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Case report

A mediastinal malignant thyroid paraganglioma: A case report and literature review

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ABSTRACT

Introduction and importance: Thyroid cancer is the most common endocrine malignancy, while primary paraganglioma of the thyroid gland (TP) is an unusual tumour and in rare cases, this disease tends to mimic thyroid cancer. They are rare extra-adrenal neuroendocrine tumours originating from the neural crest, and are found almost exclusively in the head and neck area.

Case presentation: We present a case of a 53-year-old man, in whom a mediastinal lesion originating from the left lobe of the thyroid gland was found on routine ultrasound and subsequent computed tomography (CT).

Clinical discussion: Total thyroidectomy and lymph dissection were performed. A review of the literature was made and a discussion was held regarding the diagnosis, the importance of surgical treatment and further behaviour.

Conclusion: Surgical removal of the thyroid gland is the main treatment, followed by radiation therapy. The diagnosis and differential diagnosis with other thyroid tumours is extremely important in terms of subsequent behaviour and prognosis.

1. Introduction

Primary paraganglioma of the thyroid gland is an unusual tumour, which may mimic thyroid cancer. They are rare extra-adrenal neuroendocrine tumours originating from the neural crest and are found almost exclusively in the head and neck. Few cases have been described as primary paraganglioma of the thyroid gland. Probably due to its rarity, unexpected appearance and even more unexpected metastasis, this tumour remains insufficiently recognized.

2. Case report

We present a case of a 53-year-old man without complaints, in whom after routine consultation with an endocrinologist, the neck US revealed a small thyroid nodule. The patient was advised to monitor its size. When the nodule started growing and there were compressive symptoms, the patient was admitted again for neck ultrasound (US) and the subsequent CT revealed a mediastinal lesion originating from the left lobe of the thyroid gland.

The patient was in good general condition. Enlarged cervical lymph nodes were not palpable but the significantly enlarged left lobe of the thyroid gland was descending towards the mediastinum. The rest of the physical examination was within the norm. The results of laboratory tests showed that the serum levels of FT3, FT4, and TSH were within normal limits. The patient did not take any medications. He did not state any family history of disorders.

The US of the neck and thorax revealed normal size and structure of the right lobe of the thyroid gland. The left lobe was with increased size due to a large heterodense node with dimensions 78/50/40 mm and signs of neovascularization. Caudally it reached the aortic arch, with preserved pulsating mobility to it, truncus brachiocephalicus and the left carotid artery. Single lymph nodes were visualized in the left lateral cervical region with dimensions of 7/3 mm with preserved echogenic reflex and one with dimensions of 11/5 mm and non-detectable

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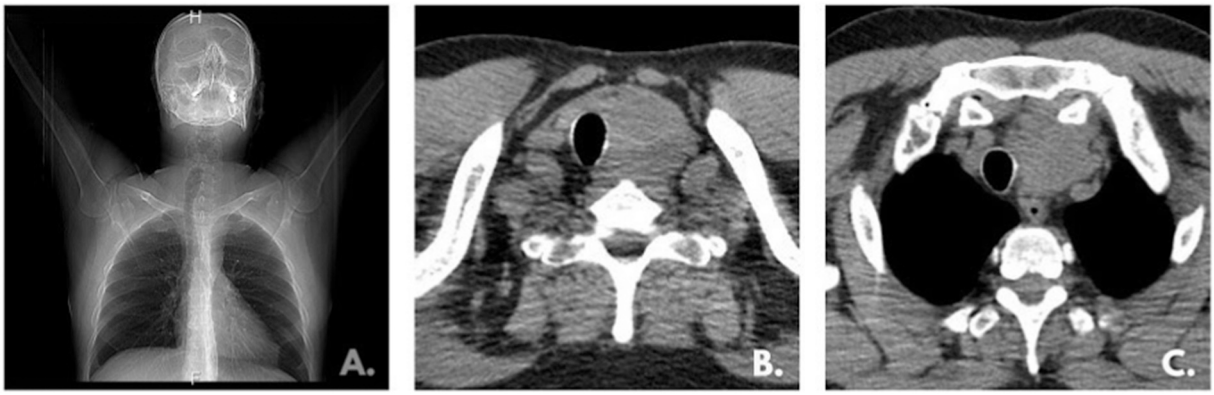

Fig. 1. Computed tomography. It revealed a large tumour formation measuring 80/50 mm, emanating from the left lobe of the thyroid gland (B, C), the lower pole of which is located in the upper mediastinum and pushes the left brachiocephalic vein ventrally. The trachea is displaced contralaterally (A).

structure of the upper pole.

