CASE REPORT

Mediastinal compressive nodular goiter – A very rare cause of obstructive acute respiratory failure

Szabolcs-Attila Gabor-Siklodi[1], Tatiana Daniela Sala[1,2*], Botond-Istvan Kiss[1,3], Renata Moriczi[1,3], Cosmin Banceu[2,4], Mircea Gabriel Muresan[1,5], Tivadar Jr Bara[1,2], Arpad Torok[1,2], Radu Mircea Neagoe[1,2]

1. 2nd Clinic of Surgery, Mures County Emergency Clinical Hospital, Targu Mures, Romania
2. George Emil Palade University of Medicine, Pharmacy, Science, and Technology of Targu Mures, Targu Mures, Romania
3. Doctoral School of Medicine and Pharmacy, George Emil Palade University of Medicine, Pharmacy, Science, and Technology of Targu Mures, Targu Mures, Romania
4. Emergency Institute for Cardiovascular Diseases and Transplantation, Targu Mures, Romania
5. Department of Anatomy and Embryology, George Emil Palade University of Medicine, Pharmacy, Science, and Technology of Targu Mures, Targu Mures, Romania

Introduction: In neglected cases, thyroid goiters may reach such extreme dimensions that they cause respiratory, swallowing, or vascular compromise. Large goiters have a tendency to extend retrosternally and, in ectopic cases, may develop entirely within the mediastinum. When no additional space is available within the thoracic cavity to accommodate further growth, they can present as acute respiratory failure.

Case presentation: We present the case of a 72-year-old female patient with a known history of thyroid goiter who was admitted to the emergency department with acute respiratory failure. A thoracic CT scan revealed an approximately 10 cm mediastinal mass causing near-complete tracheal obstruction. As the patient's respiratory function deteriorated, an emergency surgical intervention was performed by a multidisciplinary team consisting of an anesthesiologist, endocrine surgeon, thoracic surgeon, and cardiac surgeon. A sternotomy and total thyroidectomy were carried out. The postoperative course was uneventful, and the patient was discharged from the hospital on postoperative day 10 in good general condition, without subjective complaints.

Conclusions: In extremely rare cases, thyroid pathology may lead to acute respiratory failure, requiring immediate surgical intervention. The case is further complicated and rendered exceptional by the presence of a completely intramediastinal thyroid gland, necessitating a multidisciplinary approach.

Keywords: mediastinal goiter, acute respiratory failure, emergency thyroidectomy, hemorrhagic goiter

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Introduction

The thyroid gland is surrounded by thin muscles, subcutaneous fat and skin and experiences minimal resistance as it grows, typically expanding anteriorly or laterally. When the thyroid gland extends inferiorly into the thoracic cavity or when ectopic thyroid tissue is identified within the mediastinum, the condition is referred to as a mediastinal or retrosternal goiter [1].

Surgical treatment of thyroid pathology is most often performed as an elective procedure; however, in very rare cases when a patient presents with acute respiratory failure, emergency thyroidectomy is required to decompress the airway, major vessels, and esophagus [2].

In most cases, retrosternal or mediastinal thyroid goiters are extensions of the cervical thyroid gland. Mediastinal goiters can be categorized as primary or secondary. Primary mediastinal goiters, accounting for approximately 2% of cases, originate from ectopic thyroid tissue located within the mediastinum. In contrast, secondary mediastinal goiters, representing about 98% of cases, develop as a consequence of caudal extension of a cervical thyroid mass into the mediastinal space. In neglected cases, both benign and malignant lesions may lead to progressive compression of the trachea due to their slow growth, often without the patient being aware of it. Sudden onset of dyspnoea is most commonly caused by an acute change within the thyroid nodule, such as hemorrhage or tumorous infiltration of the trachea [2,3].

Hemorrhage within a cyst or adenoma is usually small and rarely produces symptoms. Massive bleeding, leading to acute respiratory failure, most often occurs following trauma, while spontaneous hemorrhage arising from a thyroid lesion is exceedingly rare [4-6].

