Radiology Case Reports 15 (2020) 1663–1668

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/radcr

Case Report

Primary retroperitoneal neuroendocrine tumor with nonspecific presentation: A case report

Tareq Hamed Al Taei, MB, BCh, BAO, Sarah Ali Al Mail, MD, Abdulaziz Hajjaj Al Thinayyan, MBBS*

Department of Radiology, Salmaniya Medical Complex, Busaiteen 00973, Bahrain

ARTICLE INFO

Article history:
Received 5 May 2020
Revised 29 June 2020
Accepted 4 July 2020

Keywords:
Neuroendocrine tumors: NETs
CT scan: computed tomography
MRI: magnetic resonance imaging

ABSTRACT

Primary retroperitoneal tumors are a rare entity of human neoplasms, with primary retroperitoneal neuroendocrine tumors being even more rare. They are usually metastatic and rarely seen as a primary tumor. We report a case of primary retroperitoneal neuroendocrine tumor in a 55-year-old lady, who presented with chronic abdominal pain. Computed tomography showed a retroperitoneal mass and biopsy confirmed the diagnosis of primary retroperitoneal neuroendocrine tumor. Primary retroperitoneal neuroendocrine tumors are rare tumors. Radiology plays a crucial part in the diagnosis of such tumors with the CT scan considers the best imaging modality for diagnosis. Surgical resection remains the definite treatment of retroperitoneal neuroendocrine tumors. Chemotherapy is used for unresectable differentiated tumors.

Introduction

Primary retroperitoneal neuroendocrine tumors (NETs) account for only 0.16% to 0.20% of all human tumors. Retroperitoneal NETs are commonly metastatic originating from the pancreas and the gastrointestinal tract [1,2]. There are 2 main groups of NETs, divided on the basis of their cytoskeleton filaments. The first group is the neural group. This group includes paraganglioma, which is characterized by the predominant expression of neurofilaments. The second group is the epithelial group that includes carcinoid, which demonstrates classically a cytoskeleton formed of keratins and occasionally neurofilaments [3]. Although neural tumors, particularly paragangliomas, are frequently reported in the literature, epithelial NETs of the retroperitoneum are exceedingly rare. We present a case of a primary retroperitoneal NET of small cell type that was discovered in a patient who underwent an abdominal CT scan for chronic abdominal pain.

Case report

Our patient was a 55-year-old lady, without any past medical history, referred from the general surgery clinic for CT abdomen and pelvis with a history of chronic abdominal pain. Physical examination and laboratory investigations were unremarkable.

* *Corresponding author.*
E-mail addresses: tawad@health.gov.bh (T.H.A. Taei), smail@health.gov.bh (S.A.A. Mail), athinayyan@health.gov.bh (A.H.A. Thinayyan).
https://doi.org/10.1016/j.radcr.2020.07.014

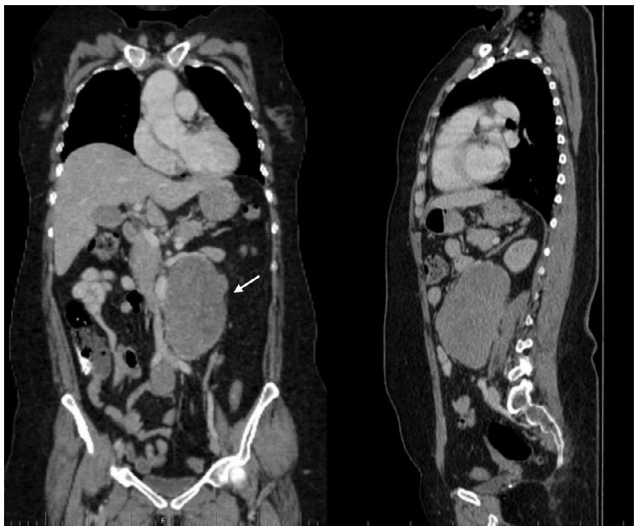

Fig. 1 – Coronal and sagittal contrast-enhanced CT chest, abdomen, and pelvis showed a retroperitoneal mass (note the arrow) located along the mid abdomen.

