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Case report

Primary neuroendocrine tumor in the retroperitoneal cavity: A rare case report☆

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ABSTRACT

Introduction and importance: Neuroendocrine tumors (NETs) are rare malignancies, accounting for a small percentage of gastrointestinal and bronchopulmonary cancers. Retroperitoneal NETs are infrequent and can be primary or metastatic. They are commonly metastatic rather than primary tumors, with primary retroperitoneal NETs being exceptionally rare.

Case presentation: A 38-year-old woman presented with left flank pain persisting for one year, which had progressively worsened. Imaging revealed a large retroperitoneal mass exerting pressure on the stomach, spleen, liver, and upper pole of the left kidney. A biopsy of the tumor was done and the results were consistent with NET. The tumor, which measured approximately 19 × 12.5 × 11 cm, was surgically removed, and the pathological findings were consistent with the results of the biopsy prior to the surgery.

Clinical discussion: Neuroendocrine tumors are rare and exhibit diverse characteristics based on location, size, hormone secretion, and metastasis. Retroperitoneal neuroendocrine tumors are typically metastatic and rarely primary. The extremely large size of the tumor in this case highlights the surgical challenges associated with retroperitoneal NETs. Imaging, such as CT and MRI, plays a crucial role in diagnosis.

Conclusion: The study emphasizes the need to consider primary NETs as a possible cause of large retroperitoneal masses, especially if the tumor size is significant. Surgical resection is the primary treatment option with generally favorable outcomes. However, the size of the tumor can complicate treatment, and further research is needed to evaluate the effectiveness of postoperative adjuvant therapy and develop therapeutic approaches for recurrent NETs.

1. Introduction

Neuroendocrine tumors (NETs) are a rare type of cancer, comprising only 0.46 % of gastrointestinal and bronchopulmonary malignancies [1]. In 1761, Morgagni first described retroperitoneal NETs, which are tumors found in the retroperitoneal region. These tumors are infrequent and can either be primary or metastatic. They typically manifest as metastatic tumors rather than originating as primary tumors. Primary tumors commonly originate from the gastrointestinal tract and pancreas, while primary retroperitoneal NETs account for only 0.16 % to 0.20 % of all tumors in the human population, making them an exceptionally uncommon type of tumor [2,3]. Retroperitoneal NETs tend to occur more frequently in individuals aged between their fourth and sixth decades, with a median patient age of 54 years (range, 14–71 years). Females have a slight predominance [4]. Retroperitoneal masses are generally asymptomatic, and the specific symptoms experienced may vary based on their size, extent, and degree of infiltration into surrounding structures. Cross-sectional imaging, such as computed tomography (CT) or magnetic resonance imaging (MRI), is the primary non-invasive method used to identify retroperitoneal masses [5]. The main approach for treating retroperitoneal NETs is surgical removal, as it offers the best chance of curing the disease. However, in cases where surgical removal is not possible, chemotherapy serves as an alternative treatment [6]. In this report, we present an exceedingly rare case of a patient who presented with left flank pain and was diagnosed with an exceptionally large neuroendocrine tumor.

☆ This work is in line with the SCARE 2020 criteria.

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2. Case presentation

A 38-year-old woman presented to our tertiary center with persistent left-sided flank pain for one year, which has progressively worsened over the past 1.5 months. There was no vomiting, constipation, or decreased appetite. She has no previous medical conditions or surgical history, the patient's obstetric history indicates a parity of three, with no history of hormonal therapies. The patient reported no cigarette smoking or alcohol use, but did have a family history of cancer in which, her sister had cervical cancer and her father had lung cancer. The physical examination revealed no notable findings, and the laboratory findings indicated low hemoglobin levels (8.4 g/dl), while all other laboratory tests yielded normal results. No tumor markers were assessed.

