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Case report

Common hepatic artery aneurysm detected by 18F-FDG PET/CT Imaging ☆☆☆★

Janata F, MD^a, Fezoulidis N, MD^a, Barachini O, MD^a, Mirzaei S, MD^b, Hergan K, MD^c, Zandieh S^{a,c,*}

^aDepartment of Radiology and Nuclear Medicine, Hanusch-Hospital, Teaching Hospital of Medical University of Vienna, Austria

^bDepartment of Nuclear Medicine with PET-Center, Wilhelminen-Hospital, Vienna, Austria

^cDepartment of Radiology, Paracelsus Medical University of Salzburg, Austria

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ABSTRACT

Hepatic artery aneurysm (HAA) is a rare, yet clinically important, condition. While the causes of HAA are poorly understood, it is estimated that mortality following spontaneous rupture is as high as 40%. We discuss the case of a 77-year-old man who presented to our hospital due to a 10 mm pulmonary lesion in the left lower lung lobe, which was identified by a computed tomography scan of the lung at another institution. An examination with 18F-fluorodeoxyglucose positron emission tomography/computed tomography was performed in our department, but no significant uptake of 18F-fluorodeoxyglucose was found in the lung, and HAA was diagnosed only incidentally. A magnetic resonance imaging angiography supported the differential diagnosis of HAA, and the aneurysm was confirmed by targeted angiography. It was located in the common hepatic artery and was coiled during an intervention session. HAA accounts for 20% of all visceral aneurysms and, with a poorly understood natural history, is difficult to diagnose clinically, but early detection and treatment of HAA can improve prognosis.

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Abbreviations: HAA, hepatic artery aneurysm; FDG, 18F-fluorodeoxyglucose; PET, positron emission tomography; CT, computed tomography; MRI, magnetic resonance imaging.

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* Corresponding author.

E-mail address: zandieh.s@icloud.com (Z. S).

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Background

Most visceral artery aneurysms (VAA) present with a range of symptoms, commonly abdominal pain and hypovolemic shock due to rupture and intraabdominal hemorrhage [1], and the mortality rate is estimated to be 70%. The hepatic artery is involved in a VAA in about 20% of cases, and advances in cross-sectional imaging have enabled earlier identification of hepatic artery aneurysms (HAA) [2–5].

Vascular wall pathology is caused by fibromuscular dysplasia, congenital connective tissue defects, trauma, or inflammatory and infectious processes. Pregnancy-associated hormonal changes, an alternating flow in the portal vein, portal hypertension, and flow changes in the visceral artery can damage the elastic fibers and promote the development of aneurysms. The course is predominantly asymptomatic, with the most feared complication being rupture, which is associated with a high mortality rate, especially during pregnancy. The timing and form of therapy is determined by the size, mor-

phology, natural course, and etiology of the aneurysm and by any existing comorbidities.

Due to the lack of reliable information on the growth tendency of VAAs, the natural course of an HAA—as with all VAAs—cannot be predicted with certainty. In 75% of patients, it is characterized by a long asymptomatic phase, although 95% of young pregnant women with a VAA become symptomatic in the third trimester [6]. Computed tomography (CT) with three-dimensional (3D) reconstruction is the gold standard for diagnosis, and endovascular interventional techniques have become an established treatment option in addition to operative strategies.

Case presentation

We report an aneurysm of the common hepatic artery in a 77-year-old male. The patient was referred to our hospital due to a round focus in the lungs and was asymptomatic. An ex-