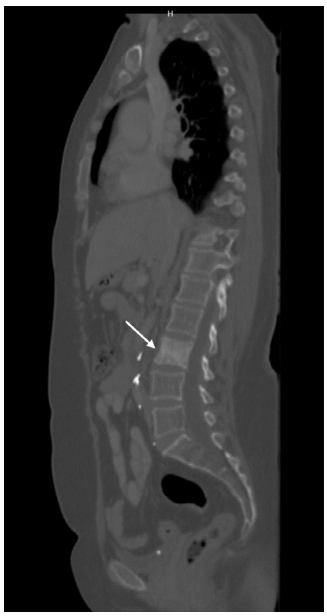

Fig. 2 – Sagittal contrast-enhanced CT chest, abdomen, and pelvis (bone window) showed sclerotic changes involving L3 vertebral body (note the arrow).

Contrast-enhanced CT abdomen and pelvis showed a retroperitoneal mass located along the mid abdomen that is encasing the lower abdominal aorta. The mass measured approximately 12.8 × 7.6 × 9.6 cm in size (CC x RL x AP). It was pressing against the left ureter and causing secondary hydroureteronephrosis. It was displacing the left renal vein anteriorly and encasing the renal artery (Fig. 1). Bone window showed sclerotic changes involving L3 vertebral body (Fig. 2). The rest of the scan was unremarkable.

The patient was admitted and a double-J stent was inserted to relieve the obstruction. MRI of the abdomen and pelvis was requested to assess the regional extension of the retroperitoneal tumor and the feasibility of surgical resection of the tumor. Multiplanar, multisequential pre- and postgadolinium MRI images of the abdomen and pelvis were obtained, which re-demonstrated the left para-aortic retroperitoneal mass. It appeared to be an irregular-shaped well-defined mass lesion, heterogeneous on both T1 and T2, showing significant restriction diffusion in diffusion weighted imaging (DWI) and apparent diffusion coefficient (ADC) Map sequences. The mass appeared to push and displace the aorta anteriomedially, encasing it up with focal areas of loss of fat plane between the aortic wall and the mass. The left ureter also appeared to be displaced laterally and compressed along its pathway as it crosses this lesion. The lower pole of the left kidney was also pushed laterally. The previously noted left-sided hydronephrosis on the CT scan was markedly reduced after insertion of the DJ stent (Fig. 3).

A biopsy revealed microscopic and immunohistochemical features consistent with that of high-grade malignant neoplasm, favoring the neuroendocrine carcinoma of small cell type. The tumor cells were positive for chromogranin and neuro-specific enolase. The Alpha fetoprotein (AFP) was negative and the Ki-67 showed high proliferative index (80% nuclearpositivity). No lymph nodes or any ovarian parenchymal tissue was observed in this biopsy. No lymphocytes' infiltration surrounding tumor septae was observed (Fig. 4). ^{99m}Tc-HDP Whole Body Skeletal Scintigraphy exhibited an abnormal radiopharmaceutical uptake at L3 vertebra (Fig. 5).

Whole body F18-FDG PET/CT was performed which showed discrete foci of active FDG uptake mainly localized at its upper and lower poles with subtle FDG activity in rest of the mass of SUVmax~11.6. Metabolic activity was also noted at L3 vertebral body with FDG activity of SUVmax~5.9. Further correlation with Gallium68 octerotide scan to assess their somatostatin receptor expression was advised (Figs. 6 and 7). Whole body Ga68 DOTATOC PET/CT was performed which displayed somatostatin receptor expression with less metabolic tumor activity compared with FDG PET/CT study except for the L3 vertebral body lesion which showed comparably more Ga68 octreotide tumor avidity (Figs. 6 and 7). Absence of specific clinical symptoms with the large size of the tumor favored a nonfunctioning type of tumor.

The patient was discussed in the multidisciplinary tumor board meeting and the decision of starting chemotherapy was agreed upon with regular radiological imaging follow-up. Surgical resection was not the best option in this case due to the evidence of bone metastasis and encasement of the aorta.

