

Cervico-mediastinal Thyroid Masses - Our Experience

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Rezumat

Masele tiroidiene cervico-mediastinale - experiența noastră

Introducere: De-a lungul ultimelor decade au fost propuse mai multe clasificări ale gușilor cervico-mediastinale și ale maselelor tiroidiene. Analizăm și discutăm prezentarea clinică, procedurile diagnostice și tehnica operatorie în relație cu complicațiile postoperatorii și rezultatele intervenției chirurgicale pentru pacienții internați în Clinica de Chirurgie Toracică pe o perioadă de 22 de ani (1991 – 2012).

Metodă: Analizăm 130 de pacienți supuși unei intervenții chirurgicale pentru mase tiroidiene, 77 de femei (59.23%) și 53 de bărbați (40.77%). Vârsta medie a fost de 53 de ani. Cel mai frecvent simptom observat a fost dispneea, întâlnită la 71 (54.61%) dintre pacienți. Examinarea CT cervico-toracică identifică existența masei cervico-mediastinale și poate aprecia gradul invaziei intratoracice, compresia traheii și deplasarea acesteia, precum și raporturile cu celelalte structuri ale mediastinului visceral. Toți cei 130 de pacienți au fost pregătiți pentru o intervenție toracică, în majoritatea cazurilor operați de Prof. T. Horvat. În cele mai multe cazuri intervenția chirurgicală s-a rezumat la abordul cervical (în 106 cazuri, 63 cu cervicotomie anterioară tip Kocher și 43 cu cervicotomie Horvat "în-Y"). În celelalte cazuri am

folosit un abord bipolar: cervicotomie anterioară și sternotomie superioară parțială în 20 de cazuri, cervicotomie și sternotomie totală în 3 cazuri, cervicotomie și toracotomie axilară dreaptă într-un caz.

Rezultate: În toate cazurile s-a reușit îndepărtarea maselelor tiroidiene și decompresiunea traheii. Rezultatele postoperatorii au fost foarte bune, cu absența disfuncției respiratorii și fără lezarea nervilor recurenți. Nu am avut mortalitate post-operatorie.

Concluzii: Prezența maselelor tiroidiene cervico-mediastinale, cu sau fără disfuncție respiratorie, impune excizia acestora ca singură modalitate de tratament. Procedura reprezintă o piatră de încercare atât pentru anestezist, prin intubația dificilă în unele cazuri, cât și pentru chirurgul toracic. Masele tiroidiene cu extensie mediastinală pot fi excizate cu succes prin abord cervical. Abordul bipolar aduce rezultate excelente, obținându-se o rezecție în limite de siguranță, în special pentru masele tumorale cu extensie la nivelul mediastinului.

Cuvinte cheie: cervico-mediastinal, masă tiroidiană intra-toracică, gușă, cervicotomie, cervicosternotomie, tiroidectomie totală

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Abstract

Introduction: Over the last decades, several definitions and classifications of cervico-mediastinal goiters and thyroid masses have been proposed. 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 our Clinic of Thoracic Surgery over a period of 22 years (1991-2012).

Methods: We reviewed 130 patients who underwent surgery for retrosternal thyroid masses, 77 (59.23%) women and 53 (40.77%) men. Mean age was of 53 years. Shortness of breath was observed in 71 (54.61%) patients as the most frequent preoperative symptom. Cervico-thoracic CT scan reveals the existence of a cervico-mediastinal mass and can appreciate the degree of intrathoracic progression, tracheal compression and dislocation, as well as the relations with other anatomical structures of the visceral mediastinum. All 130 patients were prepared for a thoracic approach, majority of the cases were operated by Prof. T. Horvat. The surgical procedure was performed by cervical approach only in most of the cases (106 cases) (Kocher type cervicotomy in 63 cases and Horvat type "en-Y" cervicotomy in 43 cases). We used a bipolar approach for large cervico-thoracic masses: cervicotomy and partial upper sternotomy in 20 cases, cervicotomy and full sternotomy in 3 cases, cervicotomy and right axillary thoracotomy in one case.

Results: The removal of the thyroid mass and decompression of the trachea have been achieved in all cases. Postoperative results were very satisfactory, with absence of respiratory distress and with normal function of the vocal cords. No postoperative mortality was encountered.

Conclusion: The presence of a cervico-mediastinal thyroid mass with or without respiratory distress requires a surgical excision as the only treatment option. The surgical procedure represented a milestone for both anesthesiologist (difficult intubation in some cases of large goiters) and thoracic surgeon. Thyroid masses extending to the mediastinum can be excised successfully by cervical incision. Bipolar approach has an excellent outcome, achieving a safe resection, especially in large thyroid masses extending to the mediastinum with close relations to mediastinal structures.

