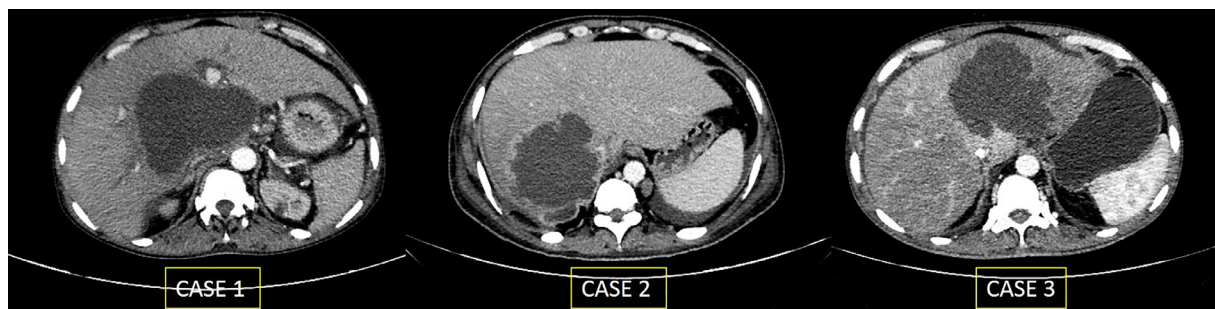
<sup>☆</sup> Competing Interests: None to declare.

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**Fig. 1 – Contrast-enhanced CT axial: peripherally enhancing hypodense space occupying lesion is noted in the caudate and right lobe in case 1; right lobe in case 2 and left lobe of liver in case 3, suggesting liver abscess.**



**Fig. 2 – Case 1: Contrast-enhanced CT axial showing (A) compression of the right portal vein (yellow arrow), (B) an eccentric hypodense filling defect in the suprahepatic IVC (yellow arrow).**

vealed *Entamoeba histolytica* IgG positive by ELISHA suggesting amoebic nature of liver abscess. Other blood parameters were within normal limits. CT scan demonstrated a large well-defined thick-walled peripherally enhancing with central area of necrosis, measured  $\sim 87 \times 112 \times 78$  mm involving the right and caudate lobe of the liver (Fig. 1). Hypodense filling defect was noted in the supra and intra-hepatic IVC extending into the left portal vein (Figs. 2–4). *E histolytica* IgG was positive by ELISHA suggesting the possibility of amoebic liver abscess. The patient was managed with metronidazole 500 mg twice thrice daily for 10 days followed by paromomycin 30 mg/kg for 7 days with drainage of the abscess by a pigtail catheter.

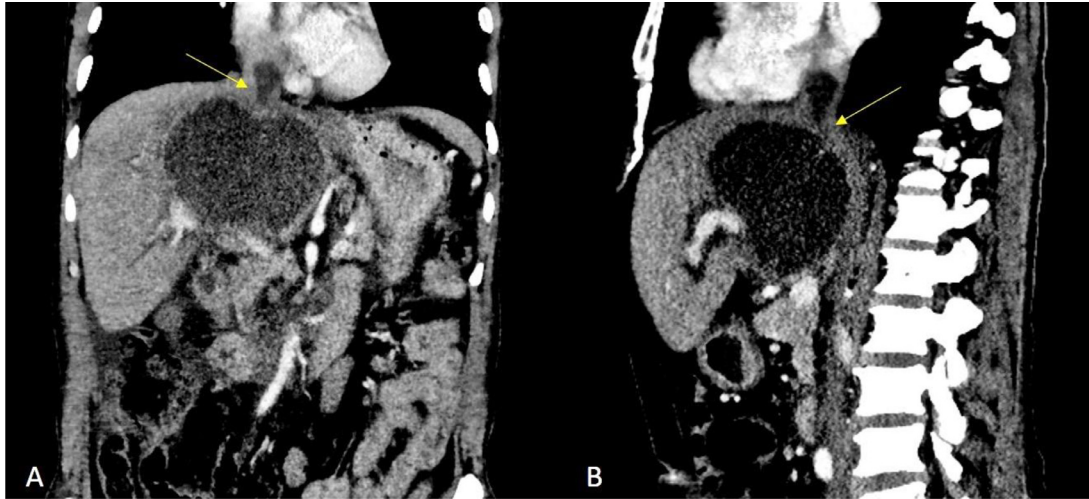
#### Case 2

A 38-year-old male presented with low-grade fever for 12 days along with shortness of breath for a week. The patient also complained of pain in his abdomen. It was dull aching which aggravated for the last 5 days. Clinical examination revealed tenderness over the right hypochondrium with an enlarged liver. No evidence of weight loss or icterus. The total leukocyte count was raised. Other blood parameters were within the normal range. A transabdominal ultrasound revealed a large hypochoic space occupying lesion in the right lobe suggest-

