

Successful resection of mediastinal spread thyroid carcinoma by median sternotomy. A case report

Jennifer Hernandez Licona M.D.

Everett Zavala Hurtado M.D.

Jonathan Omar Rodriguez Colima M.D.

Miguel Angel Jandete Medina M.D.

Background: Papillary thyroid carcinoma (PTC) represents the most frequent malignant thyroid neoplasm, with a generally indolent clinical course. Despite its good prognosis, it can present lymph node metastases, being those located in the mediastinum uncommon (6-12%), associated with advanced and recurrent disease. In these cases, a more aggressive surgical approach, such as median sternotomy, may be necessary to achieve a complete resection.

Case presentation: A 45-year-old female patient with a history of cervical resection of tumor suspected of lymphangioma, whose histopathological study reported metastasis of papillary thyroid carcinoma. She was referred to our unit, where imaging studies showed lymph node conglomerates in the right neck with mediastinal extension. Total thyroidectomy was performed, modified radical dissection of the right neck and, due to the involvement of level VII, median sternotomy for resection of the lymph node conglomerate adhered to the trachea, esophagus, right vagus nerve and vascular structures (Figure 1 and 2). The dissection was performed safely without major complications. The histopathological study confirmed lymph node metastasis of PTC. The patient presented favorable evolution, with transient hypocalcemia as the only complication and no evidence of recurrence at six months.

Discussion: Mediastinal metastases due to PTC require a high clinical suspicion and adequate imaging evaluation for their diagnosis. Although cervical lymphadenectomy is well established, mediastinal resection is infrequent and represents a surgical challenge due to its proximity to vital structures. Sternotomy allows wide and safe exposure in these selected cases, being a useful tool when the cervical approach is insufficient.

Conclusion: Median sternotomy, although infrequent in thyroid surgery, may be indispensable to achieve complete resection of mediastinal metastases in advanced PTC, offering adequate oncologic control with acceptable morbidity. This case highlights the importance of a comprehensive preoperative evaluation and consideration of extended approaches in patients with advanced locoregional disease.

Key words: papillary thyroid carcinoma, sternotomy, mediastinal tumor, lymph node metastasis.

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Papillary thyroid carcinoma (PTC) accounts for approximately 85-90% of differentiated thyroid cancers and is known for its indolent clinical course and excellent prognosis, with 10-year survival rates exceeding 90% (1). PTC has a high incidence of lymph node metastases, with an incidence of 30-80% (2), with a frequency of mediastinal metastases from PTC of 6-12% (3), indicating advanced and recurrent disease. Lateral and cervical lymphadenectomy for PTC has been well described, but very few cases of mediastinal lymphadenectomy have been reported. This lymph node resection may require more extensive approaches, such as sternotomy, especially when the nodes are located below the sternal manubrium or are

in close relationship with mediastinal vascular structures (4).

The need for sternotomy in the setting of TCC is exceptional and is reserved for selected cases in which the conventional cervical approach is insufficient to achieve complete resection. Although this procedure carries higher surgical risks, it may offer relevant oncologic benefits by allowing adequate locoregional control of the disease (5).

We present a case of a patient with papillary thyroid carcinoma with lymphatic metastases in the anterior mediastinum, which required surgical resection by sternotomy, discussing its surgical indications and surgical complexity in our case.

From the Department of General Surgery, Specialties Hospital, National Medical Center SXXI, Mexico City, México. Received on June 15, 2025. Accepted on June 22, 2025. Published on June 23, 2025.