Upon admission, the patient underwent chest and abdominal Computed Tomography (CT) scanning. The abdominal CT scan revealed a retroperitoneal mass, both cystic and solid in nature, measuring 11x14x11 cm, was identified in the left hypochondrium, exerting pressure on the stomach, spleen, liver, and upper pole of the left kidney (Fig. 1). The left adrenal gland could not be definitively visualized, and there were no clear demarcations with the tail of the pancreas. The mass did not appear to originate from the kidney, adrenal gland, or pancreas. Furthermore, extensive venous dilatations were observed surrounding the mass. The renal vein appeared unobstructed, and there was no evidence of left hydronephrosis. A homogeneous liver appeared without any discernible focal lesions. No dilation was observed in either the intrahepatic or extrahepatic bile ducts. No primary tumors were detected elsewhere, and no metastasis was observed. Based on the imaging findings, the diagnosis is consistent with a retroperitoneal tumor exhibiting cystic changes. A biopsy of the tumor outside our center was taken and the histopathological examination revealed a neuroendocrine tumor with moderate degree of nuclear atypia and a low mitotic rate.

A surgical procedure was performed three days after the patient's admission to remove the tumor. A Chevron incision was made, extending to the abdomen, revealing the presence of dilated veins surrounding the tumor (Fig. 2). The tumor was found to have invaded the spleen and the tail of the pancreas. The left colon was isolated, and a comprehensive resection of the tumor, along with the spleen and the tail of the pancreas, was carried out. The kidney was preserved during the procedure. Subsequently, the mesentery, omentum, retroperitoneum, and diaphragm were carefully examined through palpation, and no tumor-like masses were detected. Throughout the surgery, a total of four units of blood, three units of plasma, and three units of platelets were administered to the patient.

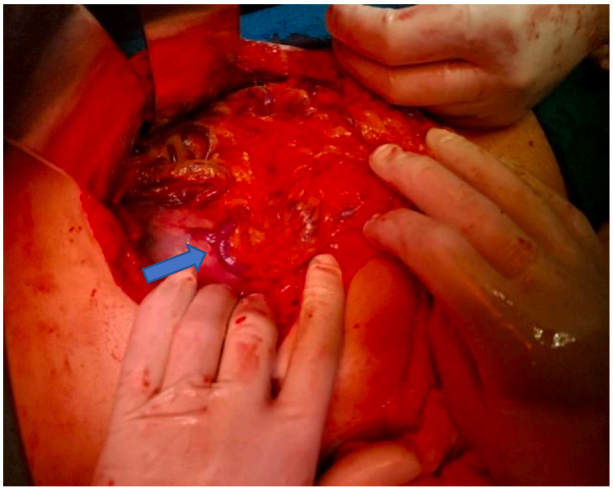

Fig. 2. Venous dilations around the mass during surgery.

The excised mass had dimensions of approximately 19 × 12.5 × 11 cm, displaying a combination of cystic and solid components resembling “fish flesh” upon visual inspection (Fig. 3). The histopathological examination of the mass revealed pathological findings consistent with the results of the biopsy prior to the surgery (Fig. 4). Unfortunately, due to limited hospital resources and financial constraints, we were unable to conduct immunohistochemical testing to further assess the tumor grade. Subsequent to the surgery, the patient experienced an uneventful

