Giant intrathoracic goitre: The challenges

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ABSTRACT

Intrathoracic goitre is defined as goitre in which at least 50% of the thyroid mass lies below the thoracic inlet. Here we report the case of a 43-year-old female, with history of left thyroid lobectomy 15 years earlier, who presented with dyspnoea. CT scan showed huge bilateral intrathoracic masses. Through median sternotomy, the masses were successfully excised, though with difficulty due to their hypervascular nature, along with completion thyroidectomy. Histopathology of the specimens showed multinodular goitre with no evidence of malignancy. The patient recovered well and one year after discharge, delivered a healthy baby.

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1. Introduction

There are more than 10 definitions for intrathoracic goitre [1]. The one most commonly quoted is that provided by Katlic et al., who defined it as goitre in which most of the thyroid mass, arbitrarily at least 50%, lies below the thoracic inlet [2].

These goitres may be primary, arising from embryonic remnants and have no connection with the cervical thyroid, or secondary, when they represent a downward growth of the thyroid gland. By far the vast majority are of the secondary variety [3], which derive its blood supply from the thyroid arteries in the neck [4]. In contrast, the primary type has separate blood supply from the intrathoracic vessels. Consequently, secondary intrathoracic goitre of average size could be removed through a cervical incision, whereas the primary variety as well as the secondary variety with enormous dimensions necessitate a thoracic approach for their removal.

2. Case summary

A 43 year old female, with history of left thyroid lobectomy 15 years earlier, presented with right neck swelling associated with shortness of breath, with no suggestive symptoms of hypo- or hyperthyroidism.

On examination, she looked overweight and her blood pressure was 100/70 mm Hg, pulse 92/min, temperature 36.6 °C, respiratory rate 24/min and oxygen saturation 95%. Neck examination showed an old collar incision and a swelling on the right side of the neck with no palpable lymph nodes.

Laboratory works showed normal haemogram, urea, creatinine and electrolytes as well as the thyroid and liver functions.

Radiologic investigations including chest X ray, ultrasound (US) and computerized axial tomography (CT) scans showed right sided cervical goitre and huge bilateral intrathoracic masses, measuring 12.5 × 19.5 cm on the right side and 9.5 × 10 cm on the left side in the greatest dimensions, which appeared connected to the cervical goitre through a narrow isthmus (Figs 1, 2, 3, 4).

Fine needle aspiration (FNA) of the cervical goitre showed follicular lesion with colloid and cystic changes.

The patient was counselled regarding the necessity for surgery and its potential risks, but she remained reluctant for several months before she finally accepted. Expectedly, the surgery was difficult and massive bleeding was encountered at different stages of the
procedure, necessitating much effort for control and several units of packed red cell transfusion.

2.1. Operative details

A median sternotomy was performed with the patient in the supine position. Grossly, the masses had the appearance of vascular thyroid tissue. The left mass was dissected first to free it from the surrounding structures and it was enucleated in toto. On the right side, several large collateral veins were found and had to be divided between ligatures. Dissection caused bleeding from minor tributaries of the superior vena, which had to be controlled and the situation was complicated more by injuring the innominate vein which had to be ligated. Finally, after tedious dissection, the mass was excised and haemostasis was achieved, followed by bilateral chest drain insertion and closure of the sternotomy wound. Completion thyroidectomy then followed through a cervical collar incision to remove the right thyroid remnant after identification and preservation of the recurrent laryngeal nerve. The patient was then shifted intubated and ventilated to the intensive care unit. Her postoperative investigations showed mild drop of serum calcium (2.9 mmol/L, reference range 2.12–2.60 mmol/L) and supplemental calcium was given.

Fig. 1. Chest X ray showing huge bilateral intrathoracic masses.

Fig. 2. Right thyroid remnant (yellow arrow) shifting the trachea to the left (white arrow), with huge bilateral intrathoracic masses.

Fig. 3. Extension of the cervical goitre into the right side of the thorax (yellow arrow).
In time, the patient was extubated and chest drains were removed when she was shifted to the regular ward and, finally, discharged on thyroxine tablets 100 μgm PO OD.