Key words: cervico-mediastinal, intrathoracic thyroid mass, goiter, cervicotomy, cervicosternotomy, total thyroidectomy

Introduction

A retrosternal thyroid mass, most often a nontoxic goiter, is not an unusual finding and its definition varies from author to author. The term goiter is accepted worldwide (degenerative disease of the thyroid gland), while the terms "substernal", "retrosternal", "intrathoracic" or "cervico-thoracic" are not clearly agreed on. According to Th. Shields, in most series, approximately 80% of the substernal thyroid masses are of the small substernal extension type, 15% are "partial" intrathoracic (in which the major part of the mass is situated within the thorax, after Wakeley and Mulvany classification – 1940) and only 2-4% are "complete" retrosternal (all of the mass lies within the thoracic cavity) (1,2). The cervico-mediastinal thyroid masses develop from the cervical region and descend to mediastinum, behind the great mediastinal vessels. According to Sweet, most of the retrosternal masses are

situated in the anterior compartment of the mediastinum and only a few retrotracheally or even in the posterior mediastinum (posterior of the esophagus) (3).

The cervico-mediastinal masses have an absolute surgical indication. The tendency to enlarge and to compress adjacent anatomical structures and the chance of malignancy require surgical excision as the main treatment option even for asymptomatic patients.

In this article, we present our experience in surgical treatment of cervico-mediastinal masses from 1991 to 2012, in our Clinic of Thoracic Surgery, majority of the cases were operated by Prof. T. Horvat. In this study, we report even the case of biggest cervico-mediastinal goiter observed in our practice. Emergency surgical excision of goiter was the best treatment in this case of retrosternal goiter complicated with severe respiratory distress.

Materials and Methods

This retrospective study included 130 patients with cervico-mediastinal masses, diagnosed and operated in our Thoracic Surgery Clinic in the period 1991-2012. Over this timeframe, 283 patients with thyroid pathology were hospitalized, pathology mainly represented by goiter. 101 of these patients (77.69 %) had cervico-mediastinal goiters, other 25 (16.92%) patients had thyroid cancers developed on cervico-mediastinal goiters, 1 patient had an intrathoracic thyroid cancer on mediastinal remnant part of a cervico-mediastinal thyroid tumor previously operated in other surgical unit, 2 patients had a "hot" follicular retrosternal thyroid adenoma and in one case we resected an intrathoracic goiter grown on remnant mediastinal part of a cervico-mediastinal goiter operated before in other surgical unit.

The inclusion criterion was represented by the cervico-mediastinal thyroid mass on CT scan examination. All patients gave their informed consent. The study was approved by the local ethics committee.

For the entire group of patients, the age ranged between 31-85 year-old (Fig. 1), with a mean of 59 year-old, and a female (F) / male (M) ratio of 1.45:1, Fig. 2).

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

Clinical features of patients are listed in Table 1. Anamnesis reveals very important data about any mediastinal visceral compression: respiratory distress (inspiratory dyspnea) (54.61% cases) suggest presence of tracheal compression, dysphagia (22.58% cases) denote esophageal compression, dysphonia (11.82% cases) imply laryngeal nerve involvement, cough (11.82% cases) indicate occurrence of a tracheal participation (simply compression or even invasion).

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.

Interdisciplinary assessment of these cases consists of

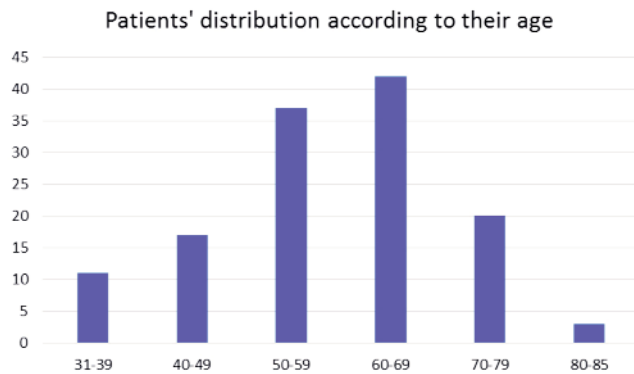


Figure 1. Patients' age distribution

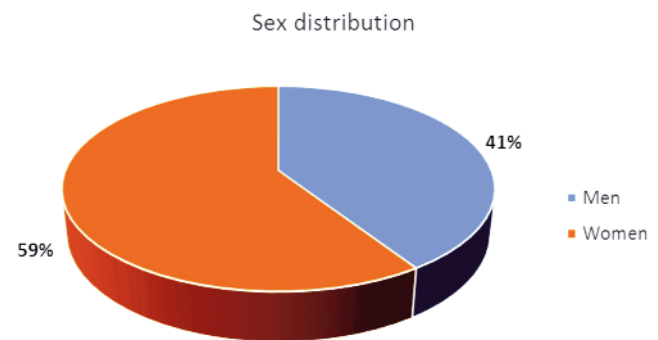


Figure 2. Patients' sex distribution

cardiac evaluation (clinical examination, electrocardiography, and echography), otolaryngology (vocal cords exploration through laryngoscopy) and pre-anesthetic evaluation.

Cardiac evaluation revealed some cardiac risk factors: obesity (10% cases), presence of an ischemic heart disease (21% cases) (stable angina or silent ischemia), moderate hypertension controlled through an adequate therapy (35% cases) (Fig. 3).

Under direct visualization, laryngoscopy showed a normal morphology and mobility of both vocal cords in 88.1 % of cases and a left vocal cord functional impairment in 11.9% of the cases.

