Solitary Sternal Metastasis - A Uncommon Presentation of Thyroid Papillary Carcinoma

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Abstract
Secondary sternal lesions are extremely uncommon, especially thyroid cancer. Our case is a 31 years old male patient undergoing thyroidectomy thrice and radioiodine treatment thrice. A suprasternal mass was found; the uptake of upper manubrium is strong at radioiodine treatment but borderline low at positron emission tomography. The lesion was proved to be a solitary metastasis from thyroid papillary carcinoma. According to recent literature, metastasectomy isn’t only a curative or palliative procedure but maximizes the effect of subsequent radioiodine treatment.

Introduction
The most common bone cancer is metastasis. Thyroid cancer may present with asymptomatic bone metastasis and be included in differential diagnoses [1,2]. The incidence of distant metastasis is 10% ~ 20% of thyroid cancer. Only 1% ~ 3% of thyroid cancer is diagnosed with distant metastasis. Sternal metastasis by thyroid cancer is very rare. Differentiated thyroid cancer such as papillary carcinoma or follicular carcinoma is treatable and usually curable; however, the metastases of bone or lung worsen the prognosis. Early diagnosis and complete resection are important. This is a unique case of a 31-year-old male patient presenting with sternal metastasis by thyroid papillary carcinoma.

Case Presentation
A 31 years old man without known underlying diseases complained his right neck mass for 2 months. Patient visited the office, and the examination was a right thyroid solid mass and bilateral cervical lymph nodes at ultrasound (Figure 1). The cytology of fine needle aspiration was papillary carcinoma. The 1st operation, radical thyroidectomy, bilateral neck lymph node dissection & left internal jugular vein partial resection, was performed. The pathological report was papillary carcinoma, bilateral T3bN1bM0. The 1st radioiodine treatment was done on July 5th, 2018 (Figure 2). From the thyroid scintigraphy, there was an uptake at thyroid area and sternum. There was thyroid cancer recurrence during the follow-up; the 2nd radioiodine treatment was done on August 12th, 2019 (Figure 3). There was still an uptake at thyroid area and sternal region. A mass at his left lower neck just above the manubrium and clavicle was confirmed with ultrasonography (Figure 4). The 2nd operation, partial intramuscular tumor excision, was performed on October 24th, 2019; there was residual mass deeply seated near the subclavian vein. The pathological report was papillary carcinoma. Copyright © 2021 Fan-Ting Liao. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Figure 1: Thyroid echo: a) right thyroid mass, b) rich blood supply at Doppler mode, c) paratracheal lymph node.
carcinoma, indicating cancer recurrence. The 3rd radioiodine treatment was done on February 14th, 2020 (Figure 5). Because there was still an uptake at the sternal site, magnetic resonance imaging was scheduled, where a solid mass was noted at sternum (Figure 6). Positron Emission Tomography (PET) was also arranged, where there was mild uptake at his sternum, whose maximal standardized uptake value was 2.2 (Figure 7). The 3rd operation, partial resection of sternum and left clavicular head, was performed on June 8th, 2020 (Figure 8). The pathological report was papillary carcinoma. There was no any sternal uptake at 4th radioiodine treatment on September 17th, 2020 (Figure 7). The patient was under regular follow-up.

Discussion

Sternal metastasis is commonly seen in lung and breast cancer. Sternal metastasis by thyroid cancer, especially papillary carcinoma, is extremely rare [1]. The sternum is the fifth bone metastatic site of thyroid cancer after the pelvic girdle, ribs, vertebrae and skull. The sternal metastasis is mostly by the lