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Treatment of Multinodular Goiter with Left-sided Retrosternal Extension and Autoimmune Thyroiditis

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Abstract

Expansion of the thyroid gland (goiter) is a common issue in clinical practice and consists of a single nodule or multinodular (MNG). MNG can vary in symptoms, from no symptoms to life-threatening manifestations. Iodine deficiency, genetic predispositions and environmental factors, and autoimmune diseases have been shown to result in MNG. Herein, we present a unique case of a 64-year-old male who was diagnosed with MNG associated with autoimmune thyroiditis and immediately scheduled for hemithyroidectomy to relieve pressure and compression symptoms on the trachea and esophagus, and to correct hyperthyroidism caused by the thyroid mass. After an uneventful postoperative recovery, the patient was discharged home a few days after his surgery and his follow-up in the outpatient clinic continued for 12 months without any related complaints and the chest X-rays remained normal.

Keywords: Ear, nose and throat; Otolaryngology; Thyroid disease; Endocrinology; Head and neck surgery; Surgery; Thyroiditis

Introduction

Autoimmune thyroiditis diseases (AITD) are the most prevalent organ-specific autoimmune diseases. They affect 2%–5% of the population with great variability between genders [1,2]. The main AITDs are Graves' disease and Hashimoto's thyroiditis, both of which reflect the loss of immunological tolerance and share the presence of cell and humoral immune response against antigens from the thyroid gland with reactive T and B cells infiltration, autobodies generation, and, subsequently, the development of clinical manifestations [3,4]. The etiology of this immune response remains unknown, the current paradigm is that AITDs are complex diseases in which susceptibility genes and environmental triggers act in concert to initiate the autoimmune response to the thyroid.

The diagnosis is often intriguing and may take time until later in the disease process. However, early in the course of the disease, patients may reveal signs, symptoms, and laboratory findings of hyperthyroidism or normal values. As the disease slowly progresses, the thyroid gland becomes very enlarged and developed a condition so-called goiter.

Goiters have different causes, depending on their type (e.g., simple, endemic, or sporadic) [5]. Multinodular goiter (MNG) is among the most frequent thyroid gland disorders, which often arises from the genetic heterogeneity of thyroid follicles and has a nodular thyroid appearance. Although the clinical characteristics of MNG diverge, direct compression of the airway and major vessels leading to obstructive sleep apnea (OSA) entails a definitive surgical procedure [6,7].

Herein, we describe a unique case report of a male patient who was presented to our department with a 6-month history of dyspnea, mild left neck pain, and swelling with retrosternal extension mainly on the left side. Following some clinical investigations, the male patient was diagnosed with MNG associated with left-sided retrosternal extension and autoimmune thyroiditis. The patient was treated with left hemithyroidectomy to relieve pressure and compression symptoms on the trachea and esophagus level, and to correct hyperthyroidism.

Case Presentation

A 64-year-old Syrian male patient, with a positive history of hypertension and chronic kidney disease, was presented to our Otolaryngology Department for further evaluation of mild left neck pain. The patient's recent medical history includes a 6-month history of dysphagia, dyspnea, and mild pain and swelling with retrosternal extension, increasing in size mainly on the left side.

On physical examination, the patient was fully conscious, with a blood pressure of 136/75 mmHg (afebrile), oxygen saturation of 100%, and a heart rate of 105 beats per minute (bpm). His chest was clear, with bilateral air entry with no added sounds. His heart S1 and S2 were normal. His abdomen was soft and lax. His lower limbs had no edema. The patient had a full cervical range of motion and intact muscle power and sensation. The neck revealed a large mass extending bilaterally, mainly on the left side and behind the manubrium. It was not possible to feel the lower border of the gland.

The patient's laboratory results included thyroid-stimulating hormone (TSH) of 0.005 mIU/L; free thyroxine of 17.3 pmol/L; random blood sugar of 6.4 mmol/L; calcium of 12.4 mg/dL; sodium of 137 mEq/L; potassium of 4.1 mmol/L; and urea of 6.8 mmol/L. His complete blood count revealed white blood cells of 10.1 × 109 cells/L; hemoglobin of 19.2 gm/dL; and platelets of 19.2 × 103/mL. In the past, the patient's thyroid function tests were normal, and he was not on any biotin or other medications that could interfere with blood work. Thyroid antibodies test was made, high thyroid peroxidase antibodies (TPO) and thyroglobulin antibodies (TgAb) were detected and diagnosis of autoimmune thyroiditis was made.

Normal values for the abovementioned parameters are as follows:

TSH = 0.5–5.0 mIU/L

FT4 = 12–30 pmol/L

TPO = <9.0 IU/mL

TgAb = <20 IU/mL

His echocardiography and computed tomography (CT) of the neck revealed a normal sinus rhythm; an ejection fraction of 66.9%; and a leaflet aortic valve calcification, as well as some disks with anterior and posterior osteophytes at levels C2–3, C3–C4, and at levels C4–C5 and C5–C6, respectively (Figure 1). The ultrasound examination showed an enlargement of the whole thyroid gland (mainly on the left side) with a right lobe of 5 × 4 cm and a left lobe of 7 × 5 cm suggesting the diagnosis of MNG, features of the nodules were iso-hyperechoic, surrounding hypoechoic halo, spongiform/honeycomb pattern, also peripheral vessels were noted, showing intranodular vascularity (hyperfunctioning nodules). Serial sections showed multiple colloidal nodules of 1–5 cm. Furthermore, the chest X-ray revealed a large superior mediastinal mass; a soft tissue density lesion (mainly on the left side) compressing the trachea toward the right side. Fine needle aspiration biopsy revealed benign result. Tc-99m pertechnetate and radioiodine (I-123) demonstrate an enlarged gland, with heterogeneous (patchy) uptake.

The patient was scheduled for hemithyroidectomy to relieve pressure and compression symptoms on the trachea and esophagus, and to correct hyperthyroidism caused by the thyroid mass. Informed consent was obtained from the patient before his surgery.

Under general anesthesia and nerve monitoring, the patient underwent a left hemithyroidectomy through a transverse collar neck incision of 2 cm above the sternal notch. The surgical procedure was performed through dissection by layers: the raising of the superior and inferior flaps, dissection of the platysma, dissection through the linea alba of the strap muscles, dissection of the left MNG lobe, dissection toward the superior and inferior vessels, ligation of the superior and inferior medial vessels, the recurrent nerve was seen to be intact, dissection of the lower part of the goiter in the mediastinum, and final closure by layers.

Immediately after surgery, the patient was extubated in the operating room. Post-operatively, thyroid function test level was normal so the patient did not need thyroid replacement therapy. The postoperative recovery was uneventful. The patient was discharged home a few days after his procedure without any complications and maintained simple analgesia. Follow-up in the outpatient clinic continued for 12 months without any related complaints and the chest X-rays remained normal (Figure 2).

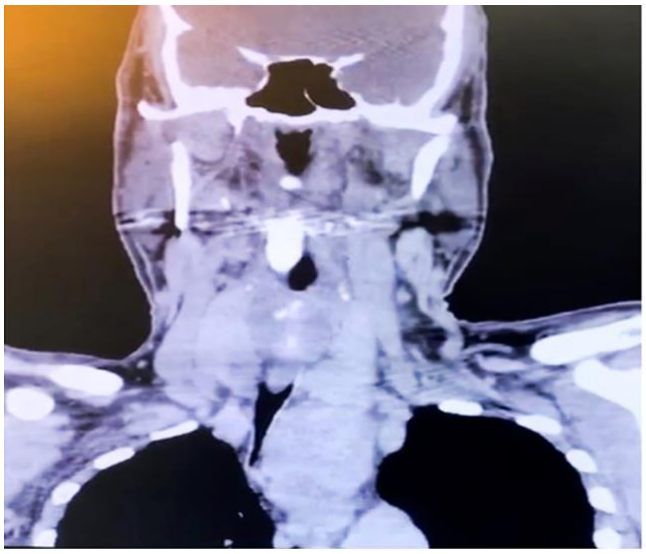

Figure 1: Preoperative computed tomography scan of the neck, showing multinodular goiter with left-sided retrosternal extension.

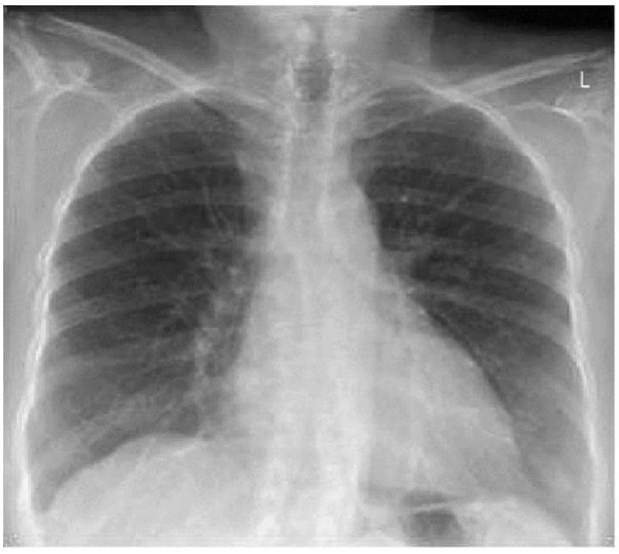

Figure 2: Postoperative chest X-ray showing regression of the superior mediastinum after surgery.

