



Original research

Surgical approach to mediastinal goiter: An update based on a retrospective cohort study



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H I G H L I G H T S

- Mediastinal goiter is often asymptomatic and incidentally diagnosed.
- Gold standard of surgical treatment is total thyroidectomy via a cervicotomic access.
- Sternotomy and thoracotomy may be associated to cervicotomy in selected cases.
- Primary mediastinal goiter has a vascularisation directly from intrathoracic vessels.
- Thyroidectomy for mediastinal goiter is associated to higher rate of complications.

A R T I C L E I N F O

Article history:

Received 15 April 2015

Received in revised form

6 May 2015

Accepted 20 May 2015

Available online 18 December 2015

Keywords:

Mediastinal goiter

Thyroidectomy

Cervical approach

Thoracotomy

Sternotomy

A B S T R A C T

Aim: Surgery for mediastinal goiters (MG) is indicated for compression symptoms and risk of malignancy. Total thyroidectomy by cervicotomy is universally considered the standard surgical approach to MG. In selected cases sternotomy or a thoracotomy are used. Options of the operative technique and practical surgical problems are analysed.

Methods: A retrospective analysis of twenty-eight-years on 1767 cases of MG in a referral centre for endocrine surgery was carried out. All patients underwent standard preoperative study and CT based surgical planning. Surgery was performed by an experienced surgical team with standard technique via cervical approach or in selected case via sternotomy or thoracotomy. Clinical records were examined.

Results: Total thyroidectomy was performed in all cases. A cervical approach was used in almost 99% of patients. Significant shorter surgical time was observed for surgery via the cervical approach vs sternotomy and thoracotomy. Benign struma was observed in 1503 patients and a carcinoma in 264. We observed postoperative bleeding in 0.5% of cases, permanent monolateral recurrent laryngeal nerve palsy occurred in 1.3%, bilateral palsy in 0.6%, transient and permanent hypoparathyroidism in 14% and 4.1% respectively.

Conclusion: MG may be approached by a cervicotomic access only with a clear knowledge of potential risk and complications of the surgical manoeuvres. Sternotomy or of a thoracotomy are indicated only in selected cases but their inapplicability may be really dangerous in those MG not otherwise resectable. MG should be referred only to specialized centre.

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1. Introduction

Mediastinal goiters (MG) are mostly located in the anterior and middle mediastinum, and rarely (10–15% of cases) in the posterior mediastinum [1].

As a matter of fact there are no unique criteria for defining mediastinal, a thyroidal mass grown below the superior thoracic inlet and this is associated to various degree of surgical problems and skills required to allow a safe thyroidectomy by cervicotomy only, without requiring an associated extracervical access.

MG accounts for 5.8% of all mediastinal masses [2] and in patients with unknown goiter, it is often discovered as an incidental finding on a radiographic examination [3]. If no palpable cervical mass are detected at clinical examination nor mediastinal compressive symptoms are evident, most of MG remain asymptomatic for long time allowing a continuous growth into the thorax. Differently the most common symptoms, due to progressive compression on the airway and on the esophagus, are represented respectively by choking, dyspnoea, sleeping apnea and dysphagia. Even vascular and nervous compression, mainly on the superior vena cava and on the sympathetic chain, may become symptomatic and suggest the diagnosis of MG. Indications for surgery in case of MG are the presence of a large mass with compression of adjacent structures and increased risk of malignancy for longstanding occult goiter. Total thyroidectomy by cervicotomy is universally considered the standard surgical approach to the MG but it is always a demanding procedure with increased difficulties according to the effective grade of intrathoracic thyroid growth [4].

Based on an institutional experience we analysed the options of the operative technique and the practical surgical problems faced when dealing with MG.

2. Materials and methods

We retrospectively analysed a population of 13,224, patients admitted for thyroid disease over a period of 28 years, since 1986 to 2014, in the Unit of Endocrine Surgery, S. Maria University Hospital, Terni, University of Perugia. This retrospective cohort study was designed according to the STROBE criteria [5]. We analysed 1767 cases (13,3%) admitted for MG. All MG patients underwent a functional study with dosage of FT3, FT4, TSH, thyroglobulin, parathyroid hormone (PTH) and antibody against thyroperoxidase and thyroglobulin. Neck and Chest computed tomography (CT) for preoperative surgical planning was performed in all cases. The goiter was defined as a MG when at CT it extended at least 3 cm below the thoracic inlet. In selected case endoscopy was used. Preoperative therapy with methimazole or propylthiouracil and beta-blockers was adopted in hyperfunctional goiters. Surgery was performed by an experienced surgical team including skilled endocrine surgeons supported, if required, by thoracic surgeons. Surgical technique is standardized based on the large experience in ordinary thyroidectomy [4,6–9]. In all patients a Jackson Pratt drainage was used and removed according to the clinical course. A serum dosage of calcium and PTH was performed in all operated patients according to the standard protocol in use in our Department as previously reported [4,7]. Follow-up of all patients was carried out in the outpatient service at 6 and 12 months after surgery. The clinical records were analysed for: history of previous thyroid pathology and incomplete surgery with residual intrathoracic goiter, symptoms, presence of tracheal deviation and/or compression, topography of the mediastinal involvement, surgical approach (cervical or cervical combined to sternotomy or thoracotomy), histology and post-operative complications.

2.1. Statistical analysis

The chi-square test was used for statistical analysis and $p < 0.05$ was considered statistically significant. All of the data were analysed using XLSTAT (Addinsoft, New York, NY, USA).

3. Results

Our series included 1767 patients, 1180 females, 587 males (mean age: 60 years, range: 55–82). Total thyroidectomy was performed in all cases. In 85 patients (4.8%) previous history of thyroid pathology and incomplete surgery was present. Compressive symptoms were present in the 40% of cases. Goiter was located in the anterior mediastinum in 92% of patients. In 170 patients, the MG was incidentally discovered during radiological investigations undertaken for other conditions. Tracheal compression was evident at CT study and symptomatic in 10% of cases. In case of tracheal compression, the insertion of the oro-tracheal tube was guided by a fiberoptic bronchoscope. We observed a secondary tracheomalacia in 37 cases (2.1%). Tracheostomy was never performed for tracheomalacia and instead patients remained intubated post-operatively for few days having the oro-tracheal tube a stenting function. Cervicotomy was performed in 1742 patients (98.5%), a subtotal sternotomy was necessary in 21 patients (1.1%), due to a large thyroid reaching the main bronchial bifurcation and in 4 cases a thoracotomy (3 antero-lateral and 1 postero-lateral) was performed to improve safety in the dissection. The mean surgical time was 110 min (range: 50–240), specifically 101 min (range: 50–205) for surgery via the cervical approach with significant difference ($p < 0.05$) compared to 165 min (range: 115–240) in cases submitted to sternotomy and thoracotomy. At pathological examination gross specimens presented mean weight of 910 g (range: 490–1730). Histology demonstrated a benign struma in 1503 patients (diffuse in 1436, unilobar in 36, adenoma in 15 and Basedow syndrome in 16) and a carcinoma in 264 (15%). Postoperative bleeding, requiring a reoperation occurred in 0.5% of cases and was controlled via the cervical approach in all patients. We observed the following complications permanent unilateral recurrent laryngeal nerve palsy occurred in 1.3% of patients, bilateral palsy in 0.6%, transient and permanent hypoparathyroidism in 14% and 4.1% respectively. Patients were discharged in 3rd or 4th postoperative day after cervicotomy, with the exception of isolated cases. Symptoms control was successful in all patients over a period of 90 days after surgery. Dysphagia was the hardest disorder to recover. Hyperthyroidism was successfully controlled in all symptomatic patients.

4. Discussion

The simply definition of MG as the presence of thyroid tissue located substernally with any degree of extension into the thoracic inlet, lacks of anatomic precision and can be interpreted unspecifically. Many authors, in presenting their experiences, adopted and proposed different definitions of MG [10,11]. Crile defined as MG those that extend to or are inferior to the aortic arch, whereas Lahey considered goiters located inferiorly to the thoracic inlet on chest X-ray [12]. de Souza and Smith defined mediastinal those goiters with a portion of at least 50% of total volume located in the mediastinum [12].

More precise definitions of substernal goiter have been suggested, namely a goiter lying 2 finger breadths below the thoracic inlet with the patient in a supine position, a goiter reaching the aortic arch, or the carina tracheae, a goiter with its inferior pole passing through the cervico-thoracic isthmus below the subclavian vessels [10–12].

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