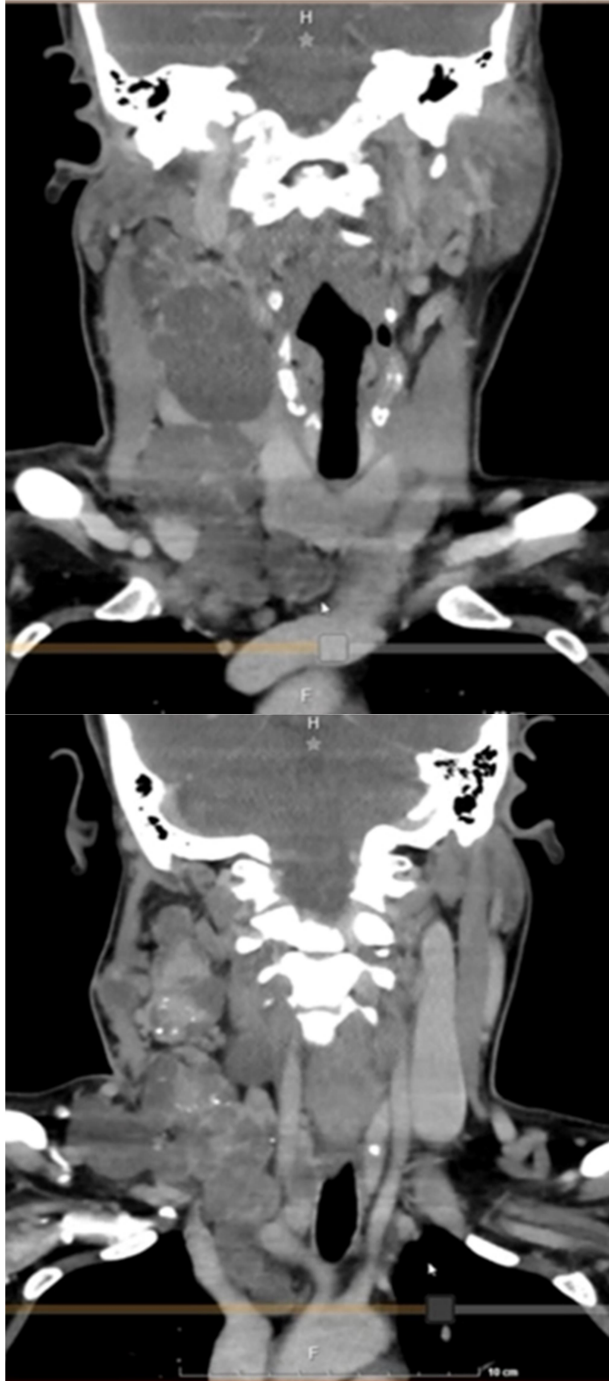


Figure 1. A short coronal CT scan of the neck shows a heterogeneous hyperdense with multiple hypodense areas due to probable central necrosis extending from zones II and III of the neck at the level of the right internal jugular chain, infiltrating the sternocleidomastoid muscle, lesion of similar characteristics to the previous one described at level IV with intrathoracic extension, and another significant lesion at level VII in the anterior mediastinum.

Case presentation

We present a case of 45 year old female patient, with a surgical history of a cholecystectomy 18 years ago and a resection of a tumor in the right hemicollar one year ago with a suspected diagnosis of

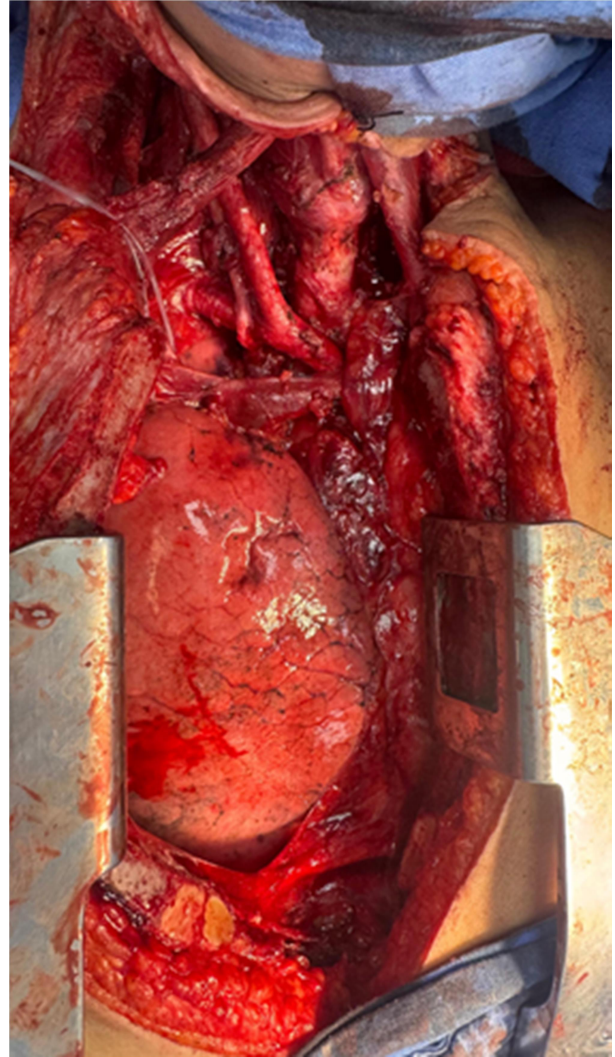


Figure 2. Lung, large vessels of the neck dissected after thyroid resection and metastasis to anterior and middle mediastinum by a median sternotomy.