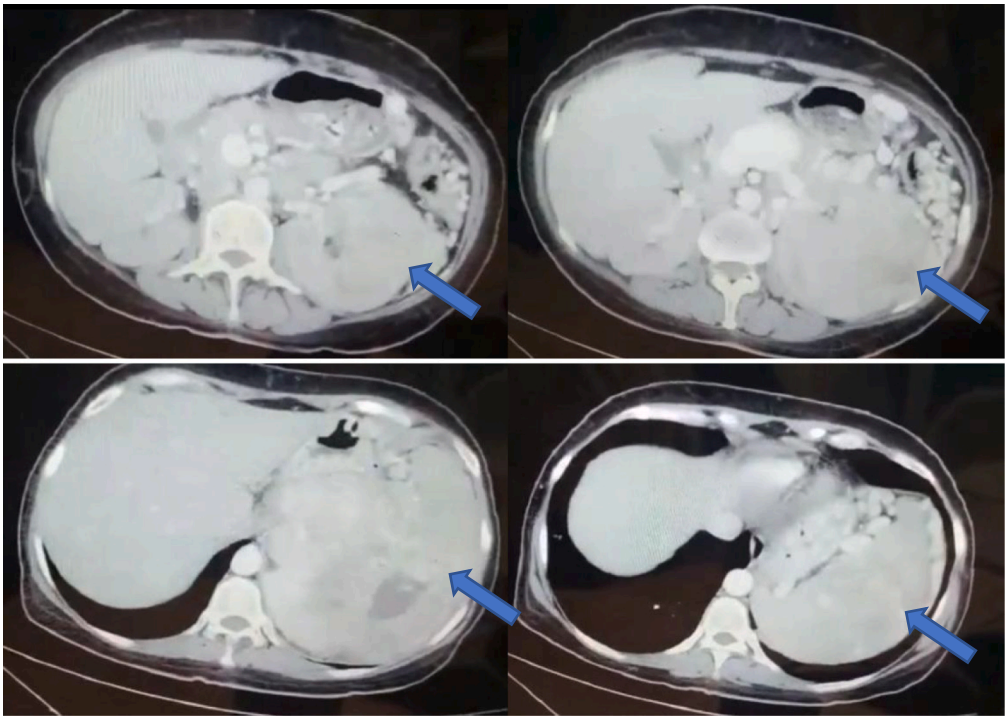

Fig. 1. Presurgical CT scan showing a mass with solid and cystic appearance involving the left hypochondrium and pushing the stomach, spleen, liver, and upper pole of the left kidney.

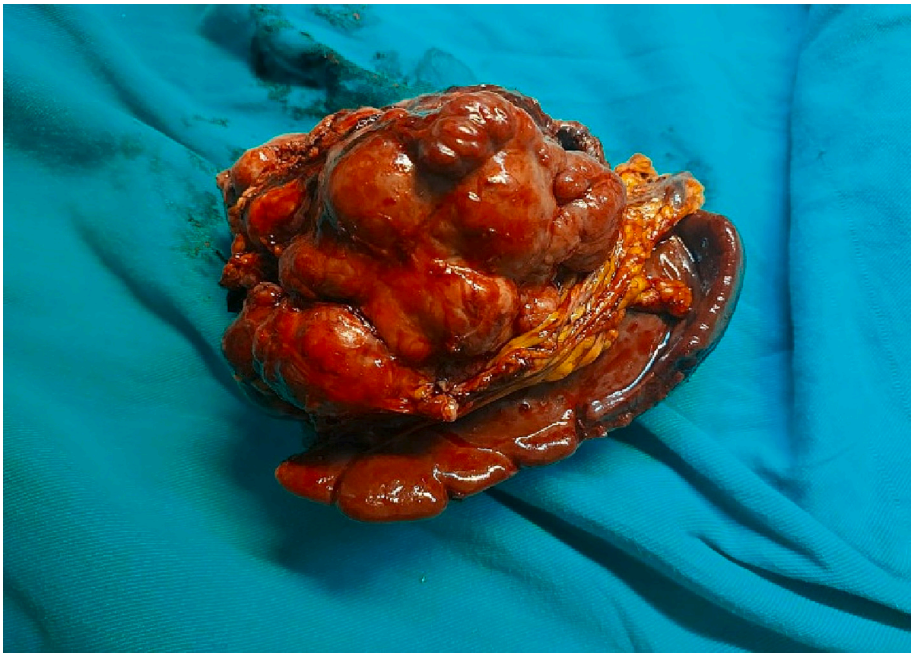

Fig. 3. The resected large cystic and solid retroperitoneal tumor with "fish flesh" appearance.

