Splenunculus Mimicking Neuroendocrine Tumour on Ga-68 DOTATATE Positron Emission Topography: The Diagnostic Value of Heat-Damaged Red Blood Cell Scintigraphy

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AUTHOR CONTRIBUTIONS

W.C. drafted the manuscript, preparing the images and designing the questions. K.S., T.Y., P.M. and S.P. conceived the case report. O.F. was responsible for the direct care of the patient. All authors (W.C., K.S., T.Y., O.F., P.M. and S.P.) read and approved the final version.

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DISCLOSURES/DECLARATION OF INTEREST STATEMENT

The authors have no competing interests to declare.

CONSENT

Did the author obtain informed consent from the patient for submission of this manuscript for publication: yes.

HUMAN AND ANIMAL RIGHTS

This manuscript describes a single-patient clinical case report and does not involve human experimentation. Written informed consent for publication was obtained from the patient. According to review by the South Eastern Sydney Local Health District (SESLHD) Research Support Office, this activity does not require formal Human Research Ethics Committee approval in accordance with the NHMRC National Statement (updated 2018). All procedures were conducted in accordance with the ethical standards of the institutional research committee and with the Helsinki Declaration of 1975, as revised in 2000.

ABSTRACT

Background: Accessory splenic tissue can mimic pancreatic or peritoneal neoplasms on both cross-sectional and functional imaging, complicating diagnosis and surveillance. Technetium-99m heat-damaged red blood cell scintigraphy is a highly specific functional imaging modality for identifying ectopic splenic tissue.

Case Summary: A 54-year-old man presented with non-specific gastrointestinal symptoms and was found to have a pancreatic tail lesion on contrast-enhanced Computed Tomography of the abdomen and pelvis. Subsequent pancreatic MRI demonstrated signal characteristics similar to the adjacent spleen, raising the possibility of an intrapancreatic accessory splenule. Functional imaging with Gallium-68 DOTATATE positron emission tomography/computed tomography demonstrated avid uptake in the pancreatic tail lesion, as well as additional DOTATATE-avid foci in the left upper quadrant peritoneum and terminal ileum, raising concern for multifocal neuroendocrine tumour. Surgical resection of the pancreatic tail lesion was performed, with histopathology confirming benign accessory splenic tissue. Surveillance imaging demonstrated persistent DOTATATE uptake in the terminal ileum and peritoneal nodule. Tc-99m heat-damaged red blood cell scintigraphy confirmed the peritoneal lesion as functioning accessory splenic tissue. The patient underwent right hemicolectomy, with histopathology confirming a distal ileal neuroendocrine tumour. Follow-up Gallium-68 DOTATATE positron emission tomography/computed tomography demonstrated no evidence of residual or recurrent malignancy, with stable uptake confined to known accessory splenic tissue.

Conclusion: This case illustrates the diagnostic challenge posed by accessory splenunculi on somatostatin receptor imaging and highlights the value of heat-damaged red blood cell scintigraphy in diagnosing accessory splenic tissue, which can often mimic neuroendocrine tumours on Gallium-68 DOTATATE positron emission tomography/computed tomography. It should be considered in the diagnostic algorithm for DOTATATE-avid lesions, to prevent misinterpretation and unnecessary intervention.

CASE PRESENTATION

A 54-year-old man with no significant past medical history initially presented with nausea and abdominal bloating.

Imaging and Serological Findings

A contrast-enhanced Computed Tomography (CT) scan of the abdomen and pelvis (Figure 1) demonstrated a well-defined isodense nodular lesion at the pancreatic tail measuring approximately 1.7 × 1.6 × 2.0 cm, raising concern for a pancreatic neoplasm. Subsequent pancreatic Magnetic Resonance Imaging (MRI) (Figure 2) demonstrated a 2.2 cm pancreatic tail nodule with signal characteristics similar to the adjacent spleen across multiple sequences, raising the possibility of an intrapancreatic accessory splenunculus.

Initial biochemical evaluation demonstrated a normal chromogranin A level. Additional tumour markers including carcinoembryonic antigen (CEA), carbohydrate antigen 19-9 (CA 19-9), and cancer antigen 125 (CA-125) were within normal limits. Full blood count, electrolytes, liver function tests, coagulation profile, and comprehensive metabolic panel were unremarkable apart from a mildly elevated C-reactive protein (CRP 6.1 mg/L; reference <5.0 mg/L).

To further evaluate the lesion, a Gallium-68 DOTATATE positron emission tomography/computed tomography (Ga-68 DOTATATE PET/CT) was performed (Figure 3), demonstrating intense radiotracer uptake at the pancreatic tail lesion (Standardized uptake value (SUV) max 33.2)). Additional avid foci were identified, including a 5-mm soft tissue nodule in the left upper quadrant peritoneum (SUVmax 10.2) and a focus of uptake at the terminal ileum (SUVmax 15.7), raising suspicion for multifocal neuroendocrine disease.

Subsequent biochemical neuroendocrine tumour evaluation demonstrated normal chromogranin A levels, normal 24-hour urinary catecholamines, and a normal 24-hour urinary 5-hydroxyindoleacetic acid (5-HIAA).

Management

Given the imaging concern for a pancreatic neuroendocrine tumour (NET), the patient underwent surgical resection of the pancreatic tail lesion. Histopathological examination demonstrated benign splenic tissue, confirming an intrapancreatic splenunculus. Follow-up

Ga-68 DOTATATE PET/CT performed one year later (Figure 4) demonstrated persistent avidity in both the terminal ileum and the left upper quadrant peritoneal nodule, while the previously resected pancreatic lesion showed only post-operative change. In view of the prior confirmation of a pancreatic splenunculus and ongoing diagnostic uncertainty regarding the remaining Ga-68 DOTATATE-avid lesions, further functional imaging was performed. Technetium-99m sulfur colloid liver–spleen scintigraphy (Figure 5) demonstrated no abnormal tracer uptake corresponding to the left upper quadrant nodule. Tc-99m heat-damaged red blood cell (HDRBC) scintigraphy with Single photon emission computed tomography/computed tomography (SPECT/CT) (Figure 6) demonstrated focal radiotracer accumulation corresponding to the left upper quadrant peritoneal nodule, confirming functioning accessory splenic tissue. The patient underwent right hemicolectomy, with histopathology confirming a distal ileal neuroendocrine tumour.

Follow-up

Surveillance Ga-68 DOTATATE PET/CT (Figure 7) performed two years later demonstrated no evidence of residual or recurrent neoplastic disease. The left upper quadrant peritoneal nodule remained stable with persistent uptake, consistent with a benign splenunculus.

DISCUSSION

Etiology & Demographics

Accessory spleens (splenunculi) are benign congenital anomalies that arise from incomplete fusion of splenic primordia during embryologic development [1]. They are relatively common variants, occurring in approximately 10-30% of the population, with autopsy studies reporting an incidence of around 12% [2]. Accessory spleens are typically located near the splenic hilum but may occur in a variety of sites including the pancreatic tail, splenic ligaments, mesentery and peritoneum [1]. Intrapancreatic accessory spleens represent a well-recognised variant that can closely mimic pancreatic neoplasms on imaging. Accessory spleens are present at birth and show no gender predilection, but they are most frequently identified incidentally in adults during imaging performed for unrelated clinical indications [1]. Importantly, accessory spleens are distinct from splenosis, which represents acquired ectopic splenic tissue resulting from splenic trauma or splenectomy with subsequent autotransplantation of splenic fragments.