Pre-anesthetic evaluation revealed a moderate anesthetic and surgical risk in most of the cases and a high risk in a case of a patient with acute respiratory failure and cardiac comorbidity. This patient presented the clinical signs of an acute upper airway obstruction (wheezing and stridor) as a result of an important progressive tracheal compression, aggravated by an acute respiratory infection or a spontaneous hemorrhage within the thyroid mass. The management of this event was promptly applied: intubation and emergency thyroidectomy.

Biological findings of thyroid gland function were within normal limits, with normal levels of TSH (thyroid stimulating hormone), spontaneous (euthyroidism), or after preoperative anti-thyroid medication (hyperthyroidism). In all cases, we performed the surgical intervention only after achieving the euthyroid state of the patient using drug therapy. To achieve this objective, Methimazole (thiamazole, thyrozol) or iodine in form of the Lugol solution was used. Other biological findings were within normal limits.

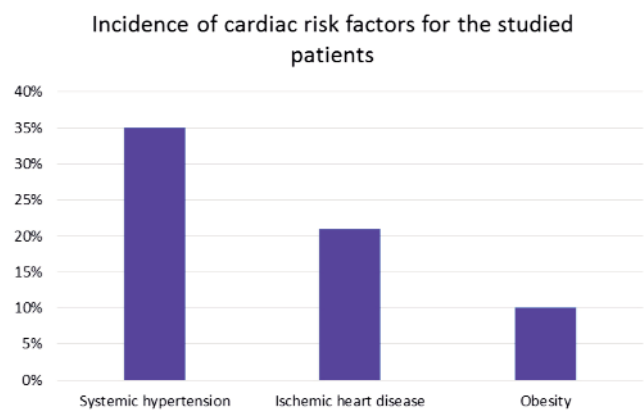


Figure 3. Incidence of cardiac risk factors for the studied patients

The standard thoracic X-ray revealed an enlargement of the mediastinal opacity and, in some cases, a tracheal compression with lateral tracheal deviation (Fig. 4).

In some of the cases, the cervical sections of the CT scan showed a right thyroid lobe enlargement with laryngeal and tracheal deviation and doesn't show the contralateral thyroid lobe at this level because it was complete intrathoracic (Fig. 5).

Thoracic sections of the CT scan (transversal plane) revealed a partial mediastinal mass (thyroid lobe) located in the visceral compartment (behind the great vessels and in close relationship to the trachea) with different degrees of compression of the tracheal or esophageal lumen (Figs. 6, 7).

The sagittal CT reconstruction (Fig. 8) revealed the degree of intra-thoracic protrusion of a cervico-thoracic goiter and helped us to evaluate the severity of compression and deviation of the trachea and relations to the esophagus, erector spinal muscles, and spine.

Coronal CT reconstruction revealed the inferior limit of the mediastinal mass (in one case extending down to the level of the tracheal carina) (Fig. 9).

In some cases the presence of calcification within an enlarged thyroid gland, visible on CT scan examinations raised the risk of malignancy (4). In other cases, we noted the presence of a combination of solid and fluid areas in the

Table 1. Patients' symptoms on presentation (patients may have more than one clinical feature)

Clinical feature	% of patients
Dyspnea	54.61%
Dysphagia	22.58%
Dysphonia	11.82%
Cough	11.82%
Asymptomatic	9.67%



Figure 4. Standard thoracic X-ray: enlargement of the mediastinal opacity with tracheal compression and right tracheal deviation



Figure 5. Cervical section CT scan (transversal plane): right thyroid lobe enlargement with left laryngeal deviation (doesn't show the presence of the left thyroid lobe in the cervical region) (image of a case from our clinic)