ing an abscess. CT scan demonstrated a large irregular peripherally enhancing lesion measuring  $\sim 72 \times 65 \times 60$  mm in the right lobe, involving segments V, VI, VII and VIII (Fig. 1). The lesion was subdiaphragmatic in location with extracapsular extension. Focal hypodensity was seen within the lumen of the IVC suggesting possible extension. Mild left-sided pleural effusion was also evident (Figs. 5 and 6). The patient was treated with antimicrobial agents and drainage of the abscess was done by a pigtail catheter.

#### Case 3

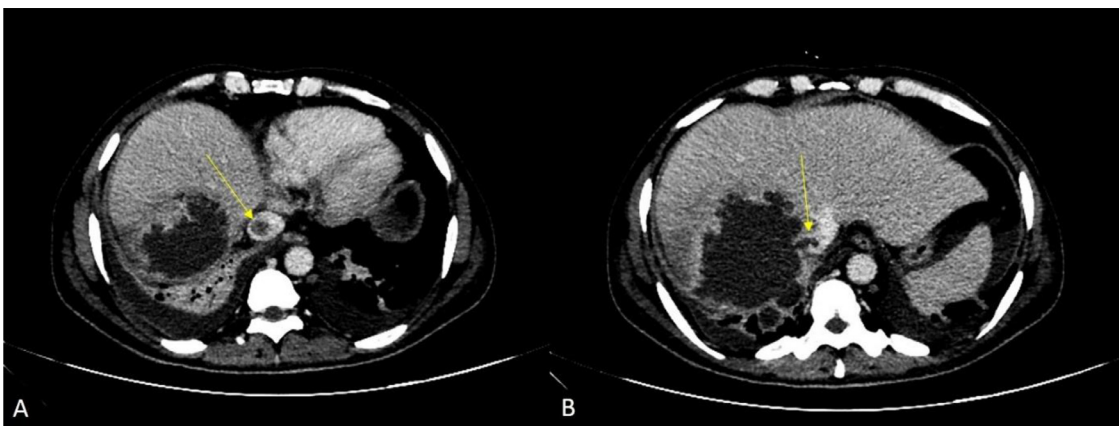
A 56-year-old male presented to our institute with pain abdomen and fever for 10 days. Fever was high-grade, measured 104.5°F. On clinical examination, tenderness was noted in the right hypochondrium. *E histolytica* IgG was positive by ELISHA suggesting the possibility of amoebic liver abscess. CT revealed a large irregular peripherally enhancing lesion measuring  $\sim 82 \times 93 \times 92$  mm in the left lobe of the liver (Fig. 1). Hypodensity was noted within the lumen of the IVC (Figs. 7 and 8). The patient was managed with metronidazole 500 mg twice thrice daily for 10 days followed by paromomycin 30 mg/kg for 7 days with drainage of the abscess by a pigtail catheter.



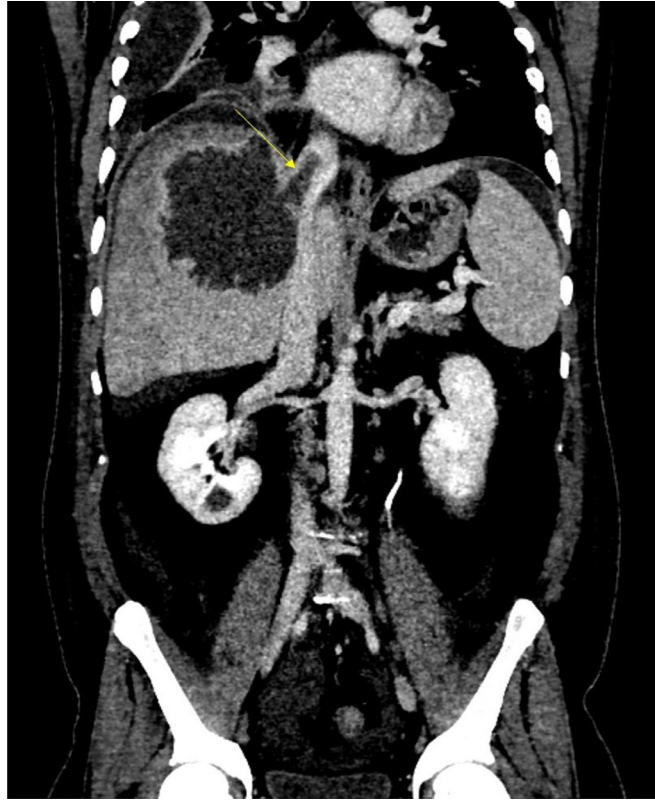
**Fig. 3 – Case 1: Contrast-enhanced CT (A) coronal (B) sagittal showing a hypodense filling defect in the suprahepatic and intrahepatic IVC (yellow arrows).**