Clinical & Imaging Findings

Accessory splenic tissue demonstrates imaging characteristics that closely mirror those of normal splenic parenchyma across all modalities (Table 1). On ultrasound, accessory spleens typically appear as small, round, well-circumscribed masses with homogeneous echotexture identical to the spleen. On contrast enhanced CT, they appear as well-defined nodules with attenuation identical to splenic tissue on all phases of enhancement [1]. Similarly, MRI typically demonstrates signal intensity identical to the spleen across sequences, with low-to-intermediate signal on T1-weighted imaging and relatively high signal on T2-weighted imaging [1]. Diffusion-weighted imaging typically shows diffusion characteristics similar to splenic parenchyma. These imaging characteristics can be particularly helpful when an accessory spleen is located in the pancreatic tail, where it may mimic a hypervascular pancreatic neoplasm such as a pancreatic NET [3,4]. However, even when signal characteristics resemble

splenic tissue, diagnostic uncertainty may remain, particularly in patients undergoing oncologic evaluation. Functional imaging may further complicate interpretation. Splenic tissue expresses somatostatin receptors, and therefore accessory may demonstrate intense uptake on Ga-68 DOTATATE PET/CT, potentially mimicking neuroendocrine tumours or metastatic disease [5]. Tc-99m HDRBC scintigraphy is highly sensitive and specific for identifying splenic tissue [6], as heat-damaged erythrocytes are selectively phagocytosed by splenic reticuloendothelial cells [7,8]. This results in intense tracer accumulation in both normal and ectopic splenic tissue. However, limitations exist. Diagnostic performance has largely been reported in retrospective studies and case series, and false negatives may occur, particularly in small lesions or those with limited reticuloendothelial function. Reported false negative rates of approximately 13% have been described in selected series [9-11].

In the present case, Ga-68 DOTATATE PET/CT demonstrated three avid lesions: a pancreatic tail lesion, a terminal ileal lesion, and a left upper quadrant peritoneal nodule. Surgical resection of the pancreatic tail lesion confirmed an intrapancreatic splenunculus. Tc-99m HDRBC scintigraphy subsequently identified the peritoneal lesion as accessory splenic tissue, while the absence of tracer uptake in the terminal ileal lesion raised suspicion for a synchronous NET which was subsequently curatively resected.

Treatment & Prognosis

Accessory spleens are benign and do not require treatment unless symptomatic or causing diagnostic uncertainty[1]. When confidently diagnosed radiologically, conservative management with surveillance is appropriate. In contrast, small bowel NET are the most common small intestinal neoplasms [12]. Surgical resection remains the primary treatment for localised disease and may be curative. Prognosis depends on tumour stage, grade and presence of metastases. In this case, Tc-99m HDRBC scintigraphy allowed confirmation of accessory splenic tissue in the peritoneal nodule, avoiding unnecessary surgery at that site, while the true NET was successfully identified and resected.

Differential Diagnoses

The differential diagnosis for Ga-68 DOTATATE-avid lesions in the pancreatic tail or peritoneum includes both benign and malignant entities (Table 2). Considerations include pancreatic neuroendocrine tumour [13], peritoneal metastases from NET, accessory spleen (splenunculus) [13], splenosis (acquired ectopic splenic tissue following trauma or splenectomy) [14], hamartoma [15], hypervascular pancreatic lesions, including pancreatic ductal adenocarcinoma [16]. Correlation with cross-sectional imaging and targeted functional imaging such as Tc-99m HDRBC scintigraphy can help differentiate accessory splenic tissue from neuroendocrine neoplasms.

TEACHING POINT

Accessory spleens occur in approximately 10-30% of the population and may demonstrate intense uptake on Ga-68 DOTATATE PET/CT, mimicking neuroendocrine tumours. Tc99m heat-damaged red blood cell scintigraphy can help confirm splenic tissue by demonstrating selective tracer uptake, aiding differentiation from neuroendocrine neoplasms.

QUESTIONS

Question 1: Which of the following statements regarding accessory spleens (splenunculi) is correct?

1. Accessory spleens occur in fewer than 1% of the population.
2. Accessory spleens may be present in approximately 10–30% of the population. (applies)
3. Accessory spleens are usually malignant lesions.
4. Accessory spleens most commonly occur in the liver.
5. Accessory spleens only occur after splenectomy.

Explanation: Accessory spleens are relatively common congenital findings. Autopsy studies have demonstrated accessory spleens in a significant proportion of individuals. [“Intrapancreatic and peritoneal splenunculi are benign congenital entities. In a 3000 patient autopsy study, an accessory spleen was found in 364 patients (12.1%).”] The other statements are incorrect because accessory spleens are benign, congenital structures and are most commonly located near the spleen or pancreatic tail rather than within the liver.

Question 2: Which of the following statements regarding the clinical management of intrapancreatic accessory spleens is correct?

1. All intrapancreatic accessory spleens require surgical removal.
2. Accessory spleens causing symptoms should be removed. (applies)
3. When confidently diagnosed radiologically, conservative management with surveillance is appropriate. (applies)
4. Accessory spleens should always be biopsied to exclude malignancy.
5. Accessory spleens are typically treated with chemotherapy.

Explanation: Accessory spleens are benign and do not require treatment unless symptomatic or causing diagnostic uncertainty. [“Accessory spleens are benign and do not require treatment unless symptomatic or causing diagnostic uncertainty. When confidently diagnosed radiologically, conservative management with surveillance is appropriate.”] Surgical intervention is only indicated if the lesion causes symptoms or if diagnosis remains uncertain; biopsy or chemotherapy is not indicated.

Question 3: Which of the following statements regarding Gallium-68 DOTATATE positron emission tomography/ computed tomography imaging is correct?

1. Ga-68 DOTATATE uptake is specific for neuroendocrine tumours.

2. Accessory splenic tissue may demonstrate intense uptake on Ga-68 Gallium-68 DOTATATE positron emission tomography/computed tomography. (applies)

3. Gallium-68 DOTATATE positron emission tomography/computed tomography cannot detect small bowel neuroendocrine tumours.

4. Accessory splenic tissue always shows no tracer uptake.

5. Gallium-68 DOTATATE positron emission tomography/computed tomography cannot identify multiple lesions in the abdomen.

Explanation: Splenic tissue expresses somatostatin receptors and therefore may demonstrate uptake on Ga-68 DOTATATE imaging, potentially mimicking neuroendocrine tumours. ["Splenic tissue expresses somatostatin receptors, and therefore accessory spleens may demonstrate intense uptake on Gallium-68 DOTATATE positron emission tomography/ computed tomography, potentially producing false-positive findings."]

Question 4: Which of the following statements regarding technetium-99m heat-damaged red blood cell scintigraphy is correct?

1. Tc-99m heat-damaged red blood cell scintigraphy scintigraphy identifies lesions based on somatostatin receptor expression.

2. Heat-damaged erythrocytes are selectively phagocytosed by splenic reticuloendothelial cells. (applies)

3. Tc-99m heat-damaged red blood cell scintigraphy scintigraphy cannot differentiate accessory spleens from tumours.

4. Tc-99m heat-damaged red blood cell scintigraphy scintigraphy is only used to evaluate liver tumours.

5. Tc-99m heat-damaged red blood cell scintigraphy scintigraphy always produces positive results in accessory splenic tissue.

Explanation: Tc-99m heat-damaged red blood cell scintigraphy scintigraphy exploits the physiologic clearance of damaged erythrocytes by splenic tissue, allowing identification of accessory spleens. ["Tc-99m heat-damaged red blood cell scintigraphy scintigraphy is highly sensitive and specific, as heat-damaged erythrocytes are selectively phagocytosed by splenic reticuloendothelial cells."] However, false-negative results may occur in small lesions or splenic tissue with reduced reticuloendothelial activity.

Question 5: Which of the following lesions should be included in the differential diagnosis of Ga-68 DOTATATE-avid lesions in the pancreatic tail or peritoneum?

1. Pancreatic neuroendocrine tumour (applies)
2. Accessory spleen (splenunculus) (applies)
3. Peritoneal metastases from neuroendocrine tumour (applies)
4. Simple pancreatic cyst
5. Splenosis (applies)

Explanation: Several entities may demonstrate Ga-68 DOTATATE uptake and should be considered when evaluating lesions in the pancreatic tail or peritoneum. ["The differential diagnosis for Ga-68 DOTATATE-avid lesions in the pancreatic tail or peritoneum includes: pancreatic neuroendocrine tumour, peritoneal metastases from NET, accessory spleen (splenunculus), and splenosis."]

These entities can mimic each other on functional imaging, requiring correlation with cross-sectional imaging and targeted nuclear medicine studies.

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FIGURES

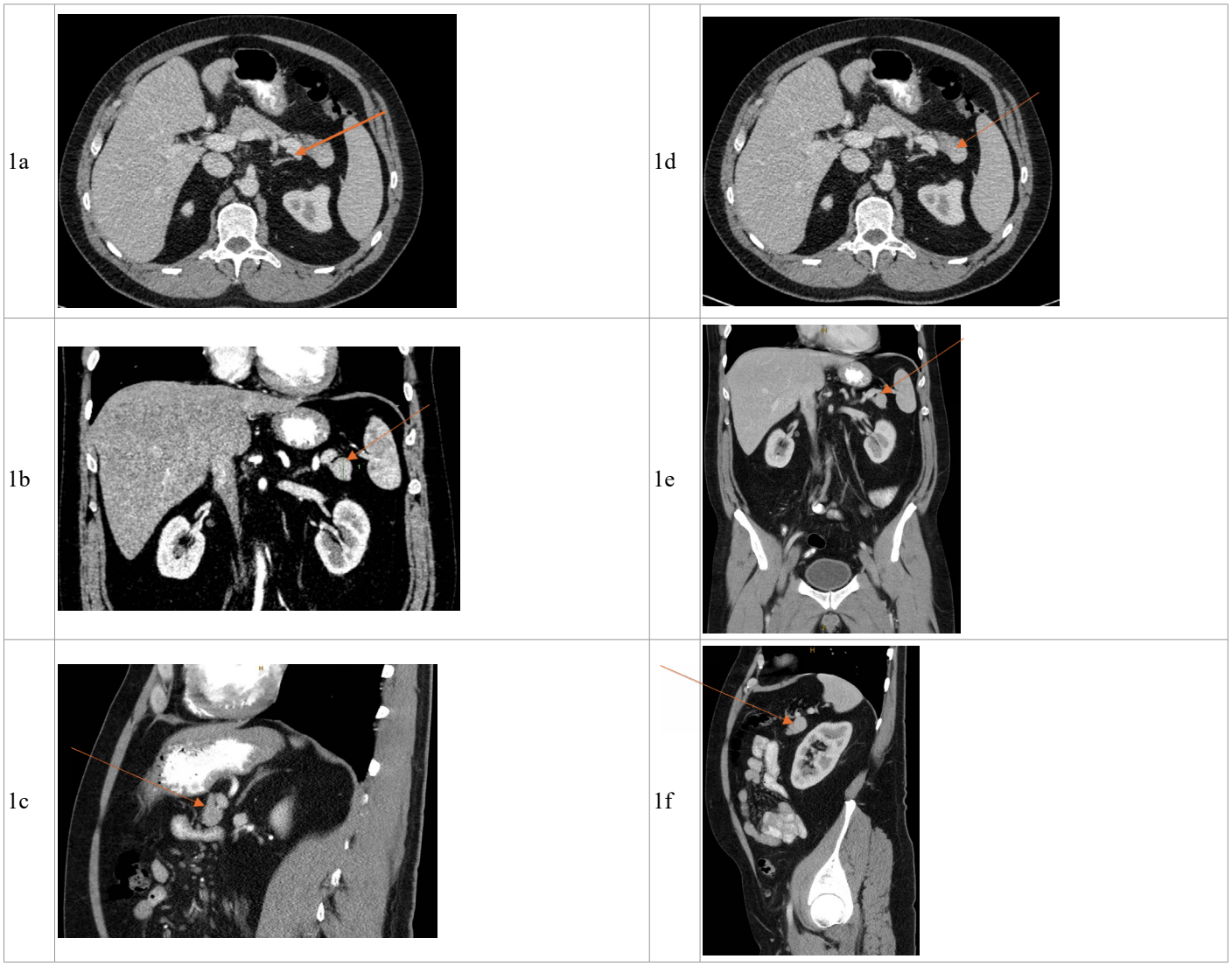

Figure 1: Age, Gender, Diagnosis: 54-year-old male with intrapancreatic splenunculus initially suspected to represent a pancreatic neuroendocrine tumour.

Findings: Multiphasic contrast-enhanced CT of the abdomen demonstrates a well-circumscribed nodular lesion within the pancreatic tail measuring approximately 17 × 16 × 20 mm.

- (1a) Axial portal venous phase CT image demonstrates a homogeneous isodense nodular lesion in the pancreatic tail (arrow), with attenuation similar to adjacent pancreatic parenchyma.
- (1b) Coronal portal venous phase CT reconstruction demonstrates the same lesion within the pancreatic tail (arrow) adjacent to the splenic hilum.
- (1c) Sagittal portal venous phase CT reconstruction further delineates the lesion (arrow) along the inferior margin of the pancreatic tail.
- (1d) Axial arterial phase CT image demonstrates the lesion (arrow) with enhancement similar to splenic tissue.
- (1e) Coronal arterial phase CT reconstruction again demonstrates the well-defined pancreatic tail lesion (arrow) without associated pancreatic duct dilatation or surrounding inflammatory change.
- (1f) Sagittal arterial phase CT reconstruction confirms the location of the lesion in the pancreatic tail (arrow).

No pancreatic duct dilatation, calcification, or peripancreatic infiltration is identified. The remainder of the pancreas appears normal.

Technique: Multiphasic contrast-enhanced CT of the abdomen and pelvis was performed for evaluation of abdominal bloating and nausea. Images were acquired using 120 kVp and 234–244 mAs, with axial acquisition and multiplanar reconstructions in the coronal and sagittal planes. Intravenous iodinated contrast was administered with imaging obtained during arterial and portal venous phases. Reported radiation dose parameters included CTDIvol 15.4–16.1 mGy and dose length product (DLP) 500.3–887.2 mGy·cm.

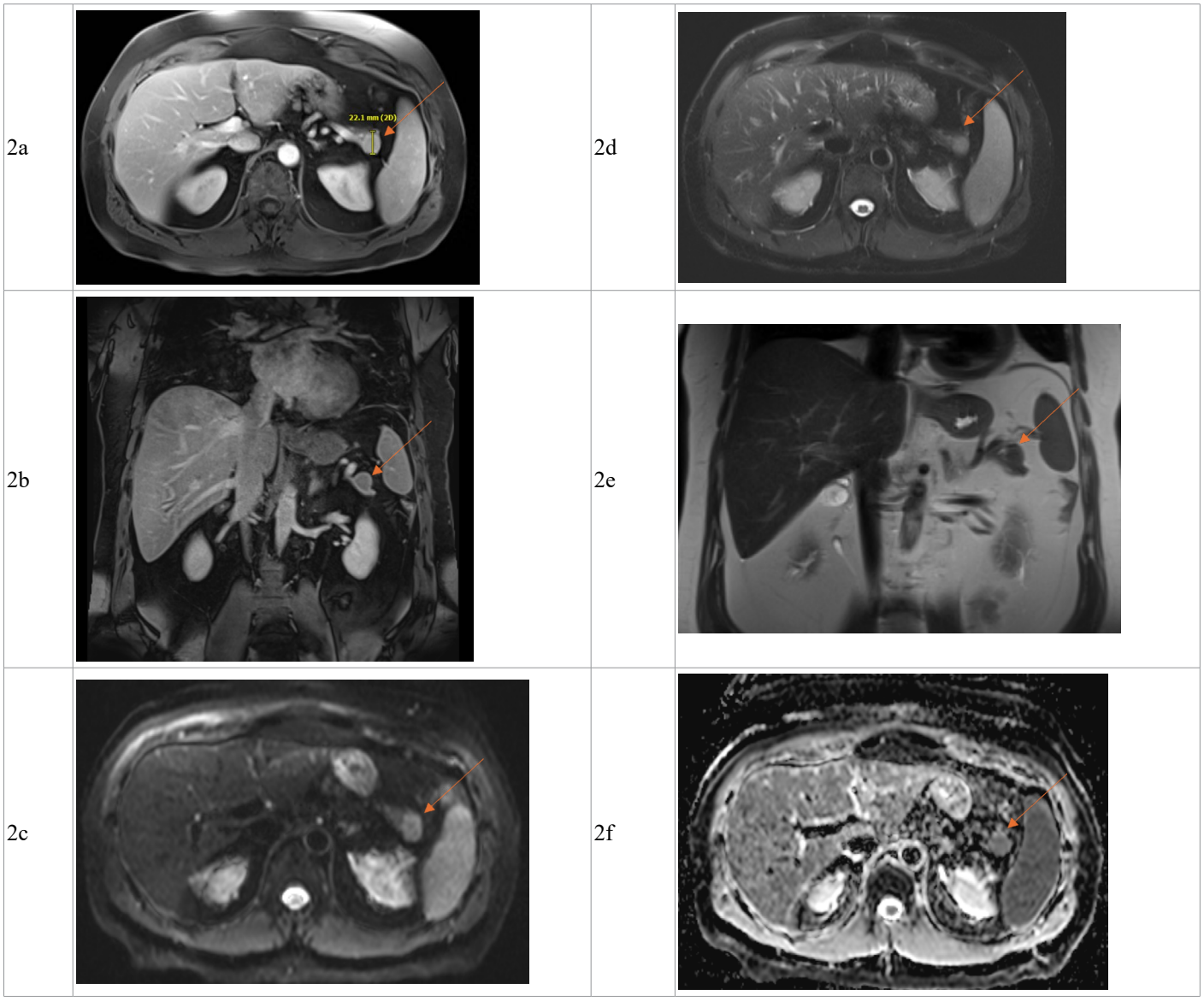

Figure 2: Age, Gender, Diagnosis: 54-year-old male with intrapancreatic splenunculus initially suspected to represent a pancreatic neuroendocrine tumour.
Findings: MRI of the pancreas demonstrates a well-circumscribed nodule within the pancreatic tail measuring approximately 22 × 20 × 18 mm, adjacent to the splenic hilum (arrows), with signal characteristics similar to the adjacent spleen.
(A) Axial T1-weighted post-contrast fat-suppressed image demonstrates a well-defined enhancing nodule within the pancreatic tail measuring approximately 22.1 mm in maximal axial dimension, with enhancement characteristics similar to the spleen.
(B) Coronal T1-weighted post-contrast fat-suppressed image demonstrates the lesion within the pancreatic tail (arrow), again demonstrating enhancement characteristics identical to the adjacent splenic parenchyma.
(C) Axial diffusion-weighted imaging (DWI) demonstrates signal intensity similar to the spleen without focal restricted diffusion to suggest malignancy.
(D) Axial T2-weighted image demonstrates the pancreatic tail lesion with signal intensity similar to the adjacent spleen.
(E) Coronal T2-weighted image demonstrates the well-circumscribed pancreatic tail nodule adjacent to the splenic hilum.
(F) Axial apparent diffusion coefficient (ADC) map demonstrates no corresponding low ADC values, confirming the absence of diffusion restriction.
Overall imaging characteristics—including identical signal intensity to splenic tissue across multiple sequences—raise suspicion for an intrapancreatic accessory spleen (splenunculus).
Technique: High-resolution 3 Tesla MRI of the pancreas was performed with multiplanar imaging. Sequences included axial and coronal T1-weighted fat-suppressed gradient-echo sequences following intravenous administration of a gadolinium-based contrast agent, obtained during dynamic contrast-enhanced phases. Additional sequences included axial and coronal T2-weighted imaging, diffusion-weighted imaging (DWI) with corresponding ADC maps, and MR cholangiopancreatography (MRCP) for evaluation of the pancreatic duct.

