



Review

Surgical management of cervico-mediastinal goiters: Our experience and review of the literature



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ABSTRACT

Aim: We analyze and discuss the clinical presentation, the diagnostic procedures and the surgical technique in relation to post-operative complications and results in cervico-mediastinal thyroid masses admitted in Thoracic Surgery Unit of AOU Second University of Naples from 1991 to 2006 and in Thoracic Surgery Unit of AOU “S. Giovanni di Dio & Ruggi D’Aragona” of Salerno over a period of 3 years (2011–2014).

Methods: We reviewed 97 patients who underwent surgical treatment for cervico-mediastinal goiters. 47 patients (49.2%) had cervico-mediastinal goiter, 40 patients (40%) had mediastino-cervical goiter and 10 patients (10.8%) had mediastinal goiter. 73 cases were prevascular goiters and 24 were retrovascular goiters. We performed total thyroidectomy in 40 patients, subtotal thyroidectomy in 46 patients and in 11 cases the resection of residual goiter. In 75 patients we used only a cervical approach, in 21 patients the cervical incision was combined with median sternotomy and in 1 patient with transverse sternotomy.

Results: Three patients (3.1%) died in the postoperative period (2 cardio-respiratory failure and 1 pulmonary embolism). The histologic study revealed 8 (7.7%) carcinomas. Postoperative complications were: dyspnea in 9 cases (10.7%), transient vocal cord paralysis in 6 patients (9.2%), temporary hypoparathyroidism in 9 patients (9.2%) and kidney failure in 1 case (0.9%).

Conclusions: The presence of a cervico-mediastinal thyroid mass with or without respiratory distress requires a surgical excision as the only treatment option. Thyroid masses extending to the mediastinum can be excised successfully by cervical incision. Bipolar approach (cervical incision and sternotomy) has an excellent outcome, achieving a safe resection, especially in large thyroid masses extending to the mediastinum with close relations to mediastinal structures and in some limited cases (carcinoma, thyroiditis, retrovascular goiter, ectopic goiter). Postoperative mortality and morbidity is very low, independent of surgical techniques. Other surgical approaches for excision of a Posterior Mediastinal Thyroid Goiter reported in literature are: VATS techniques to remove an ectopic intrathoracic goiter, robot-assisted technique for the removal of a substernal thyroid goiter, with extension into the posterior mediastinum.

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1. Introduction

Intrathoracic thyroid masses account for 5.8% of all mediastinal masses. The definition of mediastinal goiter (MG) generally refers to a struma with a location for at least 50% of its volume in substernal position into the mediastinum in the prevascular or

retrovascular space, reaching at least the level of the aortic arch, penetrating into the mediastinum for at least two fingers transverse below the jugular incision with the head in iperextension; the radiological opacity must be projected at least at the level of D4 [1,2]. For embryologic reasons, MG are mostly located in the anterior and middle mediastinum, and rarely in the posterior mediastinum. Up to 40% of MG are asymptomatic and they are diagnosed incidentally. According to the originations of thyroid tissue, intrathoracic goiter can be divided into primary intrathoracic goiter and secondary intrathoracic goiter. The vast majority of intrathoracic goiters are secondary ones which arise from the lower part of one lobe or both lobes of cervical thyroid or isthmus and grow down through the thoracic inlet. Swallowing, gravity and thoracic negative pressure help the growing goiter direct into the chest cavity. Anatomically speaking, goiter in the chest cavity generally grows to the position of relatively low resistance. At first, the tumor will grow into the anterior superior mediastinum between trachea and sternum, forming the common retrosternal thyroid goiter.

Because there are thymus (may atrophy), left and right brachiocephalic veins and superior vena cava in the front, aortic arch and its three branches (phrenic nerve and vagus nerve have smaller resistance) in the middle left of retrosternal space, tumor growth will be resisted there. Right posterior mediastinum has relatively low resistance than left posterior mediastinum, and it helps form right posterior mediastinal goiter. The primary intrathoracic goiter only accounts for 0.2–1% of all the intrathoracic goiters, it affects females more often (male: female = 1: 3 or 1: 4). Its causes are totally different from the ones of secondary intrathoracic goiter. During the embryonic developmental period of thyroid gland, part or all of the thyroid blastoma leaves primordium and is pulled into the thoracic cavity by the descending heart and great vessels, then continues to develop in the thoracic cavity, forming the final primary intrathoracic goiter. Because of different originations, secondary posterior mediastinal goiter is often continued with the cervical thyroid gland, with blood supply from inferior thyroid artery and its branches while primary posterior mediastinal goiter maintains little or no connection with the cervical thyroid gland, and has a blood supply derived from intrathoracic arteries [3–6].