The patient underwent 6 cycles of Cisplatin Etoposide, and the last follow-up CT scan showed interval regression in the size of the mass (Fig. 8).

Discussion

Retroperitoneal NETs were first described by Morgagni in 1761. They are rare tumors which are either primary, mainly originating from the gastrointestinal tract and pancreas, or

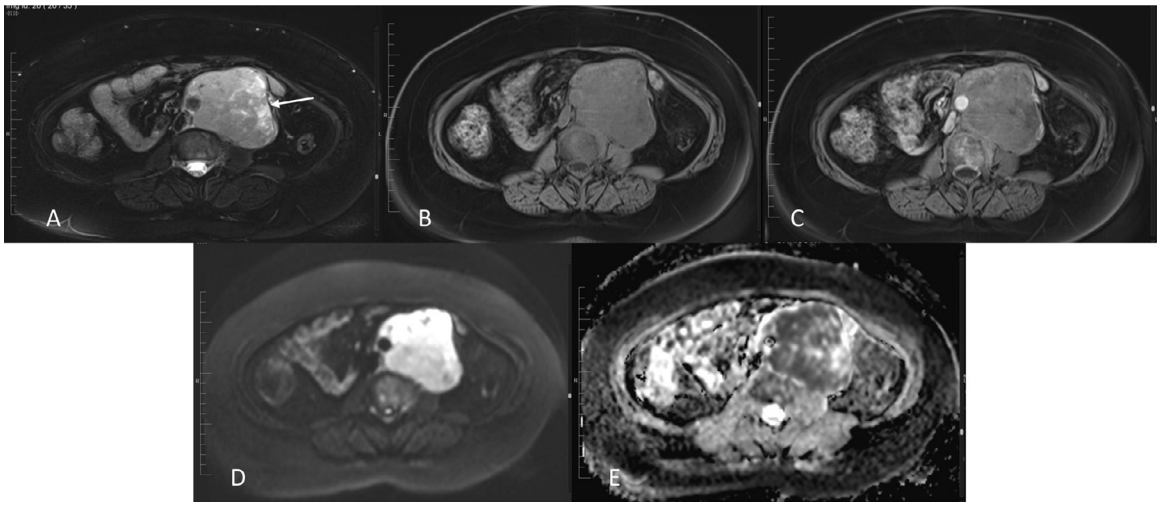

Fig. 3 – Multiaxial, multisequential pre- and postgadolinium MRI images of the abdomen and pelvis were obtained, which re-demonstrated the left para-aortic retroperitoneal mass. It appeared to be irregularly shaped with sharp margins, heterogeneous on both T2 (A) and T1 (B) with enhancement in T1 postcontrast (C), showing significant restriction diffusion in DWI (D) and ADC (E) Map sequences.

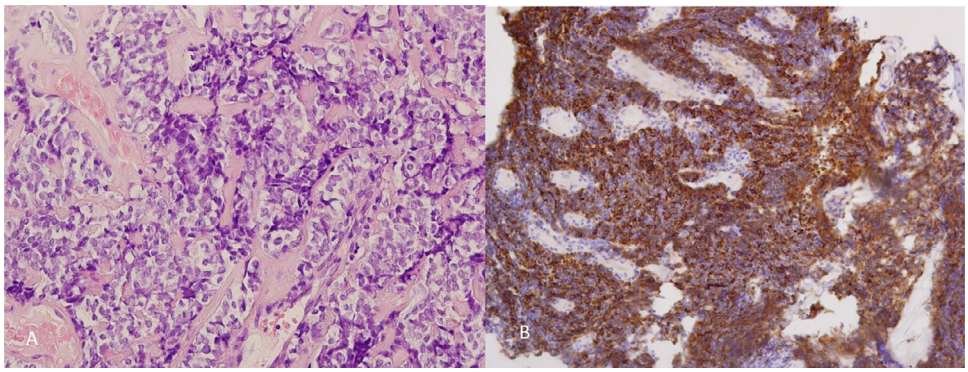

Fig. 4 – Hematoxylin and eosin (H&E) stain on low power (20×) magnification showed solid to peri-vascular arrangement of large pale round to oval nucleated cells (A). These cells show strong positivity for chromogranin stain (B).

metastatic, which are far more common than the primary tumor [1].

