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## Sternal metastasis as first manifestation of a papillary thyroid carcinoma: A case report

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## ABSTRACT

**INTRODUCTION:** Papillary thyroid carcinomas (PTC) are differentiated forms of thyroid carcinoma. Sternal metastases from differentiated thyroid cancers (DTCs) are rare and are of particular prognostic interest. Radioiodine therapy has traditionally been the treatment of choice for metastases from differentiated thyroid cancers; however, bone metastases are known to be resistant to this form of treatment. Surgical resection of distant metastases from DTCs offers a better chance of achieving long survival and a better quality of life. We report the case of a 59-year-old women who presented a presternal mass for one year revealing metastatic papillary thyroid carcinoma, a total thyroidectomy with lymph node dissection and reconstruction of the sternal defect were performed. Overall, we demonstrate that radical resection of sternal metastases can be performed safely even in patients with poor prognosis to achieve palliation and potentiation of Radioiodine therapy.

**CASE REPORT:** This is a 59-year-old women referred by the endocrinology service for a sternal metastasis of a papillary thyroid carcinoma, who presented a painless, firm and fixed presternal mass for one year, a total thyroidectomy with lymph node dissection was performed with En-bloc resection and reconstruction as a one-stage procedure. Reconstruction of the chest wall was obtained by the rigid reconstruction with titanium bars and coverage with polymesh dual prosthesis, followed by radioiodine therapy and substitution with L-thyroxine. The patient is currently in good health condition, and does not present any complications and was in euthyroidism under substitution for the long term follow up.

**DISCUSSION:** Thyroid cancer is the fastest increasing cancer in the United States, It is expected to replace colon cancer as the fourth leading cancer by 2030.2 More than 90% of thyroid carcinoma cases are classified as papillary or follicular carcinoma, both referred to as differentiated thyroid carcinomas (DTCs) and are associated with a 97%–98% 10-year survival rate. However, this rate can decrease to 14%–21% when patients present with bone metastases. Bone metastases have been reported to occur in 2%–13% of patients with DTC (Osorio et al. [1]). Several techniques have been used to repair after wide sternal resection for metastatic malignancies. Furthermore, choice of the reconstruction techniques depends on the size and the site of the defect and the preference of the surgeon (Lequaglie et al. [2]).

**CONCLUSION:** Sternal metastases from papillary thyroid carcinomas are rare, few cases of sternal metastasis as first presentation of a well-differentiated PTC are described in the literature. Operative management of these metastases is still controversial, but radical resection offer patients an optimal probability of long-term survival.

