A case of giant substernal goiter

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Abstract

Substernal goiter or retrosternal goiter is defined as a goiter with more than 50% of its mass lying below the thoracic inlet. Substernal goiter is usually manifested with compression symptoms on surrounding tissues (e.g. trachea, esophagus, vascular tissues). A 64-year-old male patient admitted to our clinic with a complaint of respiratory distress. He was diagnosed with a substernal goiter in an external center. He was referred to our clinic with the purpose of advanced examination and treatment. Mediastinum extension and trachea compression were determined with radiological examinations. Sternotomy and bilateral total thyroidectomy were performed.

Keywords: goiter, sternotomy, surgery

Introduction

The cases with substernal goiter were first described in 1749. The term substernal or retrosternal goiter is defined in many ways by many authors. Katlic et al. described the substernal goiter as an extension of more than half of the thyroid mass into the mediastinum, while Allo and Tompson described as the entrance of thyroid mass into the upper thorax [1,2]. In addition, the goiters extending to the level of the 4th thoracic vertebra or the goiters extending to the level of the aortic arch are considered as substernal [3]. The incidence of substernal goiter in the literature varies between 0.2% and 45% of all goiters [4]. In this paper, we present a case of giant substernal goiter with an extension to the anterior mediastinum.

Case

A 64-year-old male patient, who had been suffering from dyspnea for three months, stated that he was diagnosed with an enlargement in the thyroid gland extending into the thorax. The patient's medical history had no features except diabetes mellitus. Physical examination revealed that the laryngeal structures were normal and the thyroid gland was palpable. Ultrasonography (USG) showed that the end of both thyroid lobes extended towards the inferior of the clavicle. The right thyroid lobe was 60x39x31 mm, the left thyroid lobe was 75x43x35 mm, and isthmus thickness was 7.5 mm. The echogenicity of lobes was widely irregular.
The largest nodule was 33x22x13 mm in the left lobe. There was another large nodule in the superior middle cervical region (27x19x12 mm). Posteroanterior chest (PA view) X-ray revealed homogeneous opacity in the superior mediastinal region (Figure 1). Computerized neck tomography (CT) showed the enlargement of the thyroid gland which caused the expansion of the superior mediastinum and narrowed the trachea (Figure 2).

The laboratory findings of the patient revealed hyperthyroidism and he was consulted to endocrinology clinic. The patient was started propylthiouracil and methimazole treatment until he became euthyroid. The patient was treated with methimazole for 15 months. The patient underwent partial sternotomy and bilateral total thyroidectomy with nerve monitoring (Figure 3a-b). There were no complications after the operation (Postoperative vocal cord movements were normal and parathyroid functions were within normal limits). Postoperative chest X-ray was normal. The patient was started oral thyroid hormone and discharged on the 4th postoperative day.

**Discussion**

Substernal goiters are divided into two categories as primary and secondary according to their development. Primary substernal goiter is referred to originate from an ectopic thyroid tissue located in the mediastinum. Secondary substernal goiter extends from neck [5]. The primary substernal goiter uses the mediastinal vessels for blood supply. Secondary substernal goiter provides blood supply from the vascular structures of the neck. Netterville et al. and Hague and Swinton reported that the cause of substernal extension was due to a limitation of thyroid and cricoid cartilage on the top of the goiter, prevertebral fascia at the back, cervical fascia and strap muscles on the front. They suggested the weakest point was the entrance of thorax. Additionally, they also explained this with the negative pressure.
during respiration, the tendency to pull down during swallowing, and gravity [6,7]. Our case was consistent with the definition of secondary substernal goiter.

In cases with substernal goiter, the symptoms usually occur with pressure on the vital organs within the thorax. Substernal goiter may cause stridor, respiratory distress, or cough due to the compression of the trachea. In some cases, it may cause difficulty in swallowing due to the compression of the esophagus [8]. However, 15-30% of the cases are asymptomatic. Hoarseness may be associated with recurrent laryngeal nerve compression. The compression of vena cava superior, pulmonary artery, or carotid artery may result in vena cava superior syndrome, pulmonary hypertension or ischemic attacks, respectively [6]. In our case, the patient was admitted to the hospital with difficulty in breathing due to pressure on the trachea.

In most cases of retrosternal goiter, thyroidectomy can be performed successfully with a cervical incision [9]. In fact, a cervical approach was reported to be sufficient in the majority of cases. However, in some cases, complete or partial midline sternotomy may require in addition to a cervical incision. Previously performed thyroid surgery, uncontrollable hemorrhage, primary mediastinal goiter providing blood from mediastinum, recurrent intrathoracic goiter, intense adhesion, posterior mediastinal localization, malignancy, and emergency airway obstruction may require sternotomy [10]. In addition, additional surgical methods can be applied when the lower pole cannot be palpable or reached [11]. In our case, it was thought that the lower pole extended into the mediastinum and could not be palpable. It was also thought that additional surgical method might be required. Therefore, the operation was performed together with a thoracic surgeon and the thyroid mass was removed by partial median sternotomy.

As a result, in patients with substernal goiter, the preoperative evaluation may lead to successful surgeries. The cervical approach is sufficient for most patients. In some cases, a multidisciplinary approach can be performed and intrathoracic tissue can be resected with low morbidity and mortality.

**Conflict of interest**

All authors declare that they have no conflict of interest.

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**References**