cervical lymphangioma, presenting as a painless tumor in the right neck, with progressive growth, painless, soft, non-pulsatile. In the pathology study she reported metastatic papillary pattern carcinoma, so she was sent to our unit for evaluation. On physical examination, ipsilateral cervical adenomegaly of the lesion is observed and palpated, adhered to deep planes, painless. In her biochemical tests with thyroid stimulating hormone (TSH) of 2.16 mIU/L, free T3 of 3.36 pmol/L, free T4 of 1.01pmol/L and thyroglobulin of 454. 69 ng/mL, so it is decided to protocol as the main diagnostic suspicion of a papillary thyroid carcinoma with lymph node metastasis, in the neck ultrasound with rounded hypoechoic heterogeneous lesion of 25x14mm, with neoplastic characteristics and another rounded lesion of cystic and solid aspect, with multiple microcalcifications and thick calcifications of 8 mm with suspected malignancy in the medial portion of the right lobe of the thyroid corresponding to a lymph node conglomerate of metastatic appearance,

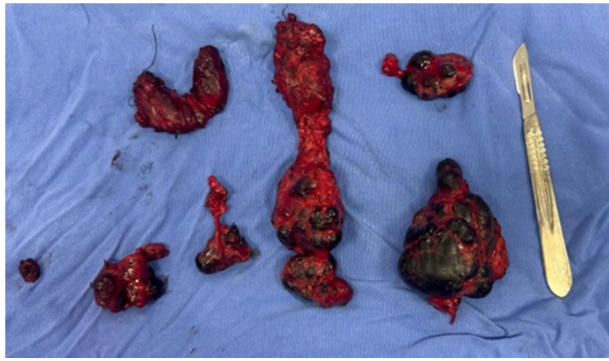


Figure 3. Macroscopic view of the surgical specimen after thyroid resection and lymph node levels II, III, IV y VII.

involving levels II, III, IV and V of the neck, to better assess the anatomical relationships of the lesions, a neck CT scan was requested with a heterogeneous hyperdense lesion with respect to soft tissues measuring 50 x 61x45 mm, with multiple hypodense areas due to probable central necrosis that spans from zone II and III of the neck at the level of the right internal jugular chain, which infiltrates the sternocleidomastoid muscle, lesion of similar characteristics to the previous one described in level IV with intrathoracic extension of 87 x 37 x 44 mm, lesion at right IV level of 34 x 32 x 38 mm and another significant lesion at level VII of 19 mm, right upper paratracheal growth 39 x 37 mm, thyroid with globular morphology with lymph node activity in the pars membranosa of trachea and esophagus (Fig.1), panendoscopy and laryngoscopy is performed without evidence of intraluminal tumor activity in larynx, esophagus, stomach and duodenum, so it was decided to perform a neck exploration where the left thyroid lobe of 5x4x3 cm, without evidence of palpable nodules, right thyroid lobe of 6x4x4 cm with stony nodule of 2x2 cm in the upper pole that infiltrates the prethyroid muscles, with great voluminous lymph node activity, with great voluminous lymph node activity in right neck with lymph node conglomerate at level II and III, of approximate of 14x12 cm, indurated, with necrosis and voluminous tumor activity ranging from level II, III, IV and V, with another lymph node conglomerate at level V of approximate of 6x5 cm, attached to the right recurrent laryngeal nerve, with extension to mediastinum so it was decided to perform a total thyroidectomy associated with central dissection and modified radical dissection of the right neck, and due to evidence of tumor activity at level VII, it was decided to perform a median sternotomy, affecting the right pleura, approaching the anterior and middle mediastinum, evidencing mediastinal lymph node conglomerate at level VII of about 6x4x3 cm, extending from the right paratracheal level, caudal posterior to the brachiocephalic trunk, innominate vein and right vagus nerve ending at the mouth of the right

subclavian vein, being firmly adhered to the trachea, esophagus, vascular and vagus nerve, it was decided to perform a blunt dissection, achieving dissection without injuring structures (Fig.2). The surgical piece was removed (Fig. 3) and the sternotomy was closed with surgical wire. It was sent to definitive histopathology study, reporting metastatic papillary carcinoma, for adequate post-surgical evolution is decided his discharge home at 7 days. She continued her outpatient follow-up with thyroid function and calcium tests, postoperative hypocalcemia, control CT of the neck and thorax, with no evidence of recurrence so far in a follow-up of 6 months.