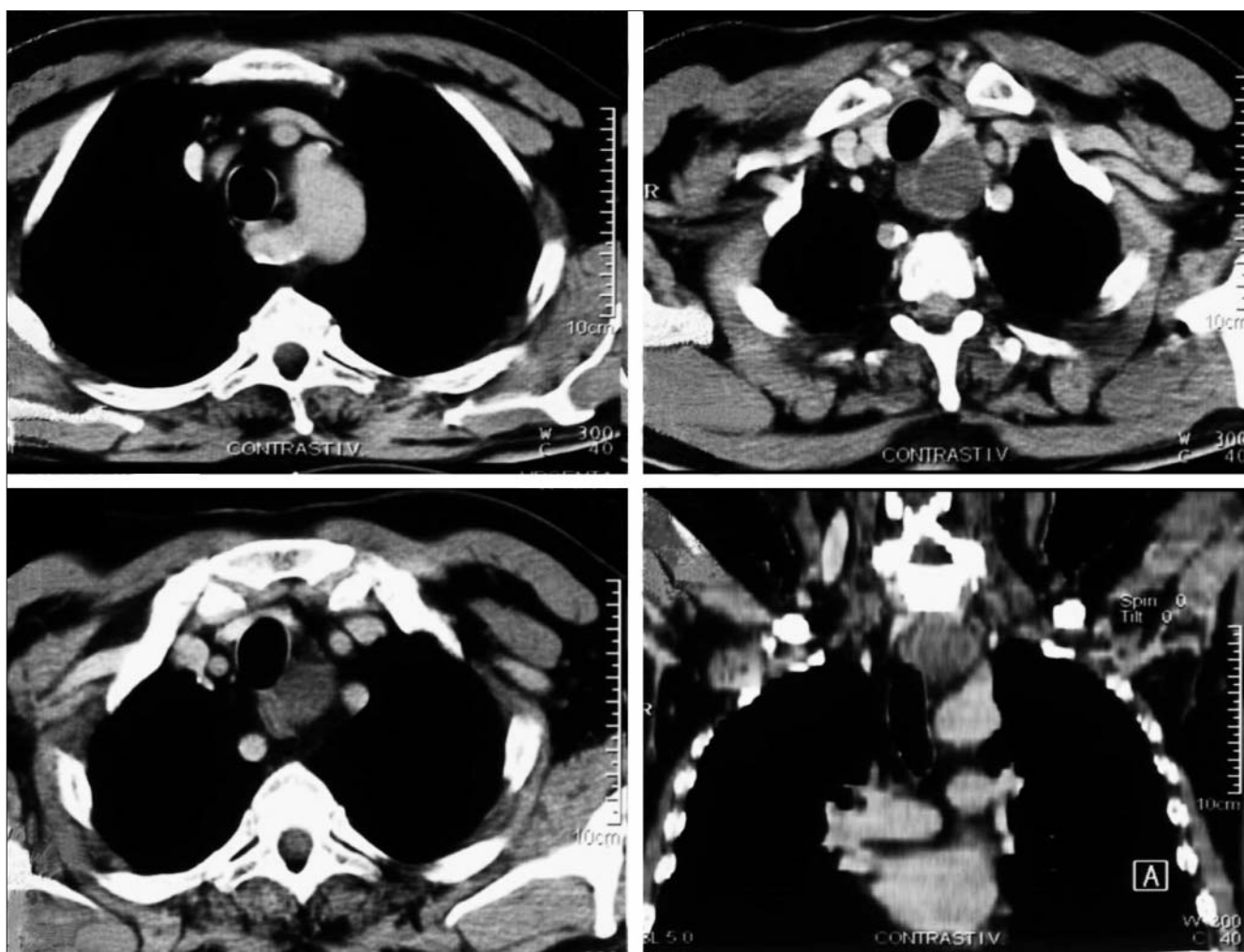


Figure 6. Thoracic sections of CT scan (transverse plane): mediastinal mass – left thyroid lobe located retro-tracheal and above the aortic arch (right tracheal deviation and a little tracheal compression). Behind the mass was present an anatomical variant of the right subclavian artery: retro-esophageal right subclavian artery (lusoria artery) with dysphagia lusoria (image of a case from our clinic)

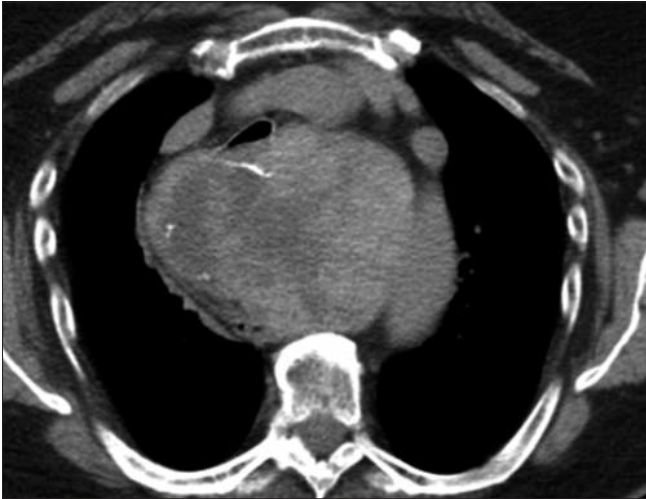


Figure 7. Thoracic sections in the transversal plane of the CT scan: mediastinal mass – left thyroid lobe located retro-tracheal with anterior and right lateral displacement of the trachea and with an important compression of the trachea and esophagus. The mediastinal part of the goiter was confined anteriorly by the aortic arch, the left innominate vein and the superior vena cava (retro-vascular position). No obstruction of these vessels was present (image from our thoracic surgery clinic cases)



Figure 8. Sagittal CT reconstruction: a huge cervico-thoracic goiter developed mostly intrathoracic (2/3 of the goiter) with an important deviation and compression of the trachea and esophagus (image from our thoracic surgery clinical cases)

cervico-thoracic mass, like in a nodular (colloid) goiter with cystic degeneration.

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.

In our cases of cervico-mediastinal thyroid masses, we performed following operation types: total thyroidectomy (surgical removal of entire thyroid gland) (75 cases), subtotal thyroidectomy (both lobes were removed except of a small thyroid tissue from posterior part of the goiter) (31 cases), hemithyroidectomy (entire thyroid isthmus was removed along with one lobe) (4 cases) and thyroid lobectomy (one lobe was removed without thyroid isthmus) (20 cases) (Table 2).

In our 25 cases of cervico-mediastinal thyroid cancers we performed a total thyroidectomy. In just 5 cases the malignant lesions were preoperative known (positive preoperative biopsy and presence of cervical adenopathies). In majority of the cases the malignant lesions were discovered at the time of the removal of the substernal thyroid mass as an occult thyroid tumor.