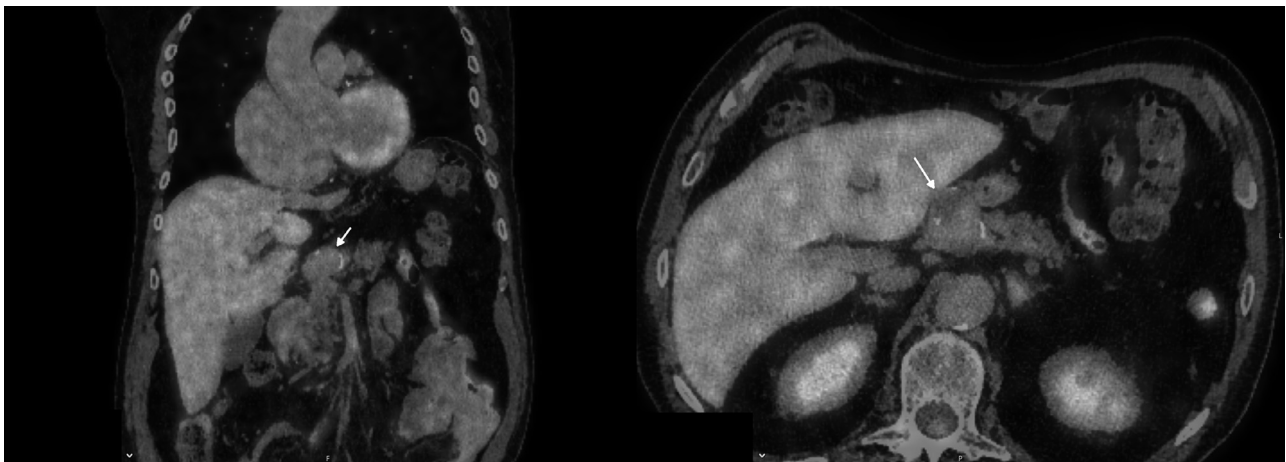


Fig. 1 – The 18F-FDG PET/CT images showed a 3.5 cm mass adjacent to the pancreas, which exhibited partial, marginal, and mild 18F-FDG uptake. The unenhanced scan showed a large, hypodense, and well-demarcated mass with marginal calcified walls.

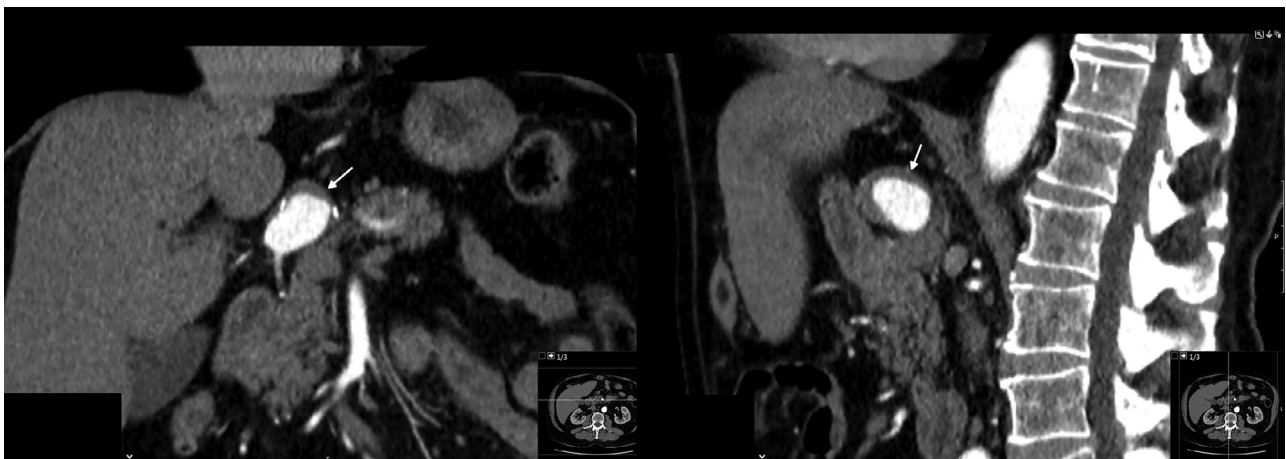


Fig. 2 – After intravenous administration of a 50–60 ml bolus of contrast medium, marked enhancement of the lesion was noted along the course of the hepatic artery.