CT (Fig. 1a, b, c) revealed a large lesion measuring 80/50 mm, emanating from the left lobe of the thyroid gland, the lower pole of which was located in the upper mediastinum and pushed the left brachiocephalic vein ventrally. The trachea was displaced contralaterally. The lesion was heterogeneous. After contrast administration, the lesion slightly and heterogeneously increased its density. Single lymph nodes of borderline size were visualized around the lesion and were located mainly pretracheally.

Fibro-optical bronchoscopy was performed due to the above-described compression and deviation of the trachea. The endoscopic finding was normal.

Transcutaneous US-guided biopsy of the lesion using a cutting needle was done and had the following histological response - poorly differentiated carcinoma.

A Kocher cervicotomy was performed and a densely elastic lesion was reached, originating from the left part of the thyroid gland and descending into the mediastinum. An attempt was made to dislocate the lesion in the operative field, but it was not successful due to intimate adherence to the mediastinal vessels. Due to the risk of injury to the latter, an extension of the T-shaped skin incision and a partial proximal sternotomy was performed. With careful dissection, the lesion was released and a total thyroidectomy was performed. A thorough unilateral left lymph node dissection was performed on groups 2A, 3, 4, 5A, B and 6 on the left.

The gross specimen was a multilobular lesion with dimensions 75/55/50 mm with grey-pink colour engaging the entire lobe of the thyroid gland and single fragments of adjacent adipose tissue (Fig. 3).

Histological result of the surgical specimen showed solid structure and extensive areas of necrosis (Fig. 2). It was composed of large and round nests of round cells with abundant eosinophilic cytoplasm and vesicular nuclei with visible nucleoli. In some places, the cytoplasm was bright, optically empty and there was a pronounced nuclear polymorphism. The tumour stroma was rich in lymphocytes. Seven lymph nodes were examined and in five (paratracheal) there were metastases. In the immunohistochemical analysis, the tumour tissue showed positive expression for Vimentin, Synaptophysin, CD56; S-100-negative reaction in tumour cells, positive in peripheral cells and mixed with the tumour cells - probably sustentacular cells and negative expression for PanKeratin, Pax 8, TTF1, CD45, Calcitonin, CD30, CD68, Calretinin and Melan A.

The immunohistochemical constellation was similar to malignant paraganglioma involving the left lobe of the thyroid gland with metastases in 5 paratracheal lymph nodes.

The patient was discharged on the sixth postoperative day in good general condition and was referred to radiotherapy. The colleagues decided not to initiate radiotherapy and to monitor the patient. Six months later, a magnetic resonance imaging (MRI) was performed. There was no evidence for relapse (Fig. 4).

3. Discussion

The most common pathological processes in the mediastinum are thymomas, neoplasms of the thyroid gland, teratomas, thoracic aortic aneurysms and aggressive lymphomas [1]. Thyroid cancer is the most common endocrine malignancy. Over the last 3 decades, the incidence of thyroid cancer has been steadily increasing [2,3]. The most common histological type is papillary carcinoma, followed by follicular and Hurthle cell carcinoma. The other cases are medullary and anaplastic thyroid carcinoma. The clinical picture can vary from asymptomatic cases to such with dyspnea, dysphagia and dysphonia. Anaplastic carcinoma is one of the most aggressive types of thyroid neoplasms, with a 5-year survival rate of less than 10% and a median survival time of six months after diagnosis [4]. Poor prognostic factors include older age at diagnosis, males, leucocytosis, tumour size, extrathyroidal invasion, and distant metastases. While surgery and radiation therapy have shown to improve survival, the prognosis remains poor [5].

Medullary thyroid carcinoma originates from C-cells of the thyroid gland. In 10% of cases at the time of diagnosis, patients have distant metastases. Five and ten-year survival (65–90% and 45–85%) depend on the stage of the disease.

