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# Cervicotomy using a hemi-clamshell approach for a rare enlarged substernal goitre

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## Abstract

The substernal goitre is defined as a goitre for which >50% of the mass is located below the superior orifice of the thorax, surgical resection remains the reference treatment, the approach used is the cervicotomy, which often allows to extract the mediastinal portion of the plunging goitre, and we report a rare case of a huge cancerous plunging goitre whose complete resection required the enlargement of the cervicotomy in right hemi-clamshell, for the carcinological, vascular and recurrent control.

**Keywords:** Plunging goitre • Cervicotomy • Hemi-clamshell

## BACKGROUND

Substernal goitre is defined as goitre for which >50% of the mass lies inferior to the thoracic inlet [1–2]. Resection is indicated but may be disputed in cases of invasive tumour and for very high-risk patients. Less than 15% of patients require an extracervical operative approach. The malignancy rate (2–7.6%) is not higher than that for cervical goitre [1–3].

## OBSERVATION

A mediastinal opacity was discovered incidentally on chest radiography in a 70-year-old man during preoperative workup for lithiasis cholecystitis. His medical history included only rheumatic fever 20 years earlier. He had no symptoms. A computed tomography scan showed a homogeneous, opaque 7.4 cm × 3.2 cm × 7.0 cm mass occupying the anterosuperior mediastinum and connected to the right thyroid lobe (Fig. 1). Blood analysis, thyroid function and bronchial endoscopy were normal. Substernal goitre was suspected, and surgical resection was proposed. However, the patient refused because he was asymptomatic.

After 18 months, the patient reappeared with lumbalgia. A spinal computed tomography scan revealed a tumour of the spinal cord compressing the posterior vertebral arch of the fourth lumbar vertebra (Fig. 1). The tumour was surgically resected and L4–L5 osteosynthesis was performed.

Microscopic analysis revealed vesicular thyroid carcinoma. Additional investigation revealed 2 brain metastases, a

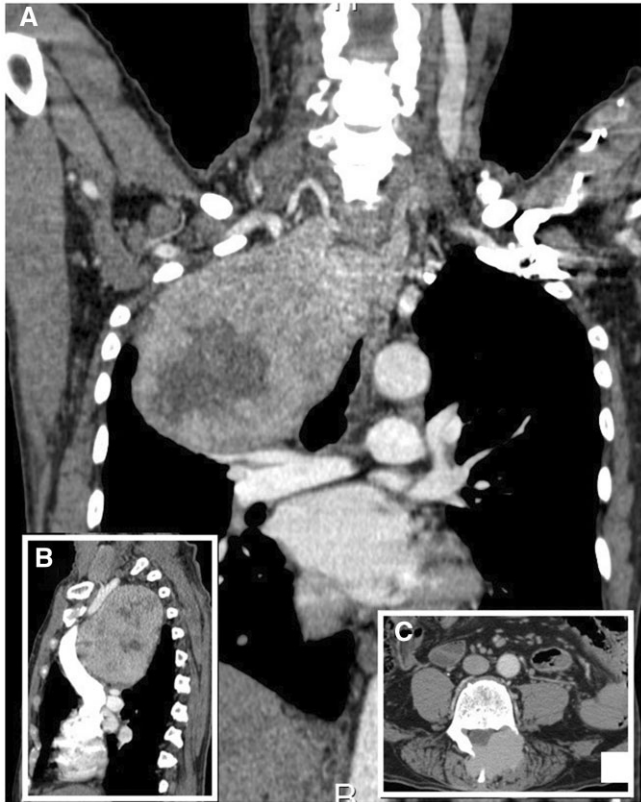
pulmonary nodule and an increase in mediastinal goitre volume from 165 to 2184 cm<sup>3</sup> (12 cm × 13 cm × 14 cm). Interdisciplinary oncology committee decided on stereotaxic radiotherapy for the brain metastases, followed by resection of the goitre before iodine therapy. The patient was referred to our institution for surgical treatment.

He complained of ‘false food routes’ and dysphagia. Cervical palpation was normal. Nasofibroscope revealed right vocal cord paralysis. The trachea was compressed and pushed to the left, without mucosal damage. The patient provided informed consent for treatment.

Given the intrathoracic development of the goitre in relation to the diameter of the cervicothoracic outlet, it was obvious that delivery by cervicotomy would be impossible. The possibility of an extension to the lung had made consider the need for a procedure on the right pulmonary parenchyma and possibly on the mediastinum. In this hypothesis, a hemi-clamshell approach associated with cervicotomy was decided upon, as it offers better safety than cervico-sternotomy, allowing both cervical, mediastinal and lateral control in the right pleural cavity.