In 2 cases of “hot” follicular retrosternal thyroid adenoma we performed a total thyroidectomy through Kocher type cervicotomy.

In a case of intrathoracic goiter grown on the remnant mediastinal part of a cervico-mediastinal goiter previously operated in other surgical unit, we performed a right thyroid



Figure 9. Coronal CT reconstruction: a huge mediastinal part of the cervico-thoracic goiter developed down to the level of the tracheal carina (image from our thoracic surgery clinical cases)

lobectomy through iterative Kocher type cervicotomy and partial upper sternotomy.

In a case of intrathoracic thyroid cancer on mediastinal remnant part of a cervico-mediastinal thyroid tumor,

Table 2. *Surgical interventions performed in our service for cervico-mediastinal thyroid masses*

OPERATION TYPE	NUMBER	PERCENTAGE
1 total thyroidectomy	75	57,69%
2 subtotal thyroidectomy	31	23,84%
3 left hemithyroidectomy	3	2,30%
4 right hemithyroidectomy	1	0,76%
5 right thyroid lobectomy	13	10%
6 left thyroid lobectomy	7	5,38%
Total	130	100%

previously operated in other surgical unit, we performed total resection of the mediastinal remnant thyroid tissue associated with timectionomy (from tactic necessity) and mediastinal extended limfadenectomy through partial upper sternotomy.

The surgical approaches for cervico-mediastinal thyroid masses were: only cervicotomy in 106 cases (Kocher type cervicotomy in 63 cases and Horvat type “en-Y” cervicotomy in 43 cases), cervicosternotomy in 23 cases (partial upper sternotomy in 20 cases and full sternotomy in 3 cases) and right axillary thoracotomy before cervicotomy in 1 case (we made the thoracotomy first in a case of patient with kyphosis with a mass situated in the posterior compartment of the mediastinum; intraoperative we made a diagnosis of cervico-mediastinal goiter, “complete” retrosternal situated according to Th. Shields) (Table 3).

The surgical approaches for cervico-mediastinal thyroid cancers were: Kocher type cervicotomy in 14 cases, Horvat type “en-Y” cervicotomy in 4 cases and cervicosternotomy (partial upper sternotomy) in 7 cases.

The surgical approaches for cervico-mediastinal thyroid goiters were: Kocher type cervicotomy in 47 cases, Horvat type “en-Y” cervicotomy in 39 cases, cervicosternotomy in 14 cases (partial upper sternotomy in 11 cases and full sternotomy in 3 cases) and axillary thoracotomy before cervicotomy in one case.

Before the surgical intervention, all 130 patients were prepared for thoracic approach and a sternotomy set was prepared (including a sternotome) in the operating room.

The surgical procedure started with a cervical – Kocher incision. After sectioning the sub-hyoidian muscles, the superior cervical blood supply of the thyroid gland was identified and controlled (ligated and cut), medial and superior dissection was completed. In all cases, in this cervical moment of the dissection of the thyroid gland we tried to identify and protect the recurrent laryngeal nerves and the superior parathyroid glands. In some of the cases, through this cervical approach, we were not able to identify the inferior thyroid vessels and the recurrent laryngeal nerve because the large dimensions of the sub-sternal portion of the thyroid gland covered them. Upward delivery of the gland was performed by fingers and the gland was detached from all sides in order to reach the lower edge, followed by the extraction of the gland from mediastinum. If the gland could not be delivered by these blunt maneuvers, uncontrolled traction was avoided and “en- Y” cervicotomy –

Table 3. *Surgical interventions performed in the cases of cervico-mediastinal thyroid masses in our service*

SURGICAL APPROACH TYPES	NUMBER	PERCENT %
1 Kocher type cervicotomy	63	48,46%
2 Horvat type “en-Y” cervicotomy	43	33,07%
3 cervicotomy and partial upper sternotomy	20	15,38%
4 cervicotomy and full sternotomy	3	2,30%
5 right axillary thoracotomy and cervicotomy	1	0,769%
Total	130	100%

Horvat type was performed. In many cases in which the major part of the thyroid mass was situated within the thorax we made the “en- Y” cervicotomy –Horvat type from the beginning of the operation. This type of cervicotomy was very useful because it offered a superior access for the medium-inferior cervical region, the superior thoracic aperture and for the upper part of the visceral mediastinum. Finally, we achieved the goal of the surgical intervention: the complete removal of the goiter and decompression of the trachea. We drained the remained cervico-mediastinal cavity in order to prevent accumulation of fluids at this level (Fig. 10).