Paragangliomas (PG) are very rare neuroendocrine tumours arising from paraganglia of the neural crest of the autonomic nervous system. Few cases have been described in the literature as primary paraganglioma of the thyroid gland. Due to its rarity and unexpected appearance and even more unexpected metastasis, this tumour remains insufficiently recognized. In addition, paraganglioma of the thyroid gland is rarely suspected by fine-needle aspiration biopsy (FNAB), which is sensitive and specific to thyroid lesions. The development of a standardized set of immunohistochemical markers for staining is necessary

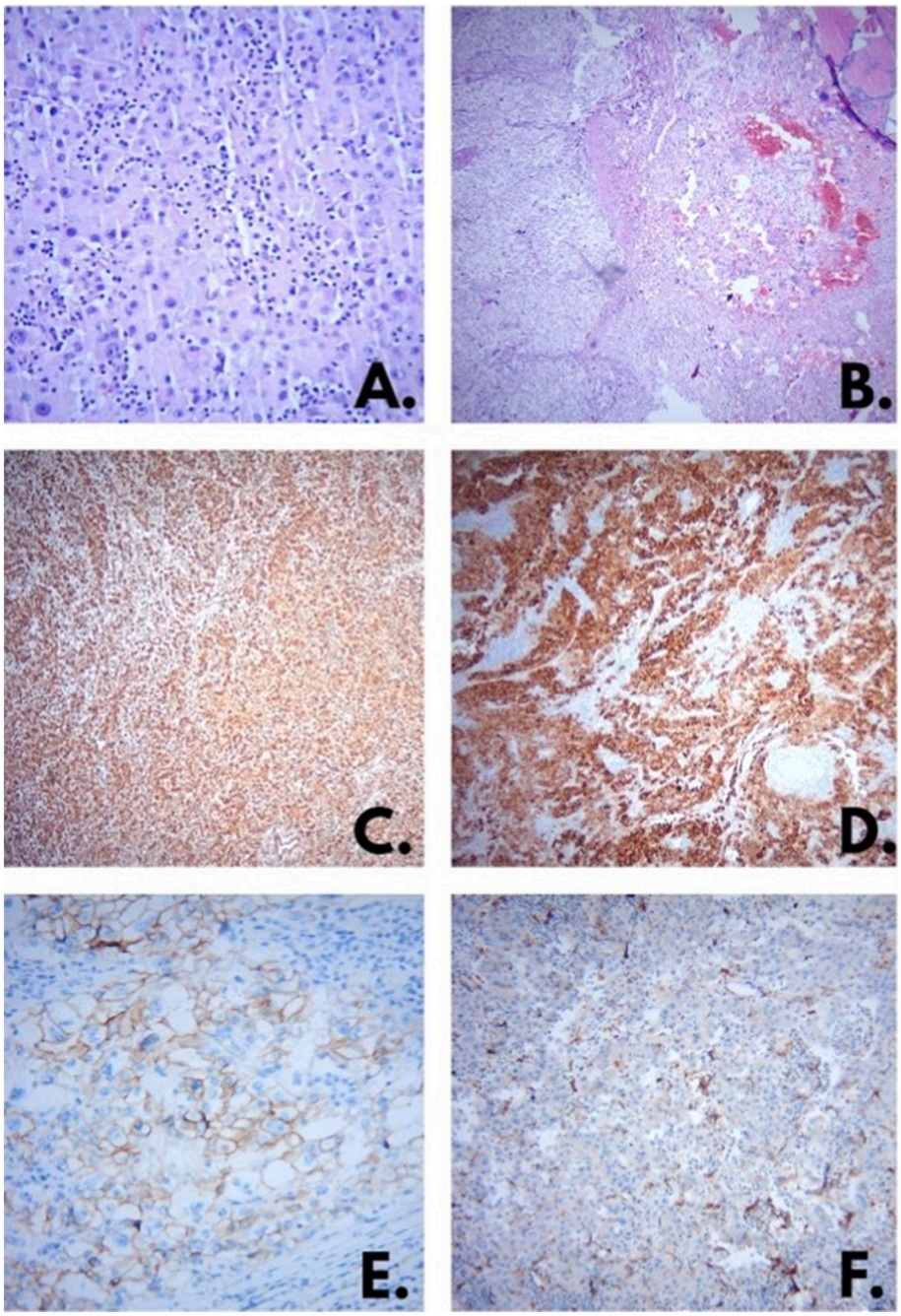

Fig. 2. H&E stainings (A – magnification ×200, B - ×100) and immunohistochemical analysis. The tumour tissue showed positive expression for Vimentin, magnification ×100 (C), Synaptophysin, magnification ×100 (D), CD56, magnification ×200 (E); S-100-negative reaction, magnification ×100 (F) in tumour cells, positive in peripheral cells and mixed with the tumour cells - probably sustentacular cells.