Discussion

Papillary thyroid carcinoma (PTC) is the most frequent malignant endocrine neoplasm, accounting for 85-90% of thyroid cancers. In most cases, it follows an indolent course (1,6). However, it has a high incidence of lymph node metastasis, with a reported frequency of 30-80%. Regional lymph node metastases are distributed in three compartments: central, lateral and mediastinal. The central region is the most commonly affected due to its proximity to the thyroid gland, followed by the lateral, and lastly, the mediastinum, with an estimated frequency of mediastinal metastases (MM) between 6 and 12% (3).

It has been postulated that MM spread mainly through the lymphatic circulation from paratracheal or pretracheal nodes, and even from lateral cervical nodes. However, cases have been documented in which dissemination occurs directly from the primary tumor, without involvement of the cervical nodes (2). According to the IASLC Lymph Node Map classification, the anterior mediastinum is divided into three lymph node groups: prevascular, high paratracheal and low paratracheal. High paratracheal lymph nodes are the most frequently affected, followed by low paratracheal lymph nodes. In our case, involvement of prevascular, high paratracheal and low ipsilateral paratracheal nodes was identified, probably as a result of dissemination from pretracheal nodes.

The treatment strategy for possible nodal disease depends first of all on identifying the disease when it is present. Every patient with a diagnosis of PTC should undergo cervical ultrasound to identify suspicious lymph nodes in central and lateral regions. Suspicious lymph nodes should be evaluated by ultrasound-guided biopsy, with cytologic analysis and thyroglobulin determination, which allows preoperative confirmation of lymph node involvement and planning of the appropriate surgical approach (6). In case of suspicion of mediastinal metastasis, imaging studies such as computed tomography, magnetic

resonance or thallium scintigraphy should be performed, being essential to have radiological evidence to consider mediastinal dissection (2).

Although cervical lymphadenectomy for CPT is well described in the literature, there are few reports on mediastinal lymphadenectomy (MML). Surgery represents the treatment of choice in these cases, although there is still no standardized surgical approach (7). MML can be performed via the cervical route; however, in cases where the nodes are located below the sternal manubrium or in close relation with mediastinal vascular structures, more extensive approaches such as sternotomy are required (8).

The indications for median sternotomy are not clearly defined. In a retrospective study by Zhang et al. (4), predictive factors for mediastinal metastases that could justify the indication for mediastinal dissection were identified, including: presence of bilateral cervical metastases, distant disease and surgical reintervention. Our patient was reoperated after a first surgery with a low degree of diagnostic suspicion, in which only a single lesion in the neck was resected, without complete cervical exploration or evaluation of the thyroid gland. These factors may be useful in identifying patients who would benefit from sternotomy, despite the comorbidities associated with this procedure, such as postoperative hematomas with risk of respiratory failure, wound infections, hypoparathyroidism or recurrent laryngeal nerve injury (9).

The mediastinum is an anatomically complex region that harbors multiple vital structures, which increases the technical difficulty and the risk of complications in any surgical approach. Sternotomy is performed in less than 5% of thyroidectomies (4), but continues to be supported by various authors in cases of mediastinal lymph node progression or when precise dissection of vital structures is required (9-11). Although less invasive approaches such as mini-sternotomy or infrasternal approach can be considered, complete sternotomy offers a wider surgical field, which decreases the risk of hemorrhage secondary to inadvertent vascular injury (11). In our case, the lesion was adhered to vital structures such as the trachea, esophagus, vagus nerve, brachiocephalic trunk and innominate vein, so sternotomy allowed adequate exposure, facilitating safe dissection and reducing complications. The only postoperative complication reported was transient hypocalcemia.

Conclusion

Papillary thyroid carcinoma can present metastases in mediastinal lymph nodes, although these are rare. Its early identification by imaging studies is essential for adequate surgical planning. Sternotomy, although rarely used in thyroid surgery, represents a

safe and effective alternative in selected cases with deep mediastinal lymph node involvement or in close relationship with vital structures. Despite the potential morbidity associated with the sternotomy approach, the benefits obtained in terms of surgical control and safety justified its use in our patient, allowing complete resection with low postoperative morbidity. This report highlights the importance of a comprehensive preoperative evaluation and of considering more aggressive approaches when the pattern of dissemination warrants it, in order to achieve optimal oncologic treatment.

Conflicts of interests

None declared by the authors.

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Jennifer Hernandez Licona
Department of General Surgery
Specialties Hospital
National Medical Center SXXI
Mexico City, México.