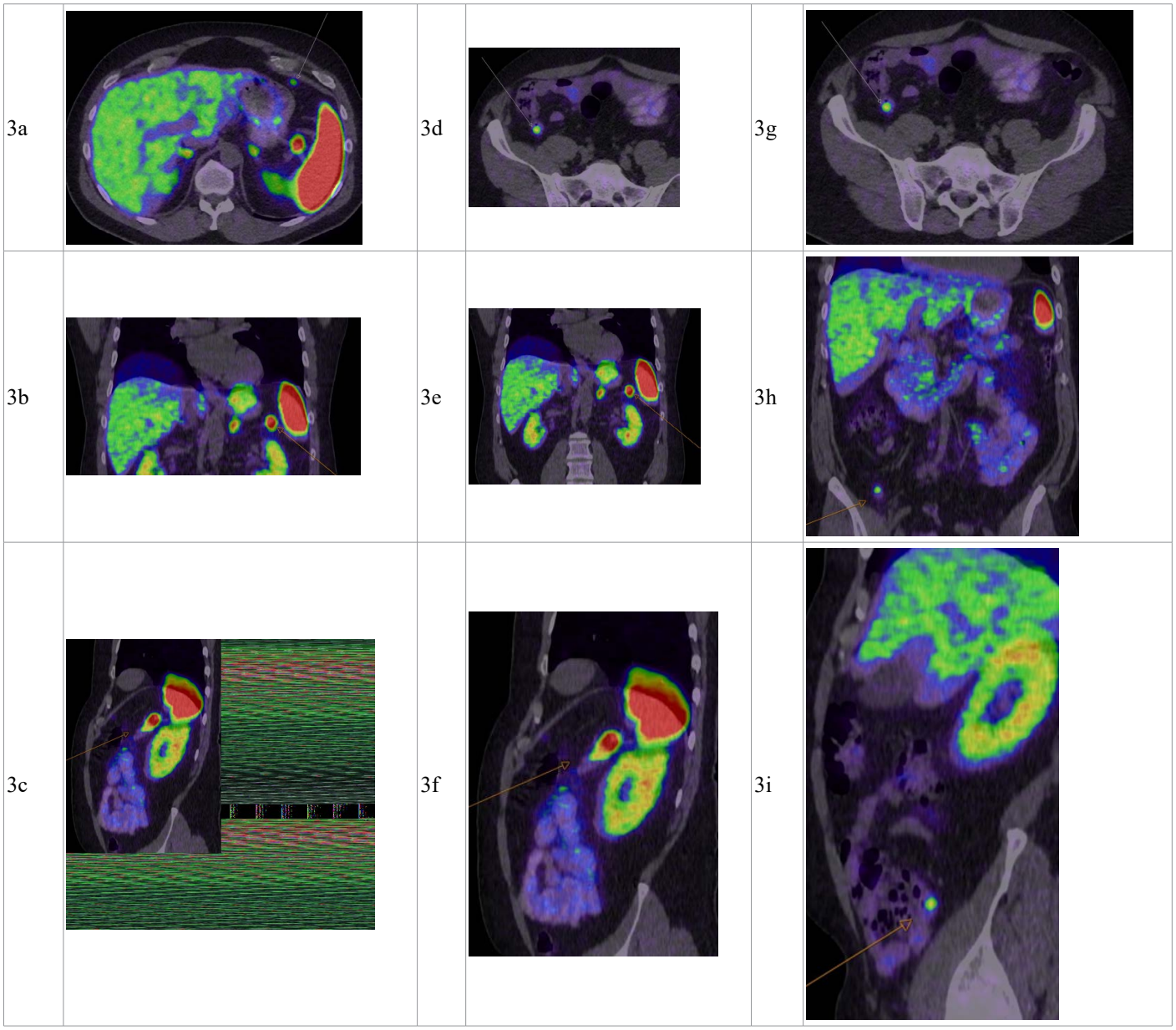

Figure 3. Ga-68 DOTATATE PET/CT demonstrating three somatostatin receptor–avid lesions.

Age, Gender, Diagnosis: 54-year-old male with intrapancreatic splenunculus and synchronous ileal neuroendocrine tumour.

Findings: (A–C) Axial, coronal, and sagittal fused Ga-68 DOTATATE PET/CT images demonstrate a focal area of radiotracer uptake in the left upper quadrant peritoneum (arrows), corresponding to a 5-mm soft-tissue nodule located anterior to the splenic flexure of the colon, with SUVmax 10.2. Mild PET–CT misregistration is present in this region due to respiratory motion artefact, slightly affecting precise spatial alignment on fused images.

(D–F) Axial, coronal, and sagittal fused PET/CT images demonstrate intense Ga-68 DOTATATE uptake within a well-defined soft-tissue nodule in the pancreatic tail (arrows), measuring approximately 22 × 20 × 18 mm with SUVmax 33.2. The lesion is adjacent to the splenic hilum and was initially suspicious for a pancreatic neuroendocrine tumour but was subsequently confirmed histologically as an intrapancreatic splenunculus following surgical resection.

(G–I) Axial, coronal, and sagittal fused PET/CT images demonstrate a third focus of increased radiotracer uptake within the terminal ileum (arrows), with SUVmax 15.7, corresponding to a small bowel lesion suspicious for a synchronous neuroendocrine tumour, later confirmed on surgical pathology following right hemicolectomy.

Physiologic radiotracer uptake is noted within the spleen, liver, kidneys, and urinary collecting system.

Technique: Whole-body Ga-68 DOTATATE PET/CT was performed following intravenous administration of 139 MBq of Ga-68 DOTATATE, with imaging acquired 61 minutes post-injection. PET images were obtained from the skull base to mid-thigh with a low-dose CT for attenuation correction and anatomical localisation. Multiplanar fused PET/CT images (axial, coronal, and sagittal) are displayed.

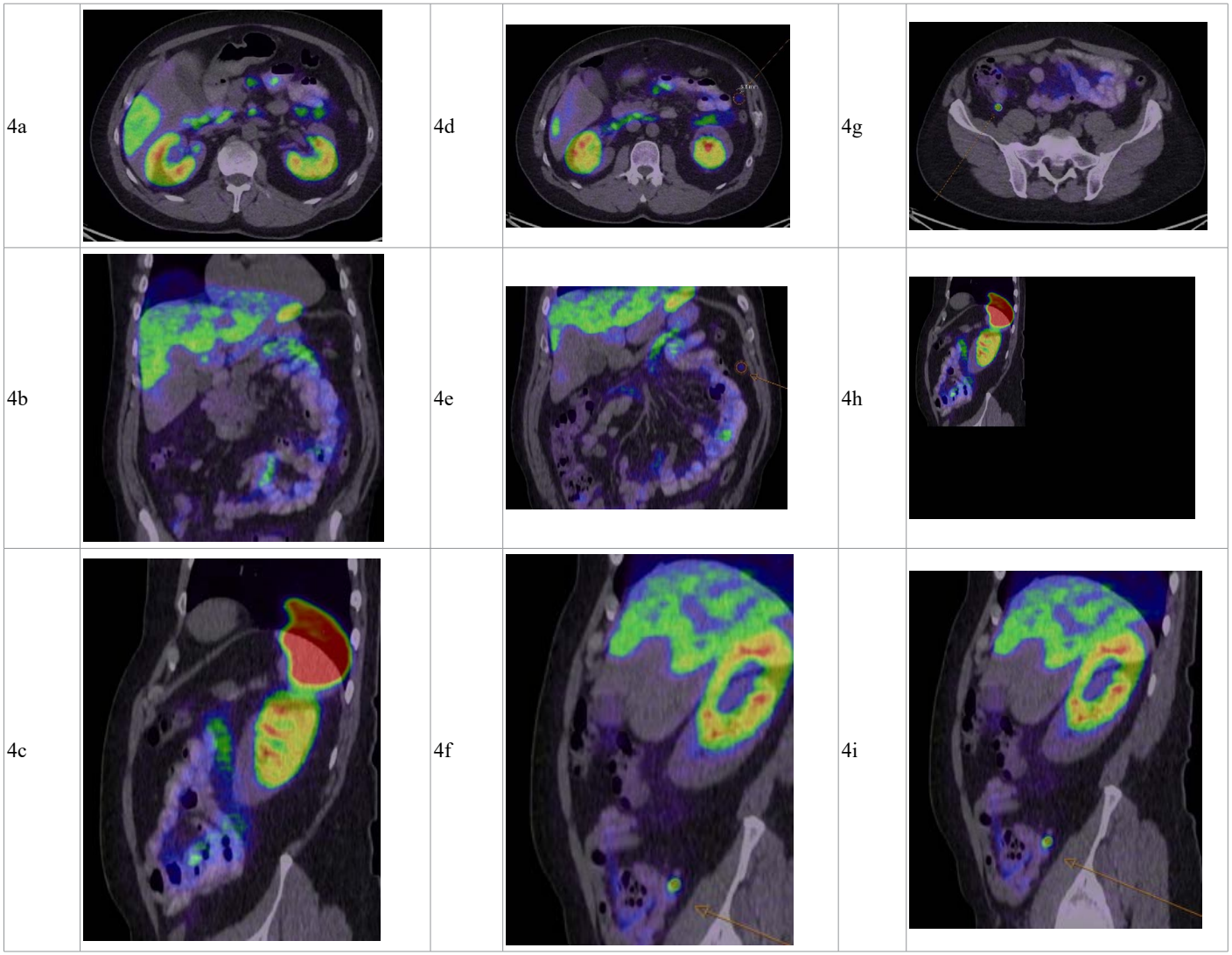

Figure 4: Follow-up Ga-68 DOTATATE PET/CT after resection of the pancreatic splenunculus.

Age, Gender, Diagnosis: 54-year-old male with previously resected intrapancreatic splenunculus and persistent DOTATATE-avid lesions in the terminal ileum and left upper quadrant peritoneum.

Findings: (A–C) Axial, coronal, and sagittal fused Ga-68 DOTATATE PET/CT images demonstrate post-operative changes at the pancreatic tail resection site without residual focal radiotracer uptake, consistent with prior surgical resection of the intrapancreatic splenunculus. Physiologic uptake is seen within the spleen and kidneys. No abnormal DOTATATE-avid lesion is identified in the pancreatic tail region.