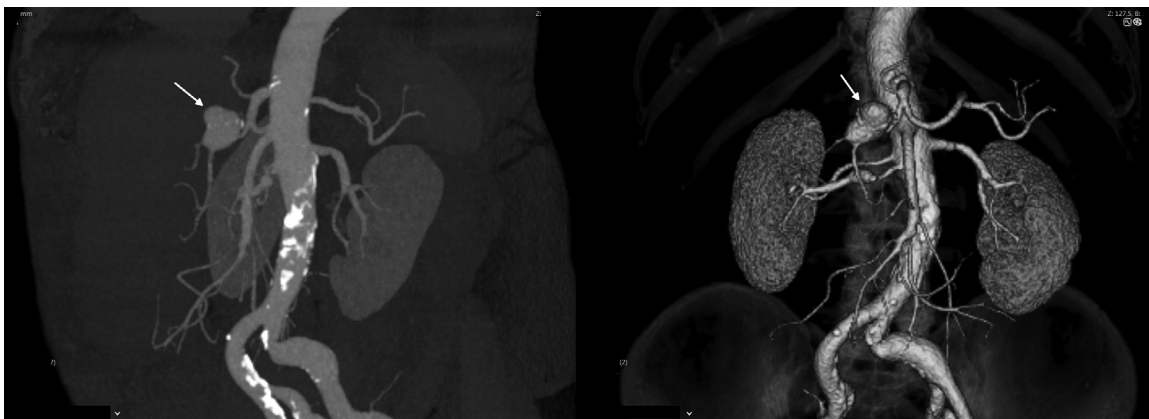


Fig. 3 – CT-reconstructed images showed the presence of a mass arising from the hepatic artery in the extrahepatic region. The arrow in the maximum intensity projection image shows the aneurysm.

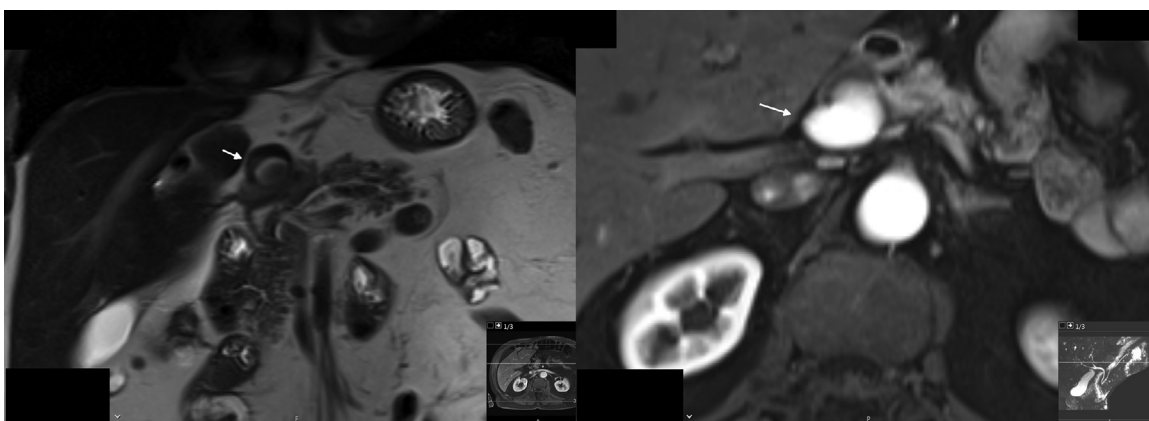


Fig. 4 – Contrast-enhanced MRI was also conducted. Dynamic contrast-enhanced MRI angiography was performed as an additional vascular imaging method for preoperative evaluation of the HAA. In the contrast-enhanced MRI image, clear enhancement of the mass, which was isointense to the arteries and had contact with the common hepatic artery, was observed in the arterial dynamic phase. In the T2 weighting, the mass showed a hypointense signal.