In some cases of cervico-mediastinal thyroid masses additional exposure of the upper part of the visceral mediastinum by sternal split was necessary, due to the presence of a big sub-sternal thyroid lobe. Identification of the left recurrent laryngeal nerve and the control of inferior thyroid vessels could not be possible unless the retrosternal portion of the gland was removed from the mediastinum. We could not accomplish this by finger or pledged dissection within the capsule of the goiter through only Horvat type “en-Y” cervicotomy and was necessary to provide additional exposure



Figure 10. *The final aspect of the operation: tiroidectomy performed through Horvat type “en- Y” cervicotomy*

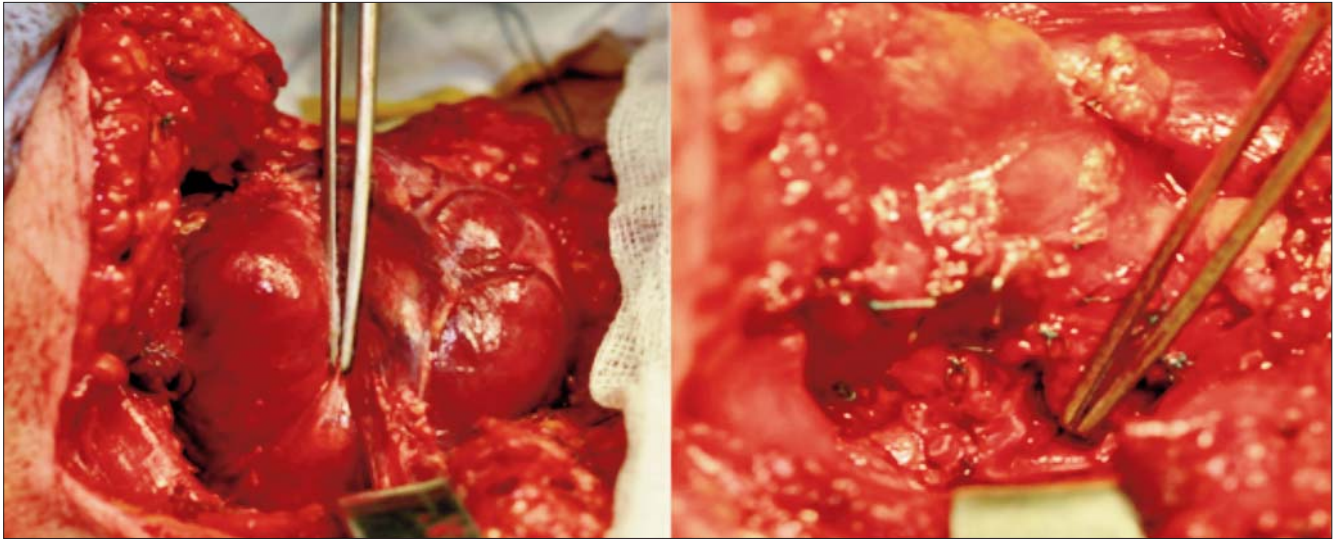


Figure 11. Horvat type “en-Y” cervicotomy with right thyroid lobe devascularisation, identification and preservation of the right recurrent laryngeal nerve (image from our thoracic surgery clinical cases)

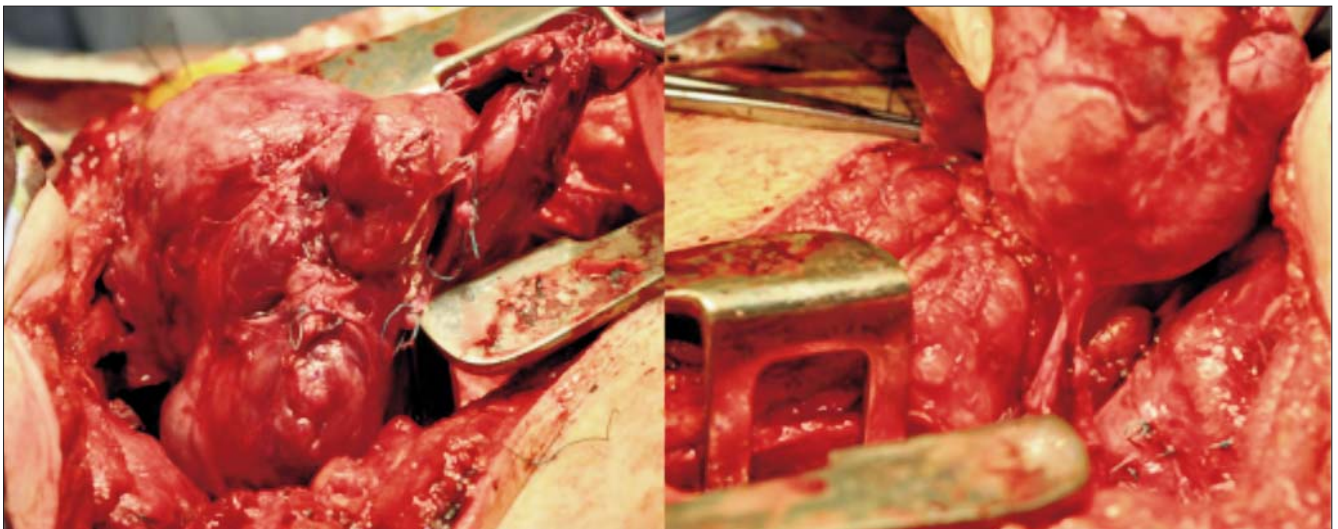


Figure 12. Partial upper sternotomy with left thyroid lobe mobilization, identification and ligation of the left inferior thyroid pedicle (dissection and ligation of the upper left thyroid pedicle was performed during the cervical time of the surgical intervention) (image from our thoracic surgery clinical cases)

by sternotomy in order to complete the mobilization of the gland (Fig. 11, 12).