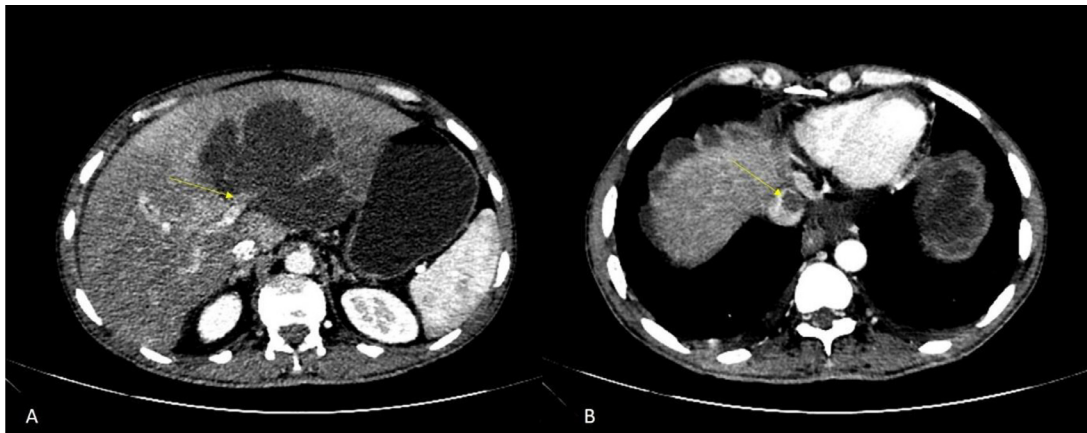
**Fig. 4 – Case 1: Contrast-enhanced CT axial showing a focal eccentric hypodense filling defect in the left portal vein adjacent to the liver abscess (yellow arrow).**



**Fig. 5 – Case 2: Contrast-enhanced CT axial showing a hypodense filling defect in (A) suprahepatic (yellow arrow) and (B) intrahepatic IVC, seen communicating with the abscess (yellow arrow).**



**Fig. 6 – Case 2: Contrast-enhanced CT coronal showing a hypodense filling defect in the IVC, which is communicating with the liver abscess (yellow arrow).**



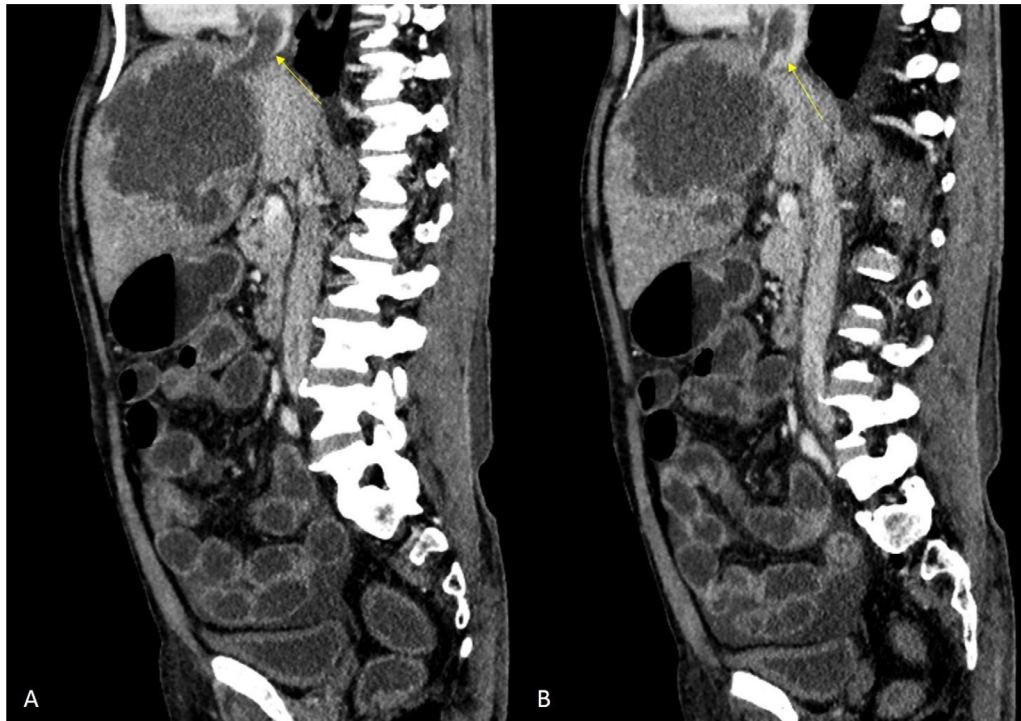
**Fig. 7 – Case 3: Contrast-enhanced CT axial showing (A) compression of the left portal vein by the lesion (yellow arrow); (B) an eccentric hypodense filling defect in the suprahepatic IVC (yellow arrow).**