2. Materials and methods

Over two different period, 1991–2006, in the Unit of Thoracic Surgery of Second University of Naples and 2011–2014 in the Unit Thoracic Surgery Unit of University of Salerno and General Surgery Unit of “S. Giovanni di Dio e Ruggi D’Aragona” Hospital of University of Salerno, were observed and treated 97 patients with cervical-mediastinal goiter (43 men and 54 women with a mean age of 63.6 years - range 36–81 years). Seven patients (6 women and 1 man) had already undergone previous surgery for goiter, and 2 of these for 2 times. The symptoms of 97 patients is summarized in Table 1. When clinically manifest MG is usually associated to compressive symptoms which mainly determine effects on surrounding structures. Respiratory distress suggest presence of tracheal compression, with consequent dislocation producing cough, dyspnea and sleeping apnea, asthma-like syndrome, acute upper airway obstruction (wheezing and stridor) (55 patients in our observations) or esophageal compression with dysphagia (15 cases). Less frequently are observed compressive effects on cervical and mediastinal neurovascular structures with rare cases of superior vena cava syndrome (4 cases) due to venous compression and thrombosis, tachycardia (12 cases), laryngeal nerve involvement with dysphonia (6 cases). Nine patients were asymptomatic.

Physical examination revealed in every case a cervical mass that moves on swallowing and in some patients a variable degree of kyphosis and a short, thick neck.

Table 1

Patients' symptoms on presentation (patients may have more than one clinical feature).

	Numbers	Percentage %
Patients	97	
Respiratory manifestations	55	57
- Dyspnea	50	52
- cough	22	23
- Asthma-like syndrome	7	7.6
Dysphagia	22	23
Hyperthyroidism	18	18.5
Tachycardia	18	18.5
Anxiety	9	9.2
Weight loss	6	6.1
Hyperhidrosis	4	4.6
Tremors	4	4.6
Dysphonia	9	9.2
Superior vena cava syndrome	6	6.1
Asymptomatic	13	13.8

The preoperative diagnosis was made by anamnesis, clinically examination, thoracic X-ray examination, cervical and thoracic CT scan exploration, laryngeal and tracheal endoscopy, thyroid scintigraphy, esophageal barium study, esophageal endoscopy and in some cases we performed fiberbronchoscopy, Nuclear Magnetic Resonance (NMR) scan and SPECT.

Forty-seven patients (49.2%) had cervico-mediastinal goiter, 40 patients (40%) had mediastino-cervical goiter and 10 patients (10.8%) had mediastinal goiter. In 73 cases it was a prevascular goiter and in 24 cases a retrovascular goiter (13 paratracheal, 8 retrotracheal and 3 retroesophageal).

Total thyroidectomy with en bloc removal of the intrathoracic portion of the thyroid, is the treatment of choice. We performed surgical interventions in all of the cases in order to achieve the removal of the thyroid mass and decompression of the trachea. These surgical interventions were performed under general anesthesia with tracheal intubation. In the cases of tracheal compression the anesthesiologist performed a difficult tracheal intubation with a thin single lumen tube under fiber-bronchoscope control.

The surgical approaches for cervico-mediastinal thyroid goiters were: Kocher type cervicotomy in 75 cases, cervicosternotomy in 22 cases (partial upper sternotomy in 12 cases, full sternotomy in 9 cases and 1 transverse sternotomy).

In our cases of cervico-mediastinal thyroid masses, we performed following operation types: total thyroidectomy (surgical removal of entire thyroid gland) (40 cases), subtotal thyroidectomy (both lobes were removed except of a small thyroid tissue from posterior part of the goiter) (46 cases), excision residual goiter (11 cases). In 2 cases has been associated tracheal resection, in 2 case a VATS procedure for pleural effusion, in 1 case the removal of a neurinoma of the phrenic nerve and finally, in another case, the removal of two ribs for metastatic follicular thyroid cancer.

3. Results

The standard thoracic X-ray revealed an enlargement of the mediastinal opacity and, in some cases, a tracheal compression with lateral tracheal deviation (Fig. 1). In some cases the presence of calcification within an enlarged thyroid gland, raised the risk of malignancy (5 cases). The esophageal barium study revealed in 16 cases the esophageal dislocation and in 8 cases, clear signs of dyskinesia. Computed tomography (CT) is part of a standard protocol of evaluation in all cases in order to define preoperatively the indication to the cervical or sternotomic approach or a combination of both and the technical issues related to each singular patient. CT, performed in 84 patients, has always consented to evaluate size,

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