(D–F) Axial, coronal, and sagittal fused PET/CT images demonstrate persistent focal radiotracer uptake in a small left upper quadrant peritoneal nodule (arrows) located anterior to the splenic flexure, measuring approximately 6 mm, with similar intensity compared with the prior study (SUVmax approximately 10). The appearance and stability favour accessory splenic tissue (peritoneal splenunculus). There is significant PET–CT misregistration in the upper abdomen due to respiratory motion artefact, slightly affecting precise anatomical localisation on fused images.

(G–I) Axial, coronal, and sagittal fused PET/CT images demonstrate persistent focal Ga-68 DOTATATE uptake in the terminal ileum (arrows) with SUVmax approximately 14, similar to prior imaging. This finding remained suspicious for a synchronous ileal neuroendocrine tumour, which was subsequently confirmed on surgical pathology following right hemicolectomy.

Physiologic tracer distribution is noted in the spleen, liver, kidneys, and urinary collecting system.

Technique: Whole-body Ga-68 DOTATATE PET/CT was performed following intravenous administration of Ga-68 DOTATATE, with imaging acquired approximately 60 minutes post-injection. PET images were obtained from the skull base to mid-thigh with a low-dose CT component for attenuation correction and anatomical localisation. Multiplanar fused PET/CT images (axial, coronal, and sagittal) are shown.

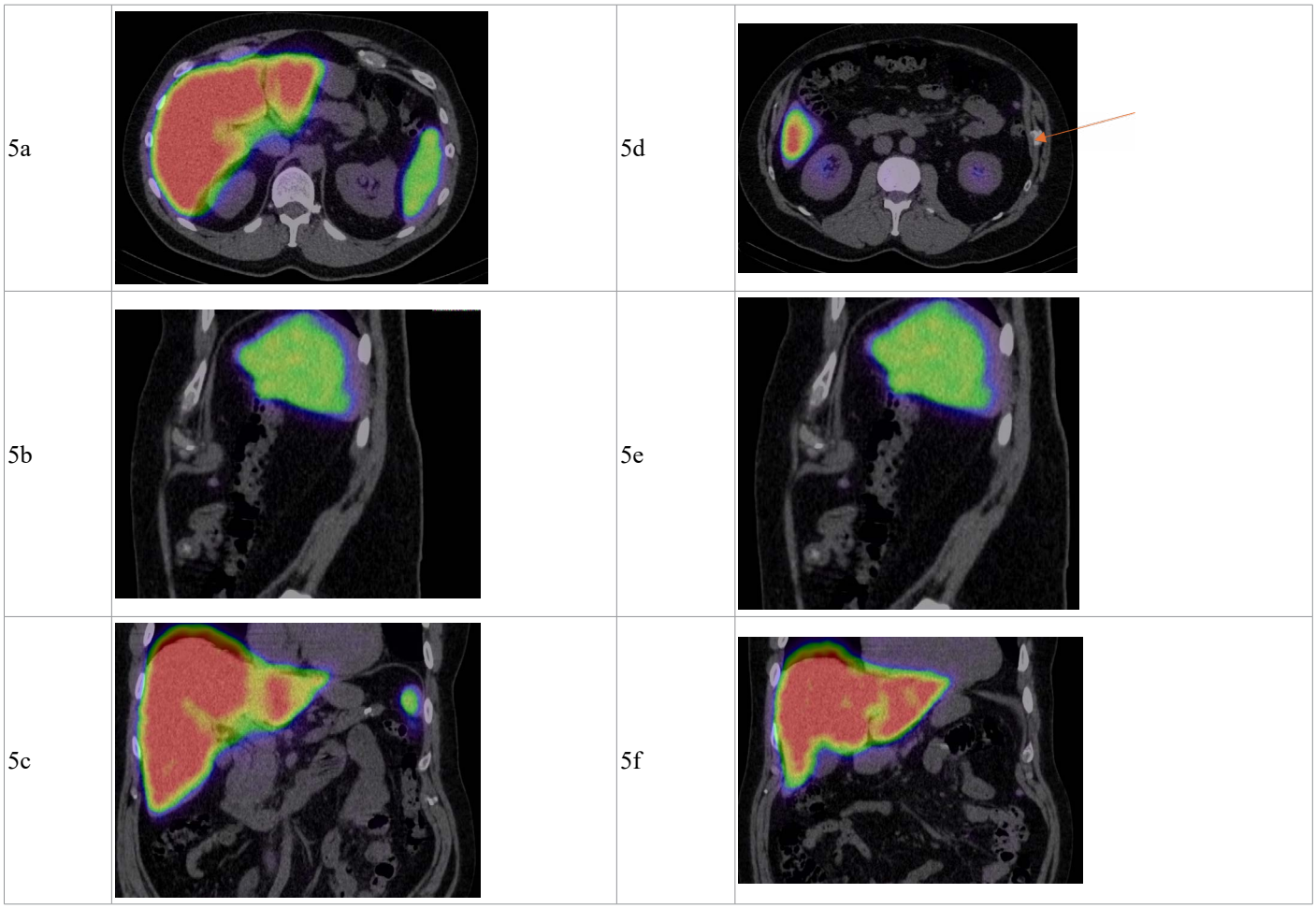

Figure 5: Tc-99m sulfur colloid liver–spleen scintigraphy demonstrating absence of uptake within a left upper quadrant peritoneal nodule prior to confirmatory Tc-99m heat-damaged red blood cell imaging

Age, Gender, Diagnosis: 54-year-old male with indeterminate DOTATATE-avid left upper quadrant nodule following resection of intrapancreatic splenunculus.

Findings: (A–C) Axial (A), sagittal (B), and coronal (C) fused Tc-99m sulfur colloid SPECT/CT images demonstrate physiologic tracer uptake within the liver and spleen, with no abnormal radiotracer accumulation corresponding to the previously described left upper quadrant peritoneal nodule measuring approximately 6 mm.

(D–F) Additional fused SPECT/CT images again demonstrate absence of sulfur colloid uptake within the left upper quadrant peritoneal nodule (arrow), indicating no demonstrable reticuloendothelial activity at this site on sulfur colloid imaging. Given the persistent DOTATATE avidity and negative findings on sulfur colloid scintigraphy, Tc-99m heat-damaged red blood cell (HDRBC) SPECT/CT was performed two days later for further evaluation (Figure 6), which subsequently confirmed functioning accessory splenic tissue at this location.

Technique: Technetium-99m sulfur colloid liver–spleen scintigraphy was performed following intravenous administration of Tc-99m sulfur colloid. Regional SPECT/CT imaging of the upper abdomen was obtained. The CT component was low-dose and used for attenuation correction and anatomical localisation. Fused axial, sagittal, and coronal SPECT/CT images are displayed.

