Surgical treatment of retrosternal goiter

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Abstract. – Background: The definition of substernal goiter is not uniform and varies among authors. We can define substernal – or retrosternal – goiter a thyroid formation with cervical departure that goes beyond the superior thoracic strait for at least 3 cm and that preserves, generally, the connections between the cervical and thoracic portion, maintaining a direct vascularization supplied by the thyroid arteries. The “forgotten” goiter is an extremely rare disease: a mediastinic thyroid mass found after total thyroidectomy.

Materials and Method: 595 patients with thyroid pathology have been treated surgically in our Department. Fifty (8.4%) of these were suffered from a cervico-mediastinic goiter. The diagnosis has been confirmed by the thyroid ecotomography, by the radiologic examination of the chest, by the neck-chest CT examination, by the MR of the mediastinum and by the thyroid scintigraphy.

Discussion: The surgical treatment, in retrosternal goiters, is related to the experiences of surgeons. For the majority of the surgeons almost all antero-superior mediastinal goiters can be removed across a cervicotomy, only in few cases in association with a sternal split. In our experience the cervical approach is the only surgical access used for all the patients. The complication rate following substernal goiter resection is higher than the average rate for cervical thyroidectomy. However, in our series we did not observed permanent recurrential lesions, only in one case a light hypophonia has been observed. After the intervention, in all patients the symptomatology caused by the mediastinal compression has disappeared.

Key Words:
Retrosternal goiter, Substernal goiter, Mediastinal goiter, Thyroid surgery, Sternotomy.

Background

Substernal goiter is a thyroid formation with cervical departure that goes beyond, with stretched neck, the superior thoracic strait for at least 3 cm and that preserves, generally, the parenchimal or fibrous connections between the cervical and thoracic portion, maintaining a direct vascularization supplied by the thyroid arteries. The prevalence of this pathology is very variable and fluctuates between 1.7 and 30 per cent of all thyroid demages. A fair percentage (2-16%) of the endotoracic goiters is represented by the forgotten goiters. The more frequent pathogenesis is due to the incomplete removal of cervico-mediastinic goiter in which a laceration during the manoeuvres of dislocation in the cervical centre, leaving a fragment of thyroid parenchyma in the mediastinum, vascularized from the inferior thyroid arteries. A still smaller percentage (1%) of the endotoracic goiters is represented by ectopic or autonomous goiters, without parenchimal and vascular connections with the thyroid gland. The initial surgical approach for the mediastinal goiter is the cervical skin incision. Second in the case of goiter, not resectable with manoeuvres of dissection and traction, it is necessary to extend the surgical approach with a split or complete median sternotomy to the fourth intercostal space, or postero-lateral thoracotomy to the fourth intercostal space. The main indications are a large intrathoracic goiter previous thyroidectomy or generic pre-operative diagnosis of a mediastinal cancer, syndrome of the superior cava, presence of malignancy with adenopathy. An alternative surgical proposit of immerse giant multinodular goiter is the trans-clavicular access according to the experience of two cases in literature. Preoperative evaluation included thyroid functions tests, chest radiography, computerized tomography (CT) scan and, in selected cases, magnetic resonance (MR) of the neck and mediastinum result useful for a better anatomic definition of the lesion, showing its

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rapport with the aerial, digestive, and vascular structures in order to establish the most appropriate surgical approach.

In our experience the cervical approach is the only surgical access used for all the patients, regardless of the different anatomical variants.

**Materials and Method**

At the Department of Surgery “Francesco Durante” of the University of Rome “La Sapienza”, in the period between January 1998 and January 2007, 595 patients with thyroid pathology have been treated surgically. Fifty (8.4%) of these were afflicted with a cervico-mediastinic goiter.

The diagnosis has been confirmed by the thyroid ecotomography, by the radiologic examination of the chest, by the neck-chest CT examination, by the MR of the mediastinum and by the thyroid scintigraphy. Of the 50 patients 20 (40%) were male and 30 (60%) female, with age between 33 and 77 years and with a mean age of 60. Twenty-nine (58%) patients were symptomatic at the moment of the diagnosis (Table I). Twenty-one (42%) patients had come to clinical observation only for the thyroid swelling.

The study of thyroid functionally has shown hypothyroidism in 4 cases (8%), hyperthyroidism in 7 (14%) cases. Thirty-seven (74%) cases were euthyroidal. Two (4%) cases showed increase of the TSH hormone, in presence of normal FT3 and FT4.