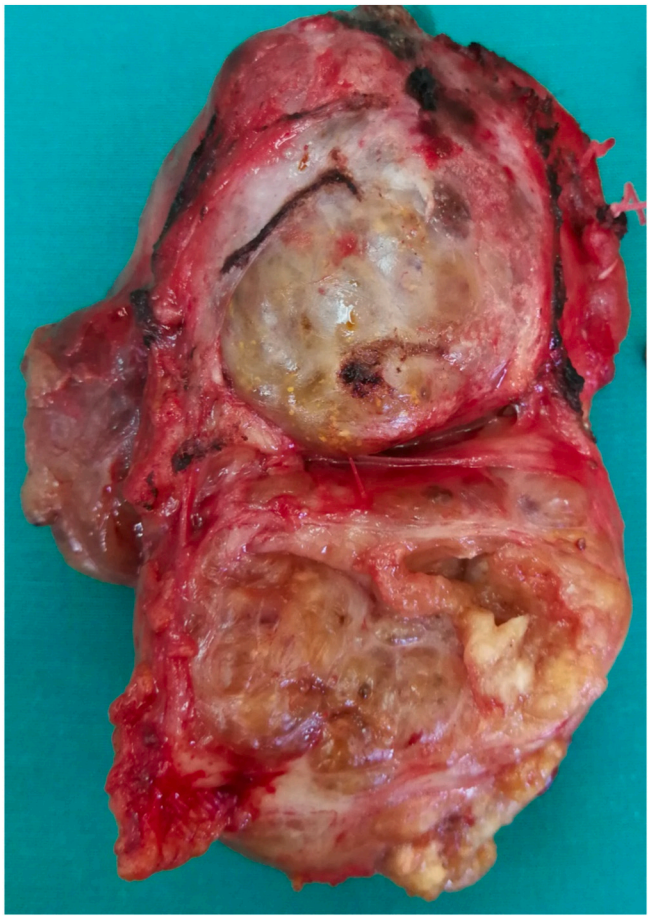

Fig. 3. Gross photograph of the removed specimen: a multilobular lesion with dimensions 75/55/50 mm with grey-pink colour infiltrating the entire lobe of the thyroid gland and single fragments of adjacent adipose tissue.

to completely distinguish PGs from other thyroid neoplasms [6]. Immunohistochemically, the neoplastic cells expressed Chromogranin, Synaptophysin, Neuron-specific enolase and CD56, whereas the sustentacular cells were positive for expression of S100 protein [7]. Surgical resection is the recommended standard treatment [8,9].

Paraganglioma of the thyroid gland can often be misdiagnosed as medullary carcinoma, but histologically there is often amyloid matter in the stroma of medullary carcinoma, which gives a positive staining with Congorot in red. Medullary carcinoma gives positive expression for Calcitonin, CEA, but also for neuroendocrine markers. Paraganglioma may also be positive for Calcitonin and Carcinoembryonic antigen (CEA), but expression for epithelial markers and the absence of S-100 in sustentacular cells facilitates the distinction between medullary carcinoma and paraganglioma. In addition, without preoperative evidence of elevated levels of calcitonin and CEA, medullary carcinoma is almost indistinguishable from paraganglioma. Only 29% of head and neck paragangliomas show catecholamine synthesis, the rest are non-secretory. In our case, a postoperative biochemical assessment of the secretion of catecholamines and metanephrines was performed, as the diagnosis was made after the operation and they were within normal limits. The patient was referred for radiation therapy and genetic analysis (RET, SDH mutations).

The case, described by us, has a mediastinal location and was detected by neck US and subsequent CT.

CT and MRI play an important role in the preoperative and postoperative assessment of thyroid tumours, and the imaging specialist must have a clear idea of the pathological behaviour of thyroid cancer and the characteristic imaging findings of the primary tumour and metastases [10].