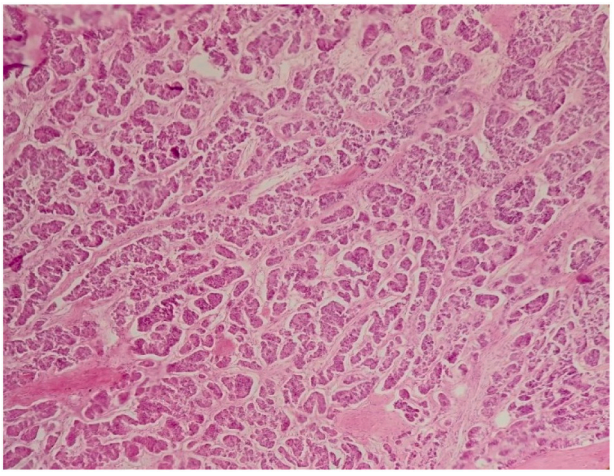

Fig. 4. The histopathological biopsy specimen showing the nested trabecular pattern of the tumor cells.

recovery and was discharged after one week in a satisfactory condition. A follow-up visit at the clinic two weeks post-surgery showed the patient to be in good health, were the patient refused referral to gastroenterologist and pulmonologist for further endoscopy work-up. Octreotide scan was not included in our study due to limited hospital resources, financial constraints, and war consequences in our country. Additionally, we were unable to maintain regular contact thereafter with the patient.

3. Discussion

Neuroendocrine tumors (NETs) are a considerably rare form of cancer, accounting for only 0.46 % of malignancies affecting the gastrointestinal and bronchopulmonary systems. These tumors predominantly exhibit metastatic characteristics, as opposed to arising as primary tumors [1–3]. NETs are non-inherited neoplasms that arise from neuroendocrine cells capable of producing neuropeptide hormones. The characteristics of NETs are closely tied to factors such as the tumor's location, size, excessive hormone secretion, and spread to other parts of the body [7]. Retroperitoneal tumors are rare tumors with neuroendocrine features generally indicating metastatic tumors originating from either a known or unknown primary source [8]. In the present case, the dimensions of the tumor were significantly large, measuring approximately 19 × 12.5 × 11 cm. This size is notably greater than the median size reported in the literature for retroperitoneal neuroendocrine tumors (NETs), which typically present as substantial masses with a median size of 8 cm [4]. This further demonstrates the potential for these tumors to grow to a very large size.

The risk factors for neuroendocrine tumors (NETs) are not well established, as these tumors are rare and their causes are not yet fully understood. A previous study has shown that the most significant risk factor for neuroendocrine tumors (NETs) development at all investigated sites is a family history of cancer, followed by body mass index (BMI) and diabetes. Cigarette smoking and alcohol consumption are potential risk factors for certain anatomical sites [9].

The primary tumors typically consist of neural neuroendocrine tumors (NETs), such as paragangliomas, ectopic pancreatic tissue, or adrenal tissues [2]. In this particular case, the tumor was completely isolated from the spleen and the tail of the pancreas, and the histological examination of the tumor showed the absence of lymph nodes, paraganglia, pancreatic, or adrenal tissues. During surgery, examination revealed no palpable tumor-like masses in the mesentery, omentum, retroperitoneum, or diaphragm. Furthermore, the CT scan did not show any signs of metastatic disease. Based on these findings, it is highly probable that the NET originated as a primary lesion in the retroperitoneal cavity. However, the possibility of the tumor being a metastatic disease of a missed small primary tumor elsewhere cannot be entirely ruled out since neither the biochemical nor the radiologic investigations commonly used to evaluate metastatic NETs are reliable in excluding such a possibility as stated by previous study [8]. Especially, in our case where an octreotide scan was not performed due to financial constraints and limited resources and endoscopic evaluation was not done as well to further role out metastatic disease.