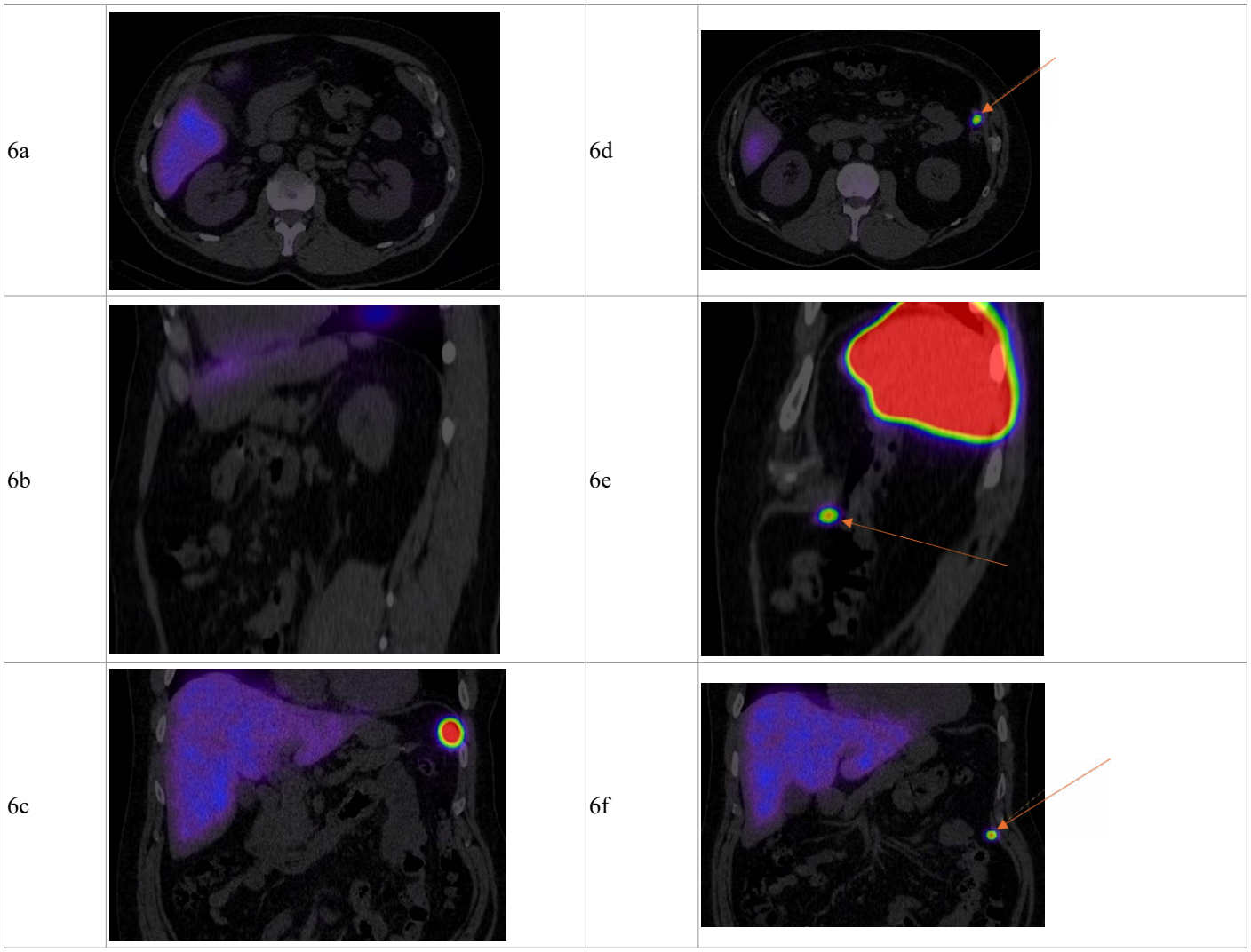

Figure 6: Tc-99m heat-damaged red blood cell (HDRBC) SPECT/CT confirming accessory splenic tissue in a left upper quadrant peritoneal nodule.

Age, Gender, Diagnosis: 54-year-old male with prior resection of an intrapancreatic splenunculus and persistent DOTATATE-avid lesions in the left upper quadrant and terminal ileum, undergoing evaluation for accessory splenic tissue versus synchronous ileal neuroendocrine tumour.

Findings: (A–C) Axial (A), sagittal (B), and coronal (C) fused Tc-99m HDRBC SPECT/CT images through the pancreatic tail resection site demonstrate no abnormal radiotracer uptake, consistent with prior surgical resection of the intrapancreatic splenunculus and no residual splenic tissue at this location.

(D–F) Axial (D), sagittal (E), and coronal (F) fused SPECT/CT images demonstrate focal radiotracer accumulation within a small left upper quadrant peritoneal soft-tissue nodule measuring approximately 6–7 mm (arrow), consistent with functioning accessory splenic tissue (peritoneal splenunculus).

Technique: Technetium-99m heat-damaged red blood cell (Tc-99m HDRBC) scintigraphy was performed following intravenous administration of autologous erythrocytes labelled with Tc-99m and heat-damaged prior to reinjection. Regional SPECT/CT imaging of the abdomen and pelvis was obtained. The CT component was low-dose and used for attenuation correction and anatomical localisation. Fused axial, sagittal, and coronal SPECT/CT images are displayed.

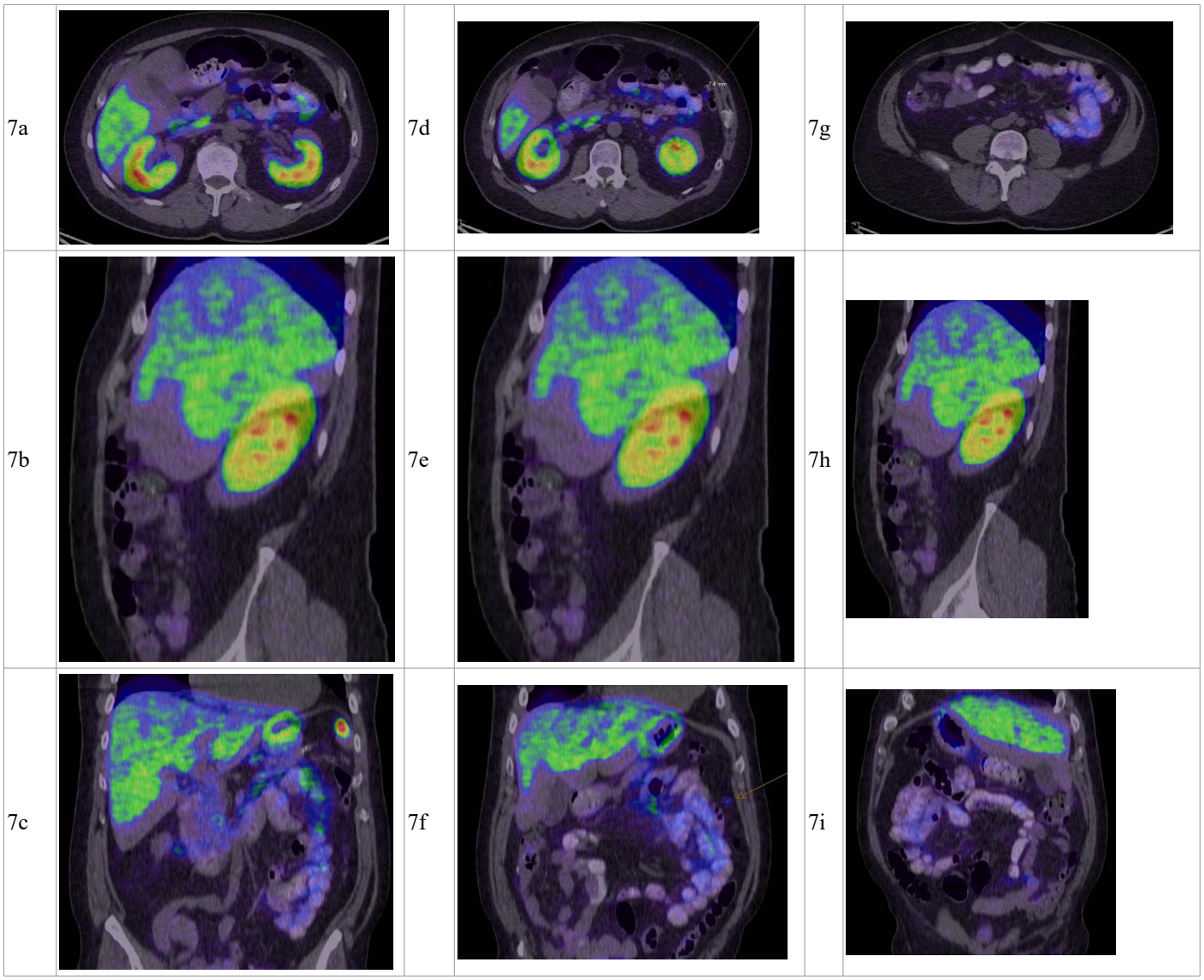

Figure 7: Follow-up Ga-68 DOTATATE PET/CT demonstrating persistent uptake within a peritoneal splenunculus with no evidence of recurrent neuroendocrine tumour.