A case of asymptomatic mediastinal cystic formation has been described in the literature, which after extirpation has been shown to be metastatic papillary thyroid carcinoma [11]. This once again confirms that such lesions, even at first glance with benign characteristics, must be proven histologically. Metere A et al. reported a rare case of asymptomatic mediastinal ectopic thyroid formation located on the right main bronchus [12]. Malignant degeneration of cervical mediastinal goitre occurs in 7.7% of cases [13]. Carcinoma of the mediastinal or ectopic thyroid gland could develop without goitre. Extended surgical access is required in only 2% -3% of patients with thyroidectomy in whom the goitre reaches intrathoracic vessels, displaces or compresses the aortic arch, results in superior vena cava syndrome, or has a malignant transformation [14]. Our case was similar, requiring a T-shaped extension of the skin incision and a partial proximal sternotomy. The presence of positive lymph nodes has little effect on the overall survival, although it does affect relapses [15].

4. Conclusion

Paraganglioma of the thyroid gland is a rare neuroendocrine tumour that can be mistaken with other types of thyroid tumours. CT, MRI and neck US play a crucial role in the diagnosis of thyroid tumours. Immunohistochemistry is key in differential diagnosis and for accurate histological diagnosis. Surgical treatment is essential, and subsequent radiotherapy is often required. Such patients require long-term follow-up, 24-hour urinary catecholamine levels, whole body CT and genetic analysis.

The manuscript has been reported in line with the SCARE 2020 criteria [16].

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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CRediT authorship contribution statement

Georgi Yankov – surgical intervention, specialist in thoracic surgery
Silvia Ivanova – histopathological examination and immunohistochemical analysis, specialist in histopathology
Marusya Genadieva - histopathological examination and immunohistochemical analysis, specialist in histopathology

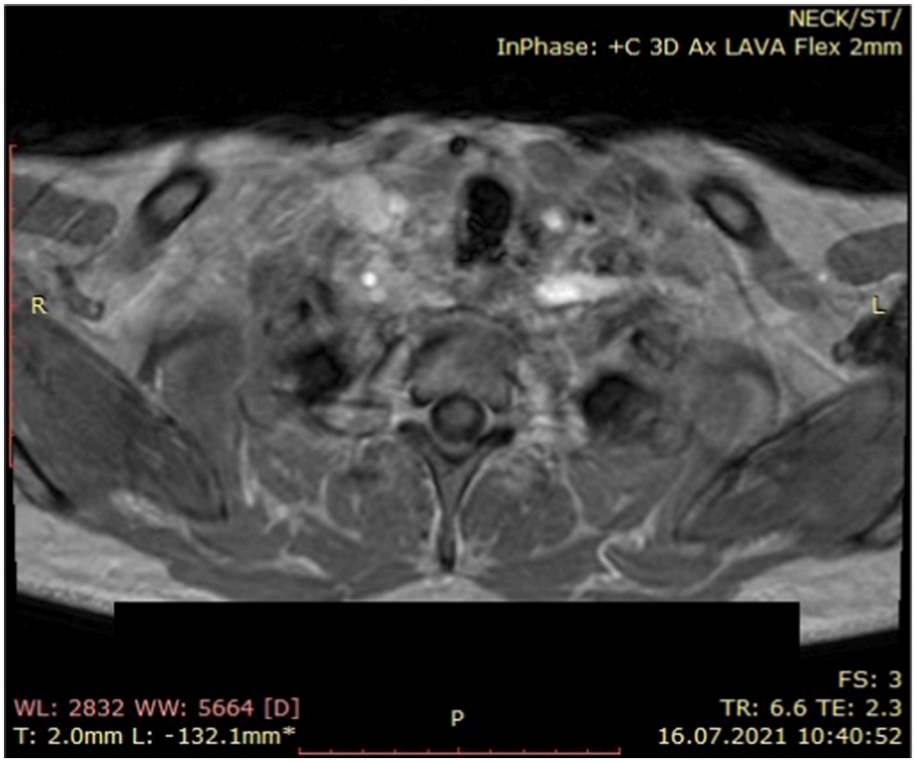

Fig. 4. MRI, six months later. There is no evidence for relapse.

Magdalena Alexieva – surgical intervention, specialist in thoracic surgery
Nikolay Yanev – fibro-optical bronchoscopy, specialist in pulmonary medicine
Desislava Ivanova – data analysis and writing of the article, medical student.

Declaration of competing interest

The authors declare that they have no conflict of interest.

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