These tumors often develop without noticeable symptoms and are frequently discovered incidentally during abdominal imaging procedures, such as ultrasonography (US) or computed tomography (CT) scans [10]. In this case, the patient presented with left-sided flank pain.

Computed tomography (CT) and magnetic resonance imaging (MRI) are crucial diagnostic tools for detecting primary tumors and/or metastases in cases of NETs, with an estimated median detection rate and sensitivity of around 80 % [11]. In our case, the CT scan revealed a retroperitoneal mass, both cystic and solid in nature, located in the left hypochondrium, exerting pressure on the stomach, spleen, liver, and upper pole of the left kidney.

Currently, there is no widely accepted and standardized staging system for neuroendocrine tumors (NETs). Despite the absence of a unified system encompassing all sites of NETs, there are common characteristics that form the basis for most existing systems. These characteristics include tumor size, mitotic count, presence of vascular and perineural invasion, nuclear polymorphisms, and the Ki-67 labeling index [12]. According to the latest classification by the World Health Organization, neuroendocrine tumors (NETs) are classified into three groups: well-differentiated endocrine carcinomas, poorly differentiated endocrine carcinomas, and tumor-like lesions [13]. However, tumor in this case could not be accurately classified into a specific group due to the lack of immunohistochemical testing, such as Ki-67 index in our hospital because of limited resources and financial constraints.

The differential diagnosis of a cystic and solid mass located in the retroperitoneal area includes plexiform neurofibroma, lymphangiomyomatosis, and primary retroperitoneal mucinous cystadenocarcinoma [4]. Upon further evaluation and histopathological examination, our case did not align with any of these diagnoses.

Surgical resection is considered the initial therapeutic approach for primary neuroendocrine tumors (NETs) and offers the potential for a curative outcome, even in cases of metastatic disease. According to recent guidelines, it is recommended that surgical resection be considered for neuroendocrine tumors when a debulking threshold of 70 % can be achieved [14]. In this particular case, the patient underwent surgical resection as the primary treatment. Performing the surgery was difficult and challenging because the tumor had invaded surrounding tissue and there were dilated veins around the tumor as shown in Fig. 2 that made the risk of bleeding and other complications higher. The prognosis for retroperitoneal neuroendocrine tumors (NETs) is generally favorable, although the efficacy of postoperative adjuvant therapy and the optimal therapeutic approaches for recurrent NETs are yet to be determined [5], underscoring the importance of more studies evaluating these topics.

This case report has been reported in line with the SCARE criteria [15].

4. Conclusion

In conclusion, this study highlights the importance of considering primary neuroendocrine tumors (NETs) as a possible cause of large retroperitoneal masses, particularly in cases where the tumor size is substantial. CT and MRI are useful diagnostic tools for identifying these tumors. Surgical resection is the primary treatment modality for primary NETs, and the prognosis is generally favorable. However, the size of the tumor can make treatment more challenging. Further studies are needed to determine the efficacy of postoperative adjuvant therapy and to develop therapeutic strategies for recurrent NETs.

Abbreviations

NET	neuroendocrine tumor
MRI	magnetic resonance imaging
CT	computed tomography

CRediT authorship contribution statement

AAN is the first author, contributed to drafting, reviewing and editing, and bibliography.

HH is a co-first author, contributed to drafting, reviewing, editing, and corresponding.

AJ contributed to drafting, reviewing, and editing.

FOA contributed to reviewing, editing, and supervising.

All authors read and approved the final manuscript.

Declaration of competing interest

No conflict of interest.

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None.

Consent for publications

Written informed consent was obtained from the patient's parents for publication of this case report and any accompanying images. A copy of the written consent is available for review by the editor of this journal on request.

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Ethical approval was also taken from the Faculty of Medicine at Damascus University (ID number: 4145), Damascus, Syria on 5 May 2023.