In one case we performed the thyroidectomy through cervicotomy after right axillary thoracotomy. Initially we decided to assess the mediastinal mass through a thoracotomy because of a diagnosis mistake (we believe that the mediastinal part of the goiter was a primary mediastinal tumor situated retrotracheal in the visceral mediastinum).

In some of the cases we performed additional surgical procedures at the same time with the thyroidectomy. Minimal pleurotomy with thoracic drainage was performed in two cases of subtotal thyroidectomy performed through cervicosternotomy (partial upper sternotomy with opening the pleural cavity). This is noted as a possible complication of sternotomy and the reason why we asked the anesthesiologist

to arrest the mechanical ventilation during the time of sternal splitting in all of the cases. In three cases, we performed auto-transplantation of normal parathyroid glands resected or devascularized during thyroidectomy, by fixation of these in the sternocleidomastoid muscle, without postoperative hypoparathyroidism. For one patient with associated diseases (cervico-mediastinal goiter and Zenker diverticulum <2 cm) we performed a cricopharyngeal myotomy during thyroidectomy (Table 4).

The anesthetic technique played an important part in the surgical planning. In cases of an important tracheal compression due to big cervico-mediastinal goiters, the anesthesiologist performed the tracheal intubation with a small single lumen tube and laryngo-tracheal visualization under fiber-bronchoscope control.

Table 4. Additional surgical procedures performed during thyroidectomy

Additional operations during thyroidectomy	Number of cases
1 Minimal pleurotomy with thoracic drainage	2
2 Autotransplantation of parathyroid glands	3
3 Cricopharyngeal myotomy	1

The patients were discharged 7-10 days after surgery, with absence of any symptoms of respiratory distress or dysphonia and normal levels of calcemia.

Postoperative care included substitutive medication with L-thyroxine 100 mcg/day.

All the patients with cervico-mediastinal thyroid cancer were sent to the oncological treatment.

Results

From 130 of the cases with cervico-mediastinal thyroid masses operated in our clinic, only 23 patients required a combined cervical and thoracic approach (sternotomy). In 20 of the cases we performed the surgical intervention through partial upper sternotomy and in three cases a full sternotomy was necessary. The removing of the retrosternal portion of the gland was performed in most of the cases (106 patients) through cervico-tomy only.

Preoperative postero-anterior chest radiography revealed tracheal compression and/or deviation in all patients who underwent the surgical intervention and needed a thoracic approach.

CT images showed the retrosternal extension to the level of the aortic arch in all patients from this group as well.

Histological examination revealed a simple colloid goiter in 71 cases. For 30 patients the histological diagnosis was nodular goiter. The incidence of thyroid malignancy in cervico-mediastinal thyroid masses was 19.23% (25 cancers from 130 cervico-thoracic thyroid masses). Th. Shields (2002) like Wakeley and Mulvany (1940) reported a 2.5% incidence of thyroid cancer which is less than the 5% incidence reported by Dahan and colleagues (1989) (5).

We have recorded no postoperative mortality. Postoperative results have been very satisfactory with immediate disappearance of preoperative symptoms like dyspnea, dysphagia and cough, and relieve of the dysphonia in short time after operation. In five cases, we noted a transitive recurrent laryngeal nerve paralysis, in four cases we observed a postoperative seroma evacuated through cervical puncture, and 10 patients had a cervical edema of the superior part of the cervical incision, relieved without any special treatment.

Discussion

The management of a retrosternal goiter has challenged surgeons since its first description, in 1749.

Over the last decades, several definitions and classifications of cervico-mediastinal goiters have been proposed. In

their clinical studies some of the authors discuss separately about cervico-mediastinal or secondary intrathoracic goiters and about "pure" or primary intrathoracic goiters (which represent 4% from number of mediastinal tumors) (6,7). The vascular criteria make the difference between these forms of intrathoracic goiters (primary and secondary intrathoracic). The great mediastinal vessels are the origin of vascularization of primary ("pure") intrathoracic goiters while cervical vessels are the origin of the elongated inferior thyroid vascular pedicle of secondary intrathoracic (cervico-mediastinal) goiters (8).

According to Wakeley and Mulvany classification (2,3) the most of the cervico-mediastinal thyroid masses operated in our service were small substernal extension type (less than 50% of the thyroid gland was intrathoracic) and "partial" intrathoracic type (in which the major part of the mass but less than 80% was situated within the thorax). In some situations, we operated a complete intrathoracic type goiter or a big cervico-mediastinal goiter (more than 80% of the thyroid gland was intrathoracic) or even a huge cervico-mediastinal goiter. In this latter situation, the patient presented the clinical signs of an acute upper airway obstruction (wheezing and stridor) as a result of an important progressive tracheal compression, aggravated by an acute respiratory infection or a spontaneous hemorrhage within the thyroid mass (9). The management of this event was promptly applied: intubation and emergency thyroidectomy through a combined cervical and thoracic approach (cervico-sternotomy). Through this approach it was achieved the complete removal of the thyroid mass from both cervical region and mediastinum and the decompression of the trachea without postoperative collapse or kinking of the tracheal wall.

The positive diagnosis in our cases of cervico-mediastinal thyroid masses consisted of a combination between clinical and paraclinical data (10,11,12).

The presenting symptoms were related to the compressive nature of the mass on nearby structures. The anamnestic evaluation relieves the presence of a progressive dyspnea, cough and sometimes dysphagia. In our study, the most frequent symptom was dyspnea, followed by dysphagia, cough and dysphonia. Physical examination revealed in every case a cervical mass that moves on swallowing, descending retrosternal.

The thoracic X-ray showed large mediastinal opacity continued upward to the cervical region and lateral deviation of the trachea.

Cervical and thoracic CT scan was used for detecting the presence and the extent of retrosternal thyroid mass and their relation to adjacent structures in the neck and chest and for determining if mediastinal masses are of thyroid origin. In our series, CT of the neck and chest was routinely performed for diagnosis, which was also helpful in the decision-making process – which approach type of surgical intervention was mostly suited. In case of a big intrathoracic thyroid mass with the inferior limit below the aortic arch (at the level of the tracheal carina in one case), we consider that

cervico-sternotomy is the most appropriate way for approaching the surgical patient.

Clinical examination, cervico-thoracic CT scan and thyroid scintigraphy provide a positive diagnosis for 82% of the patients with cervico-thoracic thyroid masses (13,14).

The cervico-mediastinal goiters should be differentiated from other pathological entities of the visceral mediastinum (15): mediastinal tumors, vascular aneurysms, mediastinal abscesses and mediastinitis.

In the cases of intrathoracic thyroid masses we performed systematic exploration of vocal cords and trachea through laryngoscopy and tracheoscopy. In presence of the dysphagia we performed examination of the esophagus (esophagography, esophagoscopy). We can assess this way the degree of visceral compression and we can evaluate the difficulty of oro-tracheal intubation (14).

Intraoperative, in situations when mediastinal structures were distorted by the presence of the cervico-mediastinal thyroid mass and strong adherences between the abnormal neo-vascularized capsule of the mass and the surrounding structures, the thoracic approach through partial upper sternotomy was important in order to minimize the bleeding due to vascular damage. Morcellation of the thyroid tissue was avoided in order to lessen the possibility of bleeding, which may be difficult to control, and because of the possible presence of an occult carcinoma within the gland.

In the literature, the rate of sternotomy is reported up to 3.4% accounting for overall thyroidectomies performed (16). The rate of sternotomy reported in our series was 8.12 % (23 cases from all 283 thyroidectomies performed during these years) and 17.69 % (23 cases) for thyroidectomies performed only for cervico-mediastinal thyroid masses (130 patients). Most of these patients were referred to our hospital from other surgical units where thoracic approach was not possible.

In most of our cases of the cervico-sternal thyroid masses we performed a thyroidectomy through cervicotomy (Kocher type cervicotomy or Horvat type "en-Y" cervicotomy). In some of these cases we performed the "en-Y" cervicotomy because of its advantages: superior access for the cervico-thoracic region with a good dissection of an intrathoracic thyroid lobe (which can be more easily extracted from mediastinum) and in cases in which cervical thyroidectomy is not possible it prepares the thoracic access through partial upper sternotomy (8).

The anesthetic technique played an important part in the surgical planning. The anesthesiologist performed the tracheal intubation with a smaller size endotracheal tube and laryngo-tracheal visualization under fiber-bronchoscope control.

The very good prognosis in our cases was due to the complete decompression of the trachea without postoperative complications (tracheomalacia, permanent vocal cord paralysis, hypoparathyroidism) and by the histologic features of the thyroid mass (simple colloid goiter in most of the cases).

Authors acknowledge anterior cervicotomy as the main approach for other several thyroid diseases, including

thyroiditis (19), polinodular goiters and of course thyroid carcinomas (especially in differentiated tumors, where maximal feasible removal of tumor tissue is imposed) (20). Considering our results, we recommend using this approach for all thyroid masses, as well for other thyroid diseases. Other authors recommend adding gastro-omental free flap for complex cervical defects [enlarged ablative surgery for advanced cancer of pharynx and larynx (21)] in order to protect the area. We think this type of reconstruction can be also suited for large cervico-mediastinal tumors, when large defects are present after resection surgery.

Conclusions

Surgery for mediastinal thyroid masses should always be considered, even in elderly patients because the high risk of tracheal compression, the suspicion of malignancy and the low morbidity of the surgery.

Most mediastinal thyroid masses can be removed only through a cervical approach. The "en-Y" cervicotomy should be considered in these cases because of its advantages over a standard cervicotomy and avoiding sternotomy.

Patients with huge or big cervico-mediastinal thyroid mass extending to the level of or below the aortic arch, may require bipolar approach through cervico-sternotomy in order to achieve a safe resection and decompression of some adjacent structures with minimal morbidity.

The cervico-thoracic thyroid masses can be removed from mediastinum through the entering gate: the superior thoracic aperture.

Conflicts of interest

I undersign, certificate that I do not have any financial or personal relationships that might bias the content of this work.

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