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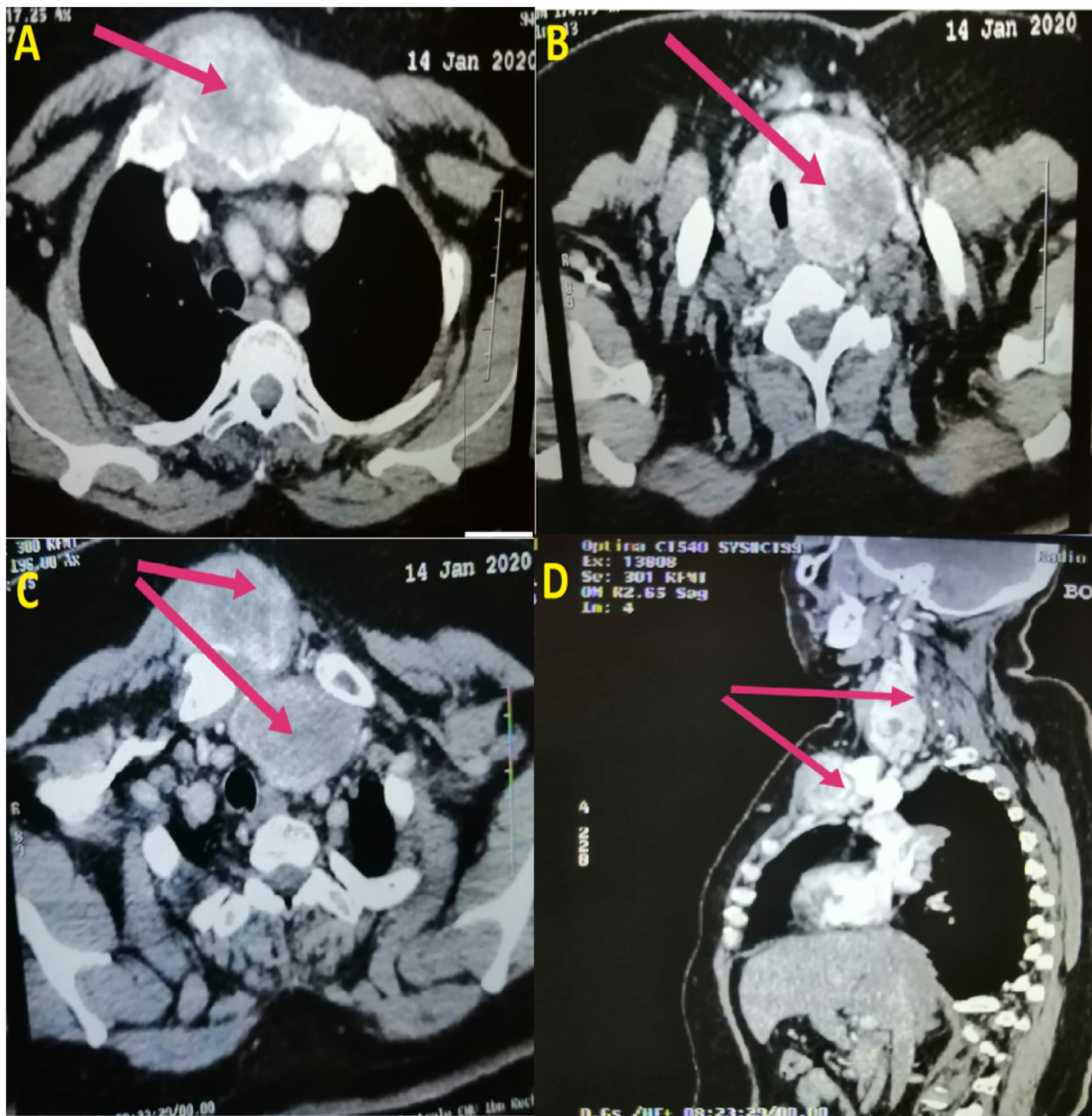
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## 1. Introduction

Papillary thyroid carcinomas (PTC) are differentiated forms of thyroid carcinoma and are characterized by slow growth and an indolent biologic behavior. A small portion of differentiated thyroid cancers (2%–13%) develop bone metastases, which can decrease a patient's survival rate by more than 60%. PTC is characterized by its lymphophilia mainly in the cervical lymph node areas, a few cases of metastasis sternal cells from PTC have been reported in



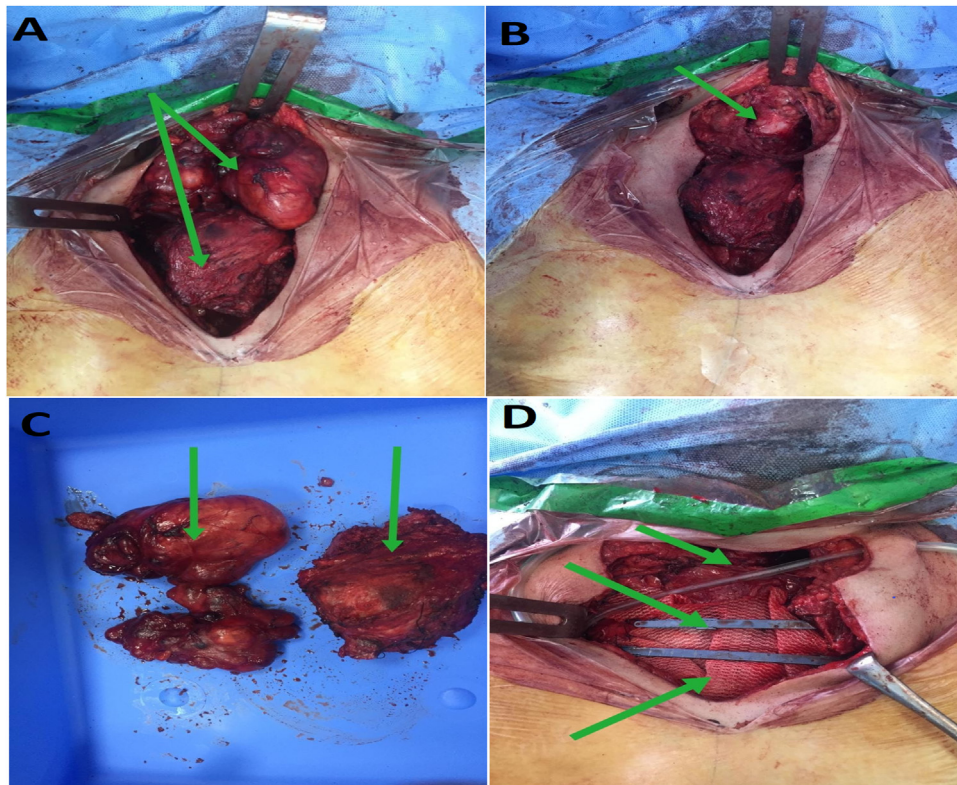
**Fig. 1.** Contrast-enhanced CT, marked with arrows: (A) the sternal destruction and expansion by the metastases, (B) the retro sternal extension of the thyroid tumour, (C),(D): axial and sagittal planes CT showing the sternal metastasis and the thyroid tumour.

the literature. cases of sternal metastasis as the first presentation of PTC are even rarer [3]. We report a case of Sternal metastasis as first manifestation of a PTC in a 59-year-old women. This work has been reported in line with the SCARE 2020 criteria [4].

**2. Case report**

This is a 59-year-old women who was referred by the endocrinology service for sternal metastasis of a papillary thyroid carcinoma, discovered by a painless, firm and fixed presternal mass, with progressive augmentation of the volume which appeared one year before. On clinical examination, the patient presented a, PS 0, tachycardia at 110 pulse, with an enormous painless and very fixed presternal mass. A cervicothoracic CT showed a plunging goiter with sternal localization (Fig. 1), the iodine scintigraphy showed sternal hyperfixation and the biopsy revealed a papillary carcinoma of thyroid origin, staged IV b. The laboratory test assessment showed hyperthyroidism: T4 = 200 nmol / L, TSH = 0.08mIU / L. The patient was treated with levothyroxine at 125 µg / day and during two months for normalization of the thyroid hormones.

After multidisciplinary concertation, a total thyroidectomy with sternal mass resection and adjuvant radioiodine therapy was decided. Under general anesthesia, a total thyroidectomy with lymph node dissection with En-bloc resection of the upper third of the sternum enlarged to the internal part of the clavicle and the first two right ribs and reconstruction as one-stage procedure was performed. Reconstruction of the chest wall was obtained by the rigid reconstruction with 2 titanium bars and coverage with polymesh dual prosthesis (Fig. 2). No perioperative complications occurred; the patient was extubated immediately after surgery and transferred to the intensive care unit (ICU) for monitoring. The postoperative was uneventful and the patient was discharged from



**Fig. 2.** Perioperative images marked with arrow (A) thyroid carcinoma and sternal mass, (B) 1 st surgical step: total thyroidectomy, (C) specimen, (D) 2nd surgical step :Sternal resection and reconstruction using Titanium bars and coverage with Polydual Mesh.

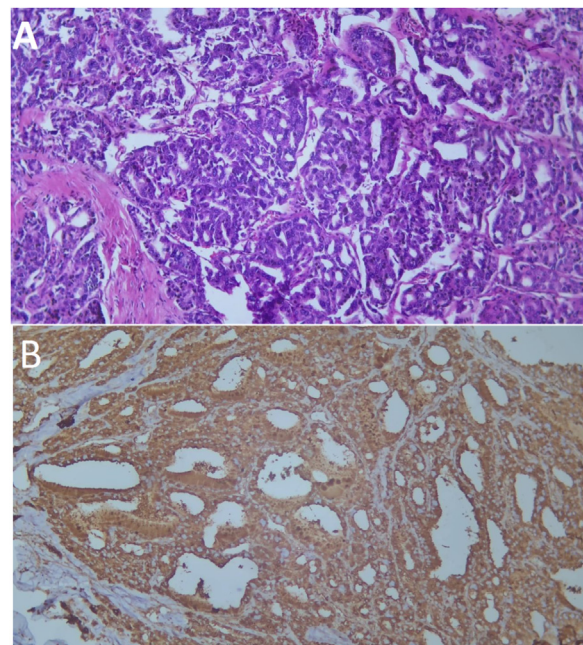
hospital on day 4. She got 200 mCi radioiodine therapy in postoperative. Subsequent anatomo-histological identified on the operative specimen a papillary thyroid carcinoma at 60% and insular at 40% with bone localization:sternal, costal and clavicular resection margins were R0. According to the analysis, the proper dimension of the sternal mass was: 70 mm × 70 mm × 50 mm; weight: 300 g, and the dimension of the total thyroidectomy was 58 mm; Weight: 143 g (Fig. 3). the post-treatment scan did not show any residual iodine-hungry lesions in the breastbone and collarbones. At 1 year of follow-up, the patient was do suppressive treatment well enough with Levothyroxine.