Fig. 5 – The aneurysm was confirmed by targeted angiography. The angiography image showed that the aneurysm was located in the common hepatic artery.

amination with 18F-fluorodeoxyglucose (FDG) positron emission tomography (PET)/CT (Biograph mCT, Siemens) was performed to look for any inflammatory or neoplastic focus. The round, sharply margined 1.3 cm lesion in the left lower lung lobe showed no 18F-FDG uptake, and because of the lower risk of malignancy in the patient, a CT examination follow-up was arranged 12 months later [7]. However, the 18F-FDG PET/CT images also revealed a 3.5 cm mass adjacent to the pancreas, which showed partial, marginal, and mild 18F-FDG uptake. The unenhanced scan showed a large, hypodense, and well-demarcated mass with marginal calcified walls (Fig. 1). After intravenous administration of a 50–60 ml bolus of contrast medium, marked enhancement of the lesion was noted along the course of the hepatic artery, and the CT image reconstruction showed the presence of a mass arising from the hepatic artery in its extrahepatic region. An aneurysm was considered as the differential diagnosis (Figs. 2 and 3).

In a contrast-enhanced magnetic resonance imaging (MRI) image (Magnetom, Siemens), a clear enhancement of the mass—which was isointense to the arteries and had contact



Fig. 6 – The aneurysm was coiled during the intervention session.

with the common hepatic artery—was observed in the arterial dynamic phase. In the T2 weighting, the mass showed a hypointense signal. The dynamic contrast-enhanced MRI angiography study supported the differential diagnosis of HAA in our patient (Fig. 4).

Finally, the aneurysm was confirmed by targeted angiography. The aneurysm was located in the common hepatic artery and was coiled during the intervention session (Figs. 5 and 6).

Conclusions

HAA are common in males (2:1) and often present in the sixth decade of life. A retrospective study at the Mayo Clinic by Abbas et al. identified 36 patients with HAA, with an estimated incidence of approximately 0.002% [8,9].

HAA account for 20% of all visceral aneurysms. With a poorly understood natural history, HAA is difficult to diagnose clinically [10,11]. The choice of treatment depends on the clinical presentation, associated risk factors, and general patient status, and vascular comorbidities should be considered, particularly in patients with arterial aneurysms.

Complication-related symptoms increase when the aneurysm diameter exceeds 2 cm, with spontaneous rupture being the most feared complication, so repair is recommended for such aneurysms. Rupture in the abdominal cavity leads to acute abdomen, and the risk of rupture is estimated to be 30%-40% with an aneurysm size exceeding 2 cm, which is associated with a mortality of 46%-75%. In multiparous cases, VAAs are particularly predisposed to rupture (25%-45% of cases); in non-pregnant women, the risk of rupture is only 3%-10%, with a mortality rate of 10%-25%. Mycotic aneurysms are also characterized by a high risk of rupture due to their rapid progression [6].

Rupture-associated bleeding can occur retroperitoneally or in the abdominal cavity, where it occurs in the bile duct or pancreatic duct system and in the accompanying vein (arteriovenous fistula). A clinical prodromal stage with upper left abdominal pain often precedes the rupture of a VAA, and in addition to rupture, complications can include peripheral embolization, thrombotic occlusion, and compression of the adjacent structures (obstructed passage of the gastrointestinal tract and hepatobiliary congestion).

Treatment options for ruptured or symptomatic HAA have evolved in recent years to include embolization [11,12], and the choice of treatment strategy for repair depends on the location and size of the aneurysm and the feasibility of the intervention opportunities. A common HAA could be either embolized or ligated in the presence of adequate collateral circulation, but in the presence of insufficient collateral circulation, the HAA could be reconstructed or a partial hepatectomy might be necessary [13,8].

As described in the case report, the diagnosis of an asymptomatic HAA is usually made randomly, and early detection and treatment of HAA would improve prognosis.

Availability of data and materials

Due to patient privacy protection, any additional materials from the study are available only upon individual request directed to the corresponding author.

Ethics approval

This study conformed to the Declaration of Helsinki.

Consent for publication

Written informed consent for publication of clinical details and/or clinical images was obtained from the participant.

Author contributions

FJ and SZ conceived the study and design. NF, OB, and FJ undertook the acquisition of data. SZ and FJ analyzed and interpreted the data and drafted the manuscript. SM and KH performed critical revision of the manuscript. SZ and KH supervised the study. All the authors read and approved the final manuscript.

Patient consent

Patient consent was obtained from the patient.

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