Guarantor

Fadi Obaied Alahmar.

References

[1] J.C. Yao, M. Hassan, A. Phan, C. Dagohoy, C. Leary, J.E. Mares, et al., One hundred years after "carcinoid": epidemiology of and prognostic factors for neuroendocrine tumors in 35,825 cases in the United States, J. Clin. Oncol. 26 (18) (2008) 3063–3072.

[2] A. Dehal, S. Kim, A. Ali, T. Walbolt, Primary epithelial neuroendocrine tumors of the retroperitoneum, Perm. J. 19 (4) (2015) 71–75.

[3] J.D. Hainsworth, D.H. Johnson, F.A. Greco, Poorly differentiated neuroendocrine carcinoma of unknown primary site. A newly recognized clinicopathologic entity, Ann. Intern. Med. 109 (5) (1988) 364–371.

[4] D. Shi, G.Q. Dong, K.R. Shen, Y. Pan, S.M. Wei, Y. Chen, et al., Primary cystic and solid neuroendocrine tumor of the retroperitoneum: a case report, Medicine (Baltimore) 100 (2) (2021), e24054.

[5] P. Rajiah, R. Sinha, C. Cuevas, T.J. Dubinsky, W.H. Bush Jr., O. Kolokythas, Imaging of uncommon retroperitoneal masses, Radiographics 31 (4) (2011) 949–976.

[6] R.H. Reznek, CT/MRI of neuroendocrine tumours, Cancer Imaging 6 (2006) S163–S177 (Spec No A).

[7] F. Elahi, A. Ahmadzadeh, M. Yadollahzadeh, K. Hassanpour, M. Babaei, Neuroendocrine tumor of the gallbladder, Arch. Iran. Med. 16 (2) (2013) 123–125.

[8] A. Dehal, S. Kim, A. Ali, T.J.T.P.J. Walbolt, Primary epithelial neuroendocrine tumors of the retroperitoneum, Perm. J. 19 (4) (2015) 71.

[9] E. Leoncini, G. Carioli, C. La Vecchia, S. Boccia, G. Rindi, Risk factors for neuroendocrine neoplasms: a systematic review and meta-analysis, Ann. Oncol. 27 (1) (2016) 68–81.

[10] T.H. Al Taei, S.A. Al Mail, Al Thinayyan AHJRCR, Primary retroperitoneal neuroendocrine tumor with nonspecific presentation: A case report, Radiol. Case Rep. 15 (9) (2020) 1663–1668.

[11] I.M. Modlin, I. Latich, M. Zikusoka, M. Kidd, G. Eick, A.K.C. Chan, Gastrointestinal carcinoids: the evolution of diagnostic strategies, J. Clin. Gastroenterol. 40 (7) (2006) 572–582.

[12] W.D. Travis, E. Brambilla, A.G. Nicholson, Y. Yatabe, J.H.M. Austin, M.B. Beasley, et al., The 2015 World Health Organization classification of lung tumors: impact of genetic, clinical and radiologic advances since the 2004 classification, J. Thorac. Oncol. 10 (9) (2015) 1243–1260.

[13] D.S. Klimstra, I.R. Modlin, D. Coppola, R.V. Lloyd, S. Suster, The pathologic classification of neuroendocrine tumors: a review of nomenclature, grading, and staging systems, Pancreas 39 (6) (2010) 707–712.
[14] C.G. Tran, S.K. Sherman, C. Chandrasekharan, J.R.J.S.O.C. Howe, Surgical management of neuroendocrine tumor liver metastases, Surg. Oncol. Clin. 30 (1) (2021) 39–55.
[15] R.A. Agha, T. Franchi, C. Sohrabi, G. Mathew, A. Kerwan, S. Group, The SCARE 2020 guideline: updating consensus Surgical CAse REport (SCARE) guidelines, Int. J. Surg. 84 (2020) 226–230.