The thyroid scintigraphy has been performed to 47 patients. Areas of hypoactivity have been noticed in 22 (46.8%) cases, areas of hyperactivity in 5 (10.6%) and in 20 (42.5%) patients captation has resulted normal. In only one case a substernal goiter was casually found during a CT examination for others causes.

We suggest CT scan of the neck and chest as an essential part of the preoperative imaging evaluation.

In one patient, CT images showed the presence of a huge retrosternal goiter with tracheal deviation extending above the aortic arch. Superior cava vein was displaced anteriorly and the anonymous vein dislocated laterally. In this case, CT imaging was crucial in the preoperative decision of a sternotomic approach. A traditional traverse Kocher’s incision was performed and both lobes were exposed; dissection of the superior pole was similar to cervical thyroidectomy. The middle thyroid vein have been tied to prevent bleeding. The surgeon opens the interclavicular ligament, finds the correct plane for careful digital mediastinal exploration, and gradually brings the retrosternal part of the gland all the way through the thoracic inlet into the cervical incision. In this case, this step was possible without sternotomy because the diameter of the mediastinal mass 56 mm (right lobe) it wasn’t larger in size of the cervical outlet.

The “forgotten” goiter is an extremely rare disease. It is a mediastinic thyroid mass found after total thyroidectomy. In a 55 year old woman a total thyroidectomy has been performed (not in our Department) by anterior cervicotomy. The patient comes to our observation because a substernal structure – a large intrathoracic goiter of the left thyroid lobe, extending for 12 cm through the thoracic outlet and cause of an important compression of the trachea – was casually found during a CT examination for other causes. The size of this mediastinal mass (60 × 38 mm) suggests that were able be removed by an anterior cervical incision.

In this study all the patients underwent retrosternal thyroidectomy through a cervical incision. In 36 (72%) cases a total thyroidectomy has been performed by anterior cervicotomy; in 11 (22%) cases an hemithyroidectomy has been performed; in 3 (6%) cases, submitted to surgical intervention of isthmus-lobectomy, a totalization has been performed.

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<tr>
<th>Table I. Symptoms at presentation in patients with substernal goiters (n = 29).</th>
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<tr>
<td>Dysphagia</td>
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<td>Respiratory symptoms (dyspnea, suffocation crisis, etc)</td>
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<td>Dysphonia</td>
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<td>Palpitations</td>
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<td>Cough</td>
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<td>Total*</td>
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*Total is > 29 because many patients had more of a symptom at presentation.
Discussion

The definition of substernal goiter is not uniform and varies among authors. Goldenberg and Lindskog\textsuperscript{13} defined substernal or retrosternal goiter a lesion of the thyroid extending caudally the fourth thoracic vertebra on chest radiography, or a structure with an inferior margin extending down to the level of the arch of the aorta, while according to Katlic and colleagues\textsuperscript{14} substernal goiter is defined when more than 50% of the mass lies distally to the thoracic outlet.

For the majority of the surgeons almost all antero-superior mediastinal goiters can be removed across a cervicotomy, only in few cases in association with a sternal split\textsuperscript{17}. CT scan is an important component of the preoperative evaluation, especially if sternotomy it’s request during the intervention. A distal dislocation of the left brachiocephalic vein, the size of mediastinal mass which a $\geq 70\%$ below the thoracic outlet and particularly a distal border below the level of the aortic arch\textsuperscript{16} suggests a combined approach.

When the goiter is situated in the posterior mediastinum the transthoracic approach is often required. It represents 10-15% of all mediastinal goiters and the development to the right side because the presence of the aortic arch prevents any descent on the left side. Frequently the transthoracic approach is preceded by a cervicotomy. In the case of ectopic or forgotten substernal goiters, a transthoracic approach is habitually required on the beginning\textsuperscript{17}.

The complication rate following substernal goiter resection is higher than the average rate for cervical thyroidectomy. Recurrent laryngeal nerve injury and hypoparathyroidism are the most common complications. The anatomic variations and the wide mediastinal dissection are probably the main causes for this finding. Also during the cervical extraction previous adhesions with large mediastinal vessels increase the risk of bleeding.

In our series we did not observed permanent recurrenental lesions, only in one case a light hypophonia has been observed. After the surgery, in all patients the symptomatology tied to the mediastinal compression has disappeared.

The goiter removed surgically showed signs of neoplastic degeneration in 10% of the cases, with prevalence of the papillary carcinoma in the 6% and in the remaining 4% of follicular carcinoma.

All the patients passed the postoperative hospitalization in optimal conditions and have been discharged on the fourth post-operative day.

References