NETs have been reported in various organs and are mainly found in the gastrointestinal tract, accounting for 25% of all intestinal tumors. The most common location for NET development is the intestine, about 60 cm distal to the distal ileum [4]. Retroperitoneal NETs have been found in the pancreas, common bile duct, duodenum, and kidney [5–7]. However, primary retroperitoneal NETs in locations other than the aforementioned organs are rare. Polikarpova SB et al. showed that retroperitoneal NETs are more common in the elderly, and that the clinical symptoms are usually mild. In general, patients have no symptoms of carcinoid syndrome [8]. These tumors develop asymptomatically and are often an incidental finding found on abdominal imaging examination, like computerized tomography (CT) and ultrasonography (US).

There is no well-established staging system for NETs. However, despite the inability to establish a single system of nomenclature, staging, and grading for NETs of all sites, there are common features that form the basis of most systems. These features include: size of the tumor, mitotic count, vascular and perineural invasion, nuclear polymorphisms, and Ki-67 labeling index [9]. The latest World Health Organization classification classifies NETs into well-differentiated endocrine carcinomas, poorly differentiated endocrine carcinomas, and tumor-like lesions. This differentiation is based on the tumor's size, histology, morphology, and the presence or absence of local invasion or metastasis [10].

Imaging of functioning tumors is primarily directed at localization and staging of the tumor, which reduces the potential surgical complications and increases the chances of surgical resection, which is the only form of curative treatment for these tumors. However, imaging is also important in the follow-up of recurrent or metastatic diseases. Nuclear imaging techniques can also be used to direct treatment with Peptide Receptor Targeted Radionuclide Therapy [11].

Transabdominal ultrasound is a noninvasive and widely available imaging modality, which does not use radiation.

Fig. 5 – ^{99m}Tc-HDP whole body skeletal scintigraphy showed abnormal radiopharmaceutical uptake is seen in L3 vertebra (note the arrow).

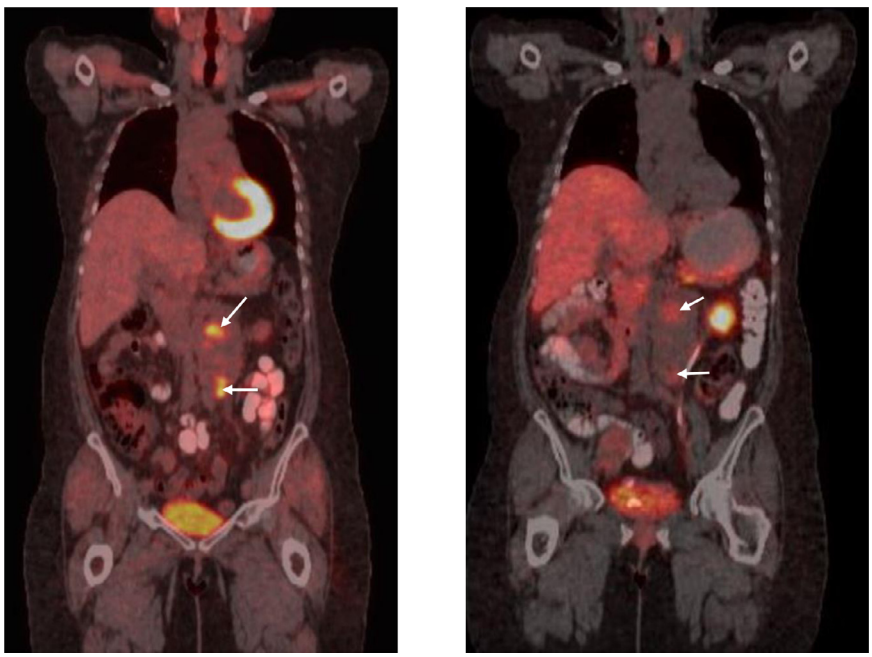

Fig. 6 – (A) Whole body F18-FDG PET/CT showed metabolic activity of the left para-aortic mass. (B) Whole body Ga68 DOTA TOC PET/CT showed less metabolic activity in comparison to the F18-FDG PET/CT scan.

However, it has a relatively low sensitivity for localizing small primary tumors [12]. On the other hand, CT is the most widespread diagnostic tool used for the localization and staging of pancreatic endocrine tumors. With the advantage of being widely available and not being subject to some of the difficulties encountered with US, such as poor visibility and operator-dependency.

Functioning tumors are usually small in size, reflecting their pathology. Larger tumors are more likely to be nonfunctioning and necrotic centrally, with greater likelihood of be-

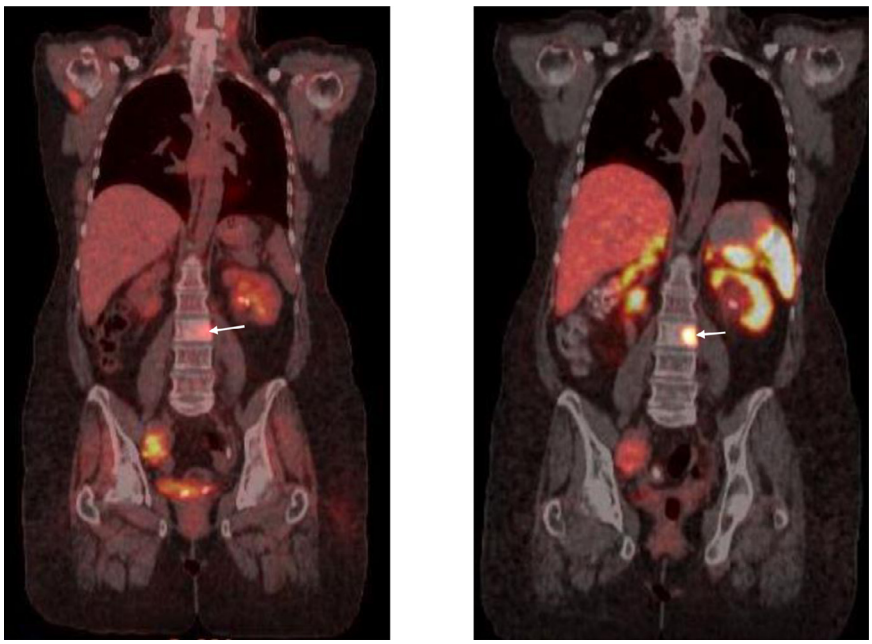

Fig. 7 – (A) Whole body F18-FDG PET/CT showed metabolic activity of the L3. (B) Whole body Ga68 DOTA TOC PET/CT showed more metabolic activity in comparison to the F18-FDG PET/CT scan (note the arrow).

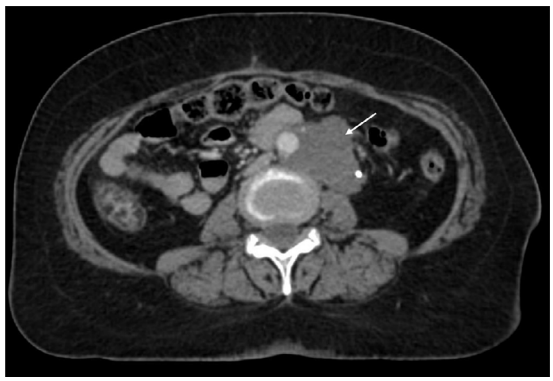

Fig. 8 – The follow-up CT scan showed interval regression in the size of the mass.

ing malignant, which was the case in our patient. Other features which are associated with malignancy include overt infiltration of the surrounding retroperitoneal structures such as blood vessels, and the presence of calcificationsm [11].

Surprisingly, MR imaging reported a lower sensitivity than CT for the detection of both the primary tumor and metastatic disease. However, with the recent marked improvements in MR technology, the diagnostic performance of MR has improved, and in several studies has been shown to equal or exceed that of CT [13]. In addition, MR imaging has a higher sensitivity than angiography or CT for metastatic diseases [14]. In cases of primary tumors, angiography is considered more sensitive.

Response to therapy is assessed by CT or MRI in both primary and metastatic diseases.

The treatment for NETs of the retroperitoneum is based on the location and the extent of the tumor. The primary treatment for retroperitoneal NETs is surgical resection, which offers a chance of curing the disease. In case of unresectable, poorly differentiated NETs, chemotherapy is used instead [11].

Conclusion

Primary retroperitoneal NETs are extremely rare tumors. Nonetheless, the diagnosis should be considered when a retroperitoneal tumor displays consistent clinical, anatomical, and pathologic features. CT scan is the best imaging modality for diagnosing retroperitoneal NETs. Other less sensitive modalities include MRI and Ultrasound. The main treatment of NETs is surgical resection. Chemotherapy is used for unresectable, poorly differentiated tumors.

REFERENCES

[1] Dehal A, Kim S, Ali A, Walbolt T, et al. Primary epithelial neuroendocrine tumors of the retroperitoneum. Perm J 2015;19(4):71–5. doi:10.7812/TPP/15-058.
[2] Hainsworth JD, Johnson DH, Greco FA. Poorly differentiated neuroendocrine carcinoma of unknown primary site. A newly recognized clinicopathologic entity. Ann Intern Med 1988;109(5):364–71. doi:10.7326/0003-4819-109-5-364.
[3] Gould VE. Neuroendocrine tumors. Path Res Pract 1988;183(2):117–18. doi:10.1016/S0344-0338(88)80039-6.
[4] Moertel CG. Karnofsky memorial lecture. An Odyssey in the land of small tumors. J Clin Oncol 1987;5:1502–22.

[5] Ma DW, Kim MK, Yoon SO, Rhee K, Yoon DS, Park H, et al. A case of double primary neuroendocrine tumor from duodenum and pancreas. Korean J Gastroenterol 2013;61:155–9.
[6] Navas-Cuéllar JA, Alamo-Martinez JM, Bernal-Bellido C, Martín-Pérez B, Marín-Gómez LM, Suárez-Artacho G, et al. Neuroendocrine carcinoma of the common bile duct. Rev Esp Enferm Dig 2014;106:558–60. Retroperitoneal neuroendocrine tumor 1141 Int J Clin Exp Med 2019;12(1):1137-1141.
[7] Moch H. Neuroendocrine tumors of the kidneys. Pathologe 2015;36:278–82.
[8] Polikarpova SB, Lubimova NV, Ogereliev AS, Britvin TA, Davidov MI, et al. Clinical and biochemical aspects of the carcinoid syndrome in neuroendocrine tumors of the abdominal and retroperitoneal organs and its impact for the disease prognosis. Bull Exp Biol Med 2009;148:803–6.
[9] Travis WD, Brambilla E, Nicholson AG, Yatabe Y, Austin J, Beasley MB, et al., editors. The 2015 World Health Organization classification of lung tumors: impact of genetic, clinical and radiologic advances since the 2004 classification. On behalf of the WHO Panel. J Thorac Oncol 2015;10(9):1243–60.
[10] Klimstra DS, Modlin IR, Coppola D, Lloyd RV, Suster S, et al. The pathologic classification of neuroendocrine tumors: a review of nomenclature, grading, and staging systems. Pancreas 2010;39(6):707–12. doi:10.1097/MPA.0b013e3181ec124e.
[11] Reznek RH. CT/MRI of neuroendocrine tumours. Cancer Imaging 2006;6(Spec No A):S163–77. doi:10.1102/1470-7330.2006.9037.
[12] Bottger TC, Weber W, Beyer J, Junginger T, et al. Value of tumor localization in patients with insulinoma. World J Surg 1990;14:107–12.
[13] Owen NJ, Sohaib SA, Peppercorn PD, Monson JP, Grossman AB, Besser GM, et al. MRI of pancreatic neuroendocrine tumours. Br J Radiol 2001;74:968–73.
[14] Pisegna JR, Doppman JL, Norton JA, Metz DC, Jensen RT, et al. Prospective comparative study of ability of MR imaging and other imaging modalities to localize tumors in patients with Zollinger–Ellison syndrome. Dig Dis Sci 1993;38:1318–28.