## Discussion

IVC thrombosis is a rare complication of liver abscess mainly described in case reports [3]. It usually results from deep vein thrombosis, however, it may be secondary to the complication of cancer. Lal et al., reported 4 cases of liver abscess presented with IVC thrombosis in which 1 patient had a large thrombus in the right ventricular cavity and right ventricular out-

flow tract. He also described the difficulties encountered in the percutaneous interventional management of the caudate lobe abscesses with the development of a left hepatic artery pseudoaneurysm [4]. McKenzie et al., [5] and other colleagues described the first case of pulmonary embolism in the background of a large liver abscess. Ray et al., [6] reported a case of a very large amoebic abscess associated with thrombus. Few studies also described the thrombus in the right atrium with IVC thrombosis in liver abscess [7,8]. Inferior vena cava throm-





**Fig. 8 – Case 3: Contrast-enhanced CT axial sagittal showing a hypodense filling defect in the suprahepatic IVC communicating with the liver abscess (yellow arrows).**

bosis is also described in a pediatric patient with an amoebic liver abscess [9]. Portal and hepatic vein thrombosis have been described in the literature [10–12]. In case 1, there was evidence of left portal vein thrombosis.

The mechanism of venous thrombosis has been explained by mechanical compression of the vascular structures and localized inflammation [5–13]. However, Martin et al., [3] suggested that mechanical compression is not necessary for the development of thrombus and emphasized the thrombogenic potential of amoebiasis. Further, he reported the recurrence of thrombus after a brief period of anticoagulation treatment suggesting a thrombogenic potential of amoebic liver abscess. In our patients, the pathophysiology of thrombosis could be explained by the extension of the abscess and vein compression by the abscess [13].

When an amoebic liver abscess ruptures into a vascular channel, there is a possibility of localized luminal thrombosis which can be a source of pulmonary embolism further leading to septicemia and septic emboli to the lung and brain.

Contrast-enhanced computed tomography (CECT) is an investigation of choice for diagnosing hepatic abscesses with a sensitivity as high as 97%. It helps in visualizing the impending perforation, ruptured liver abscess, ascites, and pleural effusion. Multiphasic CT angiography is useful in localizing the IVC, hepatic, and portal venous thrombosis. One should actively scrutinize for vascular complications including abscess extension whenever a liver abscess is seen in the caudate lobe or close to a vascular channel. A posteriorly located liver abscess is more likely to lead to IVC thrombosis [14], which was also seen in our cases. Invasive venography is considered the gold standard in venous assessment. However, it has a few

limitations. Ultrasound and CT angiography are now the most useful diagnostic tools for the detection and characterization of venous extension. MRI can be an aiding tool to distinguish liver abscess from neoplastic process. The presence of avid diffusion restriction with significantly higher apparent diffusion coefficient (ADC) values and lack of internal enhancement favor the diagnosis of liver abscess [3]. Park et al., [15] and his colleagues found that the mean ADC values of the abscesses were significantly higher than those of neoplasms. Moreover, a solid neoplasm would characteristically show enhancement within the area of diffusion restriction, whereas a nonhemorrhagic necrotic neoplasm would not show diffusion restriction.

In 2 out of 3 cases, the presence of positive serology for *E. histolytica* together with presence of liver abscess suggested the amoebic liver abscess. The absence of amoebic trophozoites on microscopy and negative pus cultures for entamoeba in amoebic liver abscesses are commonly found [16,17].

## Conclusion

- IVC and hepatic vein thrombosis is a rare life-threatening complications of liver abscess.
- Ultrasound and CT angiography are now the most useful diagnostic tools for detection and characterization of venous extension.
- Timely initiation of appropriate management will facilitate early recovery of the patient and thus avoiding complications.

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## Patient consent

Written informed consent was obtained from all the patients for the publication and any accompanying images.

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