Thus, the surgical procedure consisted of a first cervicotomy for a left thyroid lobectomy with direct visualization of the recurrent laryngeal nerve (RLN). Both left parathyroids were located and preserved, and then the right superior thyroid pedicle was ligated to reduce tumour vascularity. Subsequently, a right hemi-clamshell was performed (Fig. 2), allowing exposure of the whole mass and complete mobilization of the endothoracic section by gentle dissection. The mass was well circumscribed in the thorax and had not invaded the surrounding structures, but was

vascularized from the right phrenic vessels. Resection of the entire thyroid was performed as a monobloc. A middle lobe lung nodule was resected at the same time.



**Figure 1:** Computed tomography scan of the substernal goitre. (a) Frontal view. (b) Spine computed tomography scan showing a tumour in the posterior arch of the vertebra. (c) Sagittal view showing compression of the vena cava.

The patient was postoperatively weaned from the respirator on postoperative day 2 and discharged on day 7.

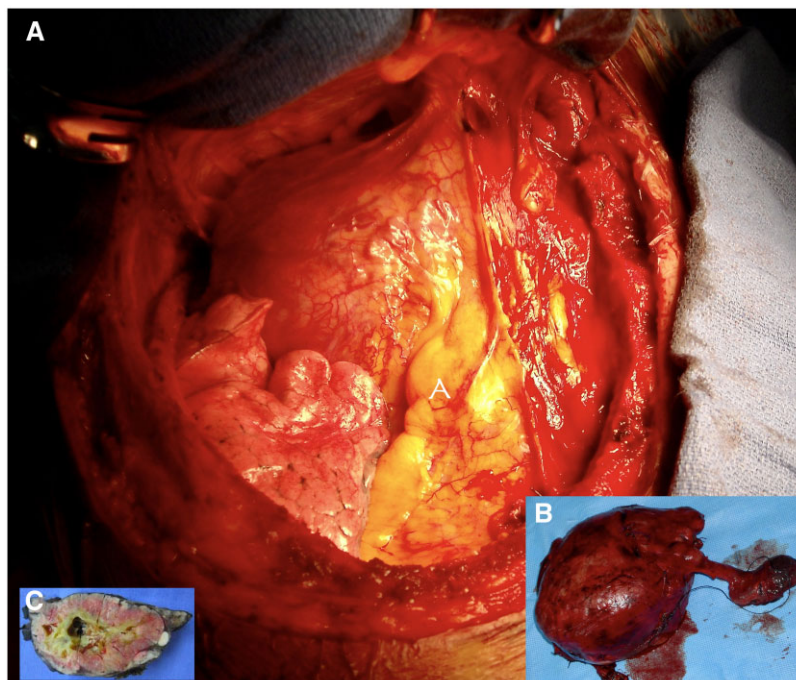
A microscopic examination revealed a massively invasive vesicular carcinoma (world health organization) (WHO classification), with a poorly differentiated (insular) 40% component, massive invasion of the capsule and vascular emboli. The resected margins were healthy. The lung nodule was metastatic thyroid carcinoma.

The patient led a comfortable life for 5 years but died during year 6 of thyroid cancer, which became iodine-resistant.

## DISCUSSION

Large sub-sternal goitres are rare. We have operated on >2500 goitres in our department over the last 10 years. The hemi-clamshell approach has only been used once in this exceptional case. Resection is usually performed through a cervical approach and is rarely associated with a manubriectomy [4]. Our operative strategy is to always start with a ligation of the blood supply to the cervical thyroid vessels from the neck, to reduce bleeding from the mass. This approach allows direct visualization of the recurrent laryngeal nerve (RLN) and parathyroid glands. We do not recommend morcellation, which carries a risk of bleeding and may affect parathyroid function and the NLR. In this case report, the extracervical approach was obvious due to the iceberg morphology and the huge size (14 cm) of the endo-thoracic goitre. We considered that adhesions to the mediastinum or lung may have occurred and that total sternotomy may not be sufficient to remove the mass.

Recurrent paralysis is the most feared complication in hypertrophied substernal goitre. We used a 'surgical magnifier' rather than intraoperative RLN monitoring, given the lack of evidence to support the routine use of the latter [5]. Tracheomalacia has been reported after long-term compressive goitre, but we have never encountered symptomatic tracheomalacia after resection of a sub-sternal compressive goitre.



**Figure 2:** Operative view of the hemi-clamshell approach. (a) The right lung was compressed by the goitre. (b) The tumour was resected, with an enlarged right lobe and normal left lobe. (c) Macroscopic view of the tumour after resection.

## CONCLUSIONS

We recommend cervical incision up to the hemi-clamshell in cases of a huge cervicomediastinal tumour.

## Conflict of interest

The authors declare that they have no conflicts of interest in relation to this article.

## Reviewer information

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