Age, Gender, Diagnosis: 54-year-old male following resection of distal ileal neuroendocrine tumour with previously confirmed accessory splenic tissue (peritoneal splenunculus).

Findings: (A–C) Axial (A), sagittal (B), and coronal (C) fused Ga-68 DOTATATE PET/CT images through the pancreatic tail resection site demonstrate no abnormal radiotracer uptake, consistent with prior surgical resection of the intrapancreatic splenunculus and no evidence of residual or recurrent lesion.

(D–F) Axial (D), sagittal (E), and coronal (F) fused PET/CT images demonstrate persistent focal radiotracer uptake within a small left upper quadrant peritoneal nodule measuring approximately 7 mm (arrow), corresponding to the previously confirmed peritoneal splenunculus. PET–CT misregistration is present in this region due to respiratory motion artefact, slightly affecting precise spatial alignment on fused images.

(G–I) Axial (G), sagittal (H), and coronal (I) fused PET/CT images through the distal ileal resection site demonstrate no abnormal DOTATATE uptake, with no evidence of residual or recurrent neuroendocrine tumour.

No additional abnormal DOTATATE-avid lesions are identified elsewhere in the abdomen.

Technique: Whole-body Ga-68 DOTATATE PET/CT was performed following intravenous administration of 183 MBq Ga-68 DOTATATE, with imaging acquired 64 minutes post-injection. PET images were obtained from skull base to mid-thigh, with low-dose CT used for attenuation correction and anatomical localisation. Fused axial, sagittal, and coronal PET/CT images are displayed.

Table 1: Summary table of accessory spleen (splenunculus)

Feature	Description
Etiology	Congenital failure of fusion of splenic anlage during embryologic development leading to ectopic splenic tissue separate from the main spleen.
Incidence	Present in approximately 10–30% of the population; autopsy series report ~12%.
Gender ratio	No significant gender predilection.
Age predilection	Congenital lesion present at birth; most commonly detected incidentally in adults during imaging for unrelated indications.
Risk factors	Congenital variant; not associated with environmental risk factors. Splenosis (distinct entity) occurs after splenic trauma or splenectomy.
Treatment	None required when diagnosis is confidently established. Surgical excision may be performed if symptomatic or if malignancy cannot be excluded.
Prognosis	Excellent. Accessory spleens are benign and remain stable over time.
Findings on imaging	X-ray: Usually not visible. US: Round, well-defined homogeneous mass with echogenicity identical to spleen. CT: Well-circumscribed nodule with attenuation identical to spleen on all phases. MRI: Signal identical to spleen (T1 hypointense to pancreas, T2 hyperintense) with similar diffusion characteristics. Contrast enhancement: Enhancement pattern identical to splenic parenchyma. Scintigraphy: Intense uptake on Tc-99m heat-damaged RBC scintigraphy due to reticuloendothelial activity. PET: May demonstrate avid uptake on Ga-68 DOTATATE PET/CT because splenic tissue expresses somatostatin receptors.

Summary table outlining the key epidemiologic, clinical, and imaging characteristics of accessory spleen (splenunculus), including its etiology, demographics, management, and typical imaging appearances across multiple modalities.

Table 2: Differential diagnosis of Ga-68 DOTATATE-avid lesions in the pancreatic tail or peritoneum

Diagnosis	X-Ray	Ultrasound	CT	MRI T1	MRI T2	MRI DWI	Contrast Enhancement	Scintigraphy	PET
Accessory spleen (splenunculus)	Usually not visible	Round homogeneous mass with echogenicity identical to spleen	Well-defined nodule with attenuation identical to spleen	Hypointense to liver, isodense to spleen	Hypointense to liver, similar to spleen	Hypointense to liver, similar to spleen	Enhancement identical to spleen	Intense uptake on Tc-99m HDRBC scintigraphy	May show intense uptake on Ga-68 DOTATATE PET
Pancreatic neuroendocrine tumour (NET)	Usually not visible	Well-defined hypoechoic hypervascular mass	Hypervascular enhancing pancreatic lesion	Hypointense to pancreas	Variable, often hyperintense to pancreas	Often shows restricted diffusion	Avid arterial enhancement with washout	No uptake on HDRBC scan	Strong Ga-68 DOTATATE uptake
Peritoneal metastasis from NET	Not visible	Small hypoechoic nodules	Peritoneal nodules or implants	Low–intermediate signal	Variable signal	Often restricted diffusion	Variable, often heterogeneous	No uptake	DOTATATE avid
Splenosis	Usually not visible	Multiple nodules with splenic echotexture	Nodules similar attenuation to spleen	Signal similar to spleen (hypointense)	Signal similar to spleen (hyperintense)	Similar diffusion to spleen (heterogenous enhancement)	Enhancement identical to spleen	Strong uptake on HDRBC scintigraphy	May demonstrate DOTATATE uptake
Pancreatic hamartoma	Not visible	Well-circumscribed hypoechoic mass	Well-defined pancreatic mass	Iso- to hypointense	Iso-hyperintense	Variable diffusion restriction	Mild heterogeneous enhancement	No uptake	Typically non-avid or mild uptake
Pancreatic ductal adenocarcinoma	Not visible	Hypoechoic irregular mass	Hypovascular pancreatic mass with ductal dilatation	Hypointense	Variable	Restricted diffusion common	Hypovascular enhancement	No uptake	Usually not DOTATATE avid

Differential diagnosis of Ga-68 DOTATATE-avid lesions involving the pancreatic tail or peritoneum, including accessory spleen and other hypervascular or somatostatin receptor–expressing lesions. Imaging characteristics across radiography, ultrasound, CT, MRI, scintigraphy, and PET are summarised to aid radiologic differentiation.

KEYWORDS

Intrapancreatic accessory spleen; splenunculus; neuroendocrine tumour; Ga-68 DOTATATE positron emission tomography/computed tomography; Tc-99m heat-damaged red blood cell scintigraphy

ABBREVIATIONS

5-HIAA = 5-Hydroxy Indole Acetic Acid
ADC = Apparent Diffusion Coefficient
CA 19-9 = Carbohydrate Antigen 19-9
CA-125 = Cancer Antigen 125
CEA = Carcino Embryonic Antigen
CRP = C-Reactive Protein
CT = Computed Tomography
CTDIvol = Computed Tomography Dose Index (volume)
DLP = Dose Length Product
DWI = Diffusion-Weighted Imaging
HDRBC = Heat-Damaged Red Blood Cell
MRCP = Magnetic Resonance Cholangio Pancreatography
MRI = Magnetic Resonance Imaging
NET = Neuro Endocrine Tumour
PET = Positron Emission Tomography
PET/CT = positron Emission Tomography/Computed Tomography
SPECT = Single Photon Emission Computed Tomography
SUV = Standardized Uptake Value

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