Total thyroidectomy is typically performed as an elective surgical procedure; however, in exceptional circumstances, it may be undertaken as an emergency intervention to achieve prompt airway decompression in patients presenting with acute respiratory failure. Bilateral involvement of the recurrent laryngeal nerves in cases of anaplastic or medullary thyroid carcinoma, lymphoma, or other malignant neoplasms may result in vocal cord paralysis, which can likewise precipitate respiratory insufficiency [7,8].

Case presentation

We present the case of a 72-year-old female patient known to have the following past medical history: cardiomegaly; chronic ischaemic cardiomyopathy; left ventricular failure,

* Correspondence to: Tatiana Daniela Sala
E-mail: salatatiana@yahoo.com

NYHA class II, with moderately reduced ejection fraction; moderate mitral regurgitation; mild aortic regurgitation; moderate tricuspid regurgitation; ascending aortic ectasia; and right breast carcinoma, surgically treated.

The patient presented to the local emergency centre in poor general condition, accompanied by tachypnoea, dyspnoea, lower extremity edema and fatigue; these symptoms had appeared about one week earlier and had progressively worsened. Pulmonary embolism was suspected and a chest CT angiography was performed, which described: a large intramediastinal goiter, with hemorrhage and necrosis (9.5 × 9 × 10 cm — axial / antero-posterior / cranio-caudal), exerting marked extrinsic compression on the trachea (displacing it to the right); minimal bilateral pleural effusion; and pulmonary embolism was excluded (Figure 1).

Six months prior, the patient underwent an endocrinological assessment, due to complaints of dyspnoea. A cervical ultrasonographic examination demonstrated a 5.58 × 5.6 × 5.54 cm isoechoic nodule, classified as EU-TIRADS 3, occupying the entire thyroid gland and extending retrosternally. A fine-needle aspiration biopsy was carried out, with the result: Bethesda category III – atypia of undetermined significance (AUS). Following this, surgical treatment was recommended, but the patient declined the procedure.

The patient's vital signs were as follows: blood pressure: 143/91 mmHg; pulse: 91 bpm; oxygen saturation: 80% on room air, increasing to 97% with oxygen administered via face mask; respiratory rate: 26 breaths per minute; Glasgow Coma Scale: 15 points.

The patient was admitted to the surgical department. Shortly after admission, her condition began to deteriorate; therefore, an emergency surgical intervention was performed with the collaboration of a multidisciplinary team consisting of an anesthesiologist, a general surgeon, a thoracic surgeon, and a cardiac surgeon.

At that time, the patient had an oxygen saturation of 88% while receiving supplemental oxygen via face mask, presented with dyspnea (respiratory rate: 28), a blood pressure of 100/62 mmHg, and a pulse rate of 82 bpm; her ASA score was class III.

A sternotomy and cervicotomy were performed, followed by exploration of the mediastinum. A soft, cystic, hemorrhagic tumor-like mass, measuring approximately 10 cm in diameter, was observed. It was well encapsulated, but exerted compression on the esophagus, trachea, and the adjacent major vascular structures; the entire thyroid gland was located intramediastinally (Figure 2).

Through meticulous dissection, the mass was successfully excised, with ligation of its feeding vessels. During the procedure, both recurrent laryngeal nerves were identified and preserved; their integrity and function remained unaffected. Two drainage tubes were placed in the residual cavity, and the wound was closed in layers.

Following the surgery, the patient received intensive care treatment. Her condition was stable; she was transferred to the intensive care unit under mechanical ventilation. On examination, vesicular breath sounds were present bilaterally, with no additional pathological rales; oxygen saturation was 98%. She was hemodynamically stable without circulatory support, with a blood pressure of 130/85 mmHg and a pulse rate of 88 bpm.

Extubation was performed on the first postoperative day. Following three days of stable recovery and close monitoring in the intensive care unit, the patient was transferred to the surgical department.

On the 5th and 9th postoperative days, follow-up chest X-rays were performed, which revealed minimal bilateral pleural effusion, with no other pathological findings. On the 4th and 5th postoperative days, the two mediastinal drains were removed. No postoperative complications were observed. Histopathological examination revealed a benign thyroid lesion characterized by hemorrhagic, necrotic, and cystic changes, with a total specimen weight of 366 grams.