Histopathology of the thoracic masses and cervical goitre reported multinodular goitre with no evidence of malignancy (Figs 5, 6, 7 and 8).

In her follow-up visits, she remained well and, 12 months after discharge, delivered a healthy baby through caesarean section. Three years later, her chest X ray appeared normal apart from right pleural thickening (Fig. 9).

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### 3. Discussion

Extension of the thyroid below the thoracic inlet has been termed retrosternal, substernal, mediastinal or intrathoracic goitre by different authors [5] and these terms are considered synonymous by some [4]. It has an incidence of 6.3%–11% [5,6] with a malignant potential of 8% [7].

The inconsistent terminology is exemplified by the presence of several definitions for intrathoracic goitre, most of them are clinically irrelevant. Only the definition provided by Katlic can predict the need for sternotomy [2]. In this context, including goitre which extends for few centimetres into the thoracic aperture, commonly named retrosternal goitre, together with those which have their main mass lying in the thorax, under one category termed “intrathoracic goitre” is quite misleading and should be abandoned. The clinical implications of this differentiation are obvious as retrosternal goitres could usually be removed through a cervical incision, and exceptionally sternotomy necessary [5,8,9]. In contrast, a thoracic approach is required for the “mainly” intrathoracic goitres [4] which may take the form of median sternotomy, as performed here, posterolateral thoracotomy [10] or a clam shell thoracotomy [11], depending on its location.

Giant intrathoracic goitres are commonly hypervascular and benign [10,12], as seen in our patient. Obviously, the size they attain without showing evidence of distant metastasis or local invasion mitigates against malignancy. Considering their hypervascularity and proximity to the great vessels, anticipation of major bleeding is prudent and precautions should be taken. Additionally, due to compression and distortion of the trachea and diminution of the lung
fields, difficult intubation and ventilation should also be expected. These two points, the difficulty in intubation/ventilation and the haemorrhagic nature of surgery, provide real challenges to the anaesthetist and the surgeon alike.

Regardless of the huge size, the patient is usually euthyroid, as we did not encounter a case hyperthyroidism associated with these giant goitres [4,10–12].

As observed here, secondary intrathoracic goitre has been reported following incomplete thyroidectomy. Similarly, a retrosternal extension which is inadvertently left behind due to its separation from the main cervical portion during dissection may lead to this unfortunate event. In this regard, the period needed for the intrathoracic goitre to grow and manifest itself is variable. It may be as short as two years [4] to more than 30 years [12]. To avoid late presentation with this condition, every effort should be exerted to detect and remove any retrosternal extension during the primary surgery. In our case, it took 14 years for the masses to declare itself.

It is not clear why these goitres reach such enormous dimensions. However, the trail of events could be perceived as follows. As described by Lahey and Swinton, due to the anatomical confinement of the thyroid, the path of least resistance the enlarging thyroid can take is downwards through the thoracic aperture [13,14], to lodge in the anterior mediastinum or rarely, the posterior mediastinum [4,10,12,15–17]. This descent is aided by the negative intrathoracic pressure, the action of swallowing and, more importantly, the effect of gravity. Progressive enlargement over the years is aided by the negative intrathoracic pressure and the resilient nature of the lungs and other thoracic contents, which allow the goitre to reach large dimensions, before causing pressure symptoms.

Known complications of intrathoracic goitre include tracheal compression leading to respiratory difficulty [15,16,18,19], oesophageal compression leading to dysphagia [15], voice changes due to compression of the recurrent laryngeal nerve [17] and rarely superior...
vena cava syndrome [18], which may end lethally [20]. In our patient, the goitre declared itself by causing respiratory difficulty.

Although some authors argued against surgery for asymptomatic patients with retrosternal goitres [8], this case as well as others in the literature provides strong evidence against this.

4. Conclusion

Huge intrathoracic goitre represents a real challenge to both the surgeon and the anaesthetist. Difficulty in intubation and ventilation should be anticipated and ICU service should be available. Due to its hypervascular nature and proximity to great thoracic vessels, massive bleeding should be anticipated and precautionary measures taken. Median sternotomy may be the appropriate access in bilateral cases. With careful planning and meticulous techniques, a successful outcome could be achieved.

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.

Ethical Approval

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