Discussion

The exact concept of retrosternal goiter (RSG) is not certainly established [8]. To define RSG, several aspects have been recommended including goiter that falls below the thoracic inlet plane, with more than 50% of the mass lying below the chest inlet plane, with major intrathoracic extension that involves the mediastinum for dissection, growing into the anterior-superior mediastinum to a depth of >2 cm, and reaching the level of the fourth thoracic vertebra as a goiter [9,10]. Most patients suffer from breathlessness (68.8%). Our patient had a respiratory failure caused by its consequent existence with OSA. Other symptoms include neck mass (75%), speech heaviness (37.5%), stridor/wheezing (19%), dysphagia (31.3%), blockage of the vena cava (≥12%), upper thyroid gland airway obstruction (31%), and intubation difficulties in 11% [7,11]. Besides, central obstruction of the airways triggers dyspnea, stridor, or obstructive pneumonia [11] and is very often misdiagnosed.

Radioiodine therapy is generally ineffective in large goiters and may cause acute inflammation and swelling of the gland leading to airway obstruction. In most cases, thyroxine suppression therapy fails to shrink most MNGs and only 10%–20% of nodules respond to this treatment. Surgery remains the gold standard treatment for RSG and approximately 2% of RSG thyroidectomized patients require surgery other than regular neckline incision (i.e., manubriotomy, sternotomy, or thoracotomy) [12].
In less than 10% of RSG cases, thyrotoxic characteristics are reported. The occurrence of goiters' carcinoma is 1.3–3.7 new cases per 1000 patients, as reported by prospective studies. However, a recent study of evidence-based substernal goiter management found RSGs to be equal to all neck inhabitants for the incidence of malignant transformation [12].

Most nodular goiters are benign and have a retrosternal component in the neck. A careful clinical and ultrasonographic examination can be performed for cervical goiters and only around 2% of people will require surgical access other than traditional cervical care combined with sternotomy, manubriotomy, or thoracotomy. Fine needle aspiration biopsies are performed in some suspected areas, with malignant nodule determination contributing to patients' selection for surgery [13]. Surgeons performing thyroid surgery should administer full thyroid medications for retrosternal goiters with related medical comorbidities, to avoid complications and the cervical approach is effective in most cases.

Most cases of RSG are benign and may arise due to iodine deficiency, goitrogen ingestion, and familial types of goiter retained in the neck [14]. Although 40% of RSG may be asymptomatic, many patients complain of pressure symptoms caused by compression of the surrounding tissues, such as the airway (which is most alarming), esophagus, and neurovascular or thyrotoxic structures [15,16]. A positive Pemberton sign suggesting superior vena cava obstruction may also be noticed. Sternotomy may be required for complete and safe excision of the mediastinal mass to achieve decompression of the surrounding structures and to prevent hemorrhagic complications if a cervical incision is performed. In our unique case report, the 64-year-old male patient who diagnosed with MNG with RSG extension mainly on the left side and an autoimmune thyroiditis, was treated with left hemithyroidectomy to relieve pressure and compression symptoms on the trachea and esophagus level and to correct hyperthyroidism. The patient was discharged a couple of days after his surgery without any postoperative complications and his follow-up in the outpatient clinic continued for 12 months without any related complaints and the chest X-rays remained normal.

In summary, a retrosternal extension of a goiter, one of the most common types of masses in the superior mediastinum, is rarely associated with autoimmune thyroiditis and classically present with compressive symptoms, such as dyspnea, dysphonia, dysphagia, and sleep apnea. Surgical treatment with a hemithyroidectomy is preferable in the case of benign thyroid disease.

Conclusion

The main AITDs are Graves' disease and Hashimoto's thyroiditis, both of which reflect the loss of immunological tolerance and in which thyroid cells are destroyed via cell and antibody-mediated immune processes.

Most nodular goiters have a benign retrosternal component in the neck and required complete and safe surgical excision of the mediastinal mass to achieve decompression of the surrounding structures and to prevent hemorrhagic complications if a cervical incision is performed. Surgical treatment with a hemithyroidectomy is preferable in the case of benign thyroid disease. The combination of retrosternal extension with autoimmune thyroiditis makes this case unique.

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