The patient was discharged from our clinic on the 10th postoperative day in good general condition, afebrile,

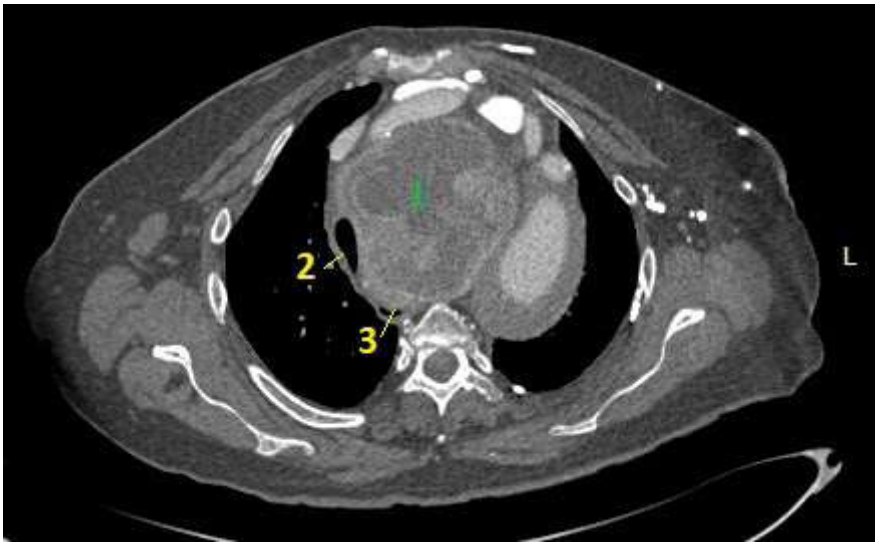

Fig. 1. 1. Mediastinal goiter; 2. Trachea; 3. Esophagus

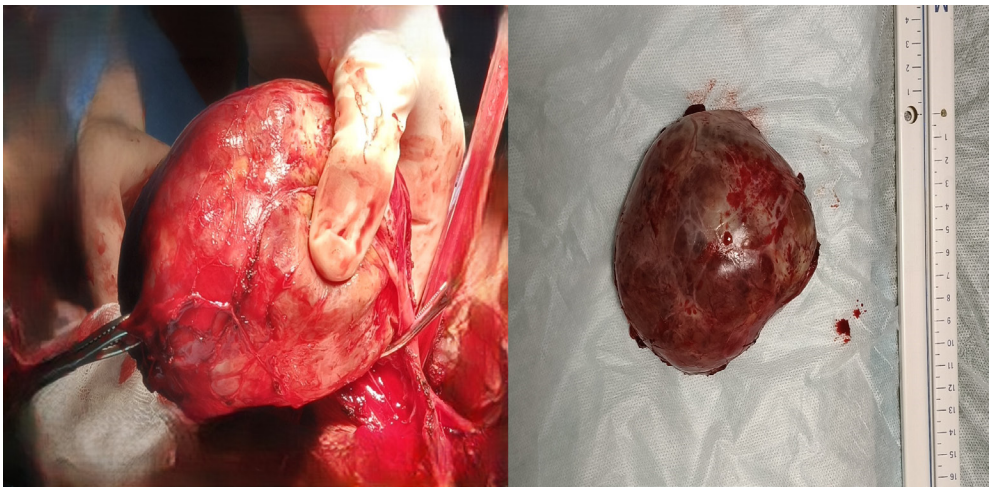

Fig. 2. A soft, cystic, hemorrhagic tumor-like mass (specimen weight: 366 grams)

hemodynamically and respiratorily stable (SpO_2: 98% on room air), with vesicular breath sounds present bilaterally, no pathological rales detected on auscultation, and without any subjective complaints.