### 3. Discussion

Papillary and follicular carcinomas of the thyroid gland, referred together as differentiated thyroid cancer (DTC), is one of the most curable cancers and is associated with a favorable prognosis. Papillary and follicular carcinomas carry 10-year overall survival rates of 93% and 85%, respectively. Distant metastasis in DTC can be divided into 2 categories: distant metastasis as the initial presenting diagnosis and distant metastasis after the initial treatment of thyroid cancer. The incidence of distant metastasis after the initial treatment of DTC is between 7% and 23%. The frequency of individuals diagnosed with DTC presenting initially with distant metastatic disease ranges from 1% to 9% [1,5].

Patients with DTC may present with extracervical metastasis in 5%–10% of cases at diagnosis. Bone metastasis incidence in patients with FTC is more common compared to PTC (6.8% and 0.4%, respectively). Sternal metastases of thyroid origin are rather uncommon with less than 20 cases being published to date [6–8].

According to the 8th edition of the AJCC, all patients older than the age of 55 years with metastasis (M1) are given a diagnosis of



**Fig. 3.** Histopathology (A) bone localization of papillary thyroid carcinoma, (B) diffuse expression of thyroglobulin.

stage IV B DTC (the most advanced stage), regardless of tumor size (T) and lymph node involvement (N) [9]. There is no consensus for Management of sternal metastasis, due to the lack of cases and randomized studies, complete resection of a isolated

bone metastasis of thyroid origin remains the best option according to several authors. This form of cytoreduction is believed to be generally important for both local palliation and the achievement of tumoricidal doses of RAI to unresectable lesions. A large, retrospective study demonstrated that the presence of solitary bone metastases, and RAI therapy with previous bone surgery were independent factors associated with a better prognosis in patients with differentiated thyroid cancer leading to the 5- and 10-year survival rates of 86.5 and 57.9% respectively [10].

The Sternal resections and reconstructions consist in a radical resection associated with the maintenance of chest stability, lung function and an acceptable cosmetic result. Consequently, a critical point, common to all wide anterior chest-wall resections, is a suitable prosthetic replacement, able to restore the rigidity of the chest and to prevent paradoxical motion, and a healthy soft-tissue coverage able to seal the pleural space, to protect the mediastinum and to prevent infections [11].

Various techniques have been used in the past to repair the defects in the anterior thoracic wall: the fascia lata, rib grafts, large skirl flaps, and the contralateral breast. An important advance has been the use of myocutaneous flaps, thus conserving the tributary vascular system. The possibilities of combining prosthetic materials and myocutaneous skin flaps are potentially infinite, and there is often more than one option for resolving the situation effectively in each individual patient. The need for a skeletal reconstruction depends on the size and site of the resection: it is necessary in case of removal of the sternum and the anterior and lateral tracts of the ribs, but it may not be necessary for the repair of posterior wall defects entirely covered by the scapula or if the defect can be stabilized by the action of the adjacent muscles. Some authors believe that defects of the sternal and posterior walls need to be stabilized less frequently than anterior or lateral defects. Various types of prosthetic material can be used: rigid and nonpolypropylene and Vicryl nets or Gore-Tex patches are well tolerated and easy to handle and can be sutured under tension, thus improving the stability of the thoracic wall [2].

This is the first surgical management in our department for a sternal metastasis of a thyroid carcinoma, a partial sternectomy and reconstruction was performed by using titanium bars and PolyDual MESH for coverage of the pleural space and mediastinum. The titanium bars are always used for rigid reconstruction with a low rate of overall and respiratory complications and a low rate of prosthesis or bars complications. Several rigid reconstruction systems are effectively used and reported in literature. As non-rigid prosthetic materials, the most commonly used are Prolene or Marlex mesh and ePTFE [11].

#### 4. Conclusion

There is no consensus for Management of sternal metastasis, Sternal resection is an important palliative option improving prognosis and survival for patients with thyroid cancer metastases to the sternum, To our knowledge, this is the second case of sternal metastasis as first manifestation of a PTC in English literature.

#### Declaration of Competing Interest

The authors report no declarations of interest.

#### Funding

None.

#### Ethical approval

As per international standard, written ethical approval has been collected and preserved by the author(s).

#### Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

#### Authors' contributions

This work was carried out in collaboration among all authors. Authors NI, HS designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors NI, SH, SB and MR, RK and MK managed the analyses of the study. Author HS managed the literature searches. All authors read and approved the final manuscript.

#### Registration of research studies

Not applicable.

#### Guarantor

Dr Sara Hafidi.

#### Provenance and peer review

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#### References

- [1] M. Osorio, S.P. Moubayed, H. Su, M.L. Urken, Systematic review of site distribution of bone metastases in differentiated thyroid cancer, *Head Neck* 39 (4) (2017) 812–818.
- [2] C. Lequaglie, P.B. Massone, G. Giudice, B. Conti, Gold standard for sternectomies and plastic reconstructions after resections for primary or secondary sternal neoplasms, *Ann. Surg. Oncol.* 9 (5) (2002) 472–479 [Internet] [cité 17 déc 2020] Disponible sur: <https://moh-it.pure.elsevier.com/en/publications/gold-standard-for-sternectomies-and-plastic-reconstructions-after>.
- [3] M. Osorio, S.P. Moubayed, H. Su, M.L. Urken, Systematic review of site distribution of bone metastases in differentiated thyroid cancer: bone metastases in thyroid cancer, *Head Neck* 39 (4) (2017) 812–818, <http://dx.doi.org/10.1002/hed.24655> [Internet]. avr [cité 13 déc 2020] Disponible sur: .
- [4] R.A. Agha, T. Franchi, C. Sohrabi, G. Mathew, A. Kerwan, SCARE Group, The SCARE 2020 guideline: updating consensus surgical CAse REport (SCARE) guidelines, *Int. J. Surg.* 84 (December) (2020) 226–230.
- [5] E. Sampson, J.D. Brierley, L.W. Le, L. Rotstein, R.W. Tsang, Clinical management and outcome of papillary and follicular (differentiated) thyroid cancer presenting with distant metastasis at diagnosis, *Cancer* 110 (October (7)) (2007) 1451–1456.
- [6] Clinical features of bone metastasis for differentiated thyroid carcinoma: A study of 21 patients from a Tunisian center [Internet]. [cité 19 déc 2020]. Disponible sur: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3987268/>.
- [7] M. Osorio, S.P. Moubayed, H. Su, M.L. Urken, Systematic review of site distribution of bone metastases in differentiated thyroid cancer: bone metastases in thyroid cancer, *Head Neck* 39 (4) (2017) 812–818, <http://dx.doi.org/10.1002/hed.24655> [Internet]. avr [cité 13 déc 2020] Disponible sur: .
- [8] J. Yanagawa, F. Abtin, C.K. Lai, M. Yeh, C.D. Britten, D. Martinez, et al., Resection of thyroid cancer metastases to the sternum, *J. Thorac. Oncol.* 4 (8) (2009) 1022–1025, août.
- [9] M. Li, N. Trivedi, C. Dai, R. Mao, Y. Wang, Y. Ning, et al., Does T stage affect prognosis in patients with stage IV B differentiated thyroid cancer? *Endocr. Pract.* 25 (September (9)) (2019) 877–886.
- [10] B.R. Haugen, E.K. Alexander, K.C. Bible, G.M. Doherty, S.J. Mandel, Y.E. Nikiforov, et al., American Thyroid Association Management Guidelines for

adult patients with thyroid nodules and differentiated thyroid cancer: the American Thyroid Association Guidelines task force on thyroid nodules and differentiated thyroid cancer, *Thyroid* 26 (January (1)) (2015) 1–133 [Internet]. 2016 [cité 19 déc 2020] Disponible sur: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4739132/>.

[11] S. Bongioli, L. Voltolini, S. Borgianni, R. Borrelli, M. Innocenti, G. Menichini, et al., Short and long-term results of sternectomy for sternal tumours, *J. Thorac. Dis.* 9 (November (11)) (2017) [Internet] [cité 17 déc 2020] Disponible sur: <http://jtd.amegroups.com/article/view/16968>.

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