Discussions

At present, airway obstruction secondary to goiter is considered a rare phenomenon in the literature, attributable to timely recognition and appropriate therapeutic intervention. Such cases typically evolve insidiously or are encountered in regions with limited access to healthcare; in developed countries, their occurrence is generally related to patient neglect. Acute, truly life-threatening tracheal compression is exceptionally uncommon, with approximately 75% of cases remaining asymptomatic due to the slow progression of airway compromise [1,8].

Intrathoracic goiters are subclassified as retrosternal or mediastinal. They constitute approximately 5% of mediastinal tumors, whereas ectopic thyroid tissue accounts for only 0.1% of mediastinal masses, predominantly affecting women over the age of 50 [9].

Computed tomography (CT) often reveals a well-circumscribed mass, which may occasionally exhibit calcifications and cystic components. Preoperative differentiation from a thymoma is challenging, as imaging alone is usually insufficient; the anatomical location complicates biopsy, and definitive diagnosis is most reliably established via postoperative histopathological examination [9,10].

Acute respiratory failure secondary to non-traumatic thyroid dysfunction can result from four primary mechanisms: spontaneous intrathyroidal hemorrhage, tracheal invasion by a neoplasm, tracheal compression due to a tumor, and bilateral recurrent laryngeal nerve paresis caused by malignancy. Spontaneous thyroid hemorrhage occurs most commonly in benign lesions, is usually of venous origin, and has been reported to carry a mortality rate of up to 27.8% in certain series [6,11,12].

The onset of acute respiratory failure requires urgent intervention to ensure adequate ventilation and oxygenation. The initial step in management should be approached from an anesthesiological perspective. According to cases reported in the literature, the appropriate technique involves the insertion of a small-caliber endotracheal tube simultaneously with the induction of general anesthesia, as opposed to performing intubation after full induction, which carries a higher risk of aspiration and intubation failure. On the other hand, an inhalation induction followed by laryngoscopy and orotracheal intubation, may be considered dangerous because of complete airway obstruction following loss of consciousness [6,13].

Another critical aspect of management is the choice of surgical approach. In the case of a mediastinal mass, complete excision of the tumor tissue remains the only definitive treatment option. Whereas in cervical goiters extending retrosternally, an isthmectomy combined with tracheostomy formation may serve as a temporary measure, this option is not feasible in true mediastinal goiters. Considering the tracheal compression within the mediastinum, tracheostomy following resection is likewise unnecessary, provided that no recurrent laryngeal nerve injury has occurred.

According to the literature, the extent of resection may include total thyroidectomy, subtotal thyroidectomy, or isthmolobectomy. However, in cases of entirely mediastinal localization requiring sternotomy, complete excision of the thyroid tissue should be pursued, regardless of whether the lesion is benign or malignant. When complete removal is not achievable, the primary surgical objective should be decompression of the trachea [6,14-16].

Emergency thyroid surgery carries a higher risk of complications such as recurrent laryngeal nerve injury, postoperative hemorrhage (particularly within the mediastinal region), and hypoparathyroidism. Some authors recommend the use of intraoperative nerve monitoring in such cases. Furthermore, given the intrathoracic position of the goiter, a multidisciplinary surgical approach involving endocrine, thoracic, and cardiac surgeons is strongly advised [1,6,17].

Conclusion

Mediastinal goiter constitutes an exceedingly rare etiology of acute respiratory failure necessitating emergent thyroidectomy. In such cases, the primary objective is the prompt relief of airway obstruction. This requires timely and targeted surgical intervention, which may be achieved through a sternotomy approach when indicated. The complexity of the procedure mandates close multidisciplinary collaboration. Owing to the emergency setting, intraoperative and postoperative complications tend to occur with greater frequency; nonetheless, the primary therapeutic goal remains the stabilization of the patient's respiratory function.

Author's contribution

GSSA(Conceptualization, Data curation, Writing – original draft)
STD(Conceptualization, Data curation, Writing – review & editing)
KBI(Resources)
MR(Resources)
BC(Data Curation)
MMG(Visualization)
BT(Resources)
TA(Resources)
NRM(Project administration, Supervision)

Conflict of interest

None to declare.

Ethical statement:

Written informed consent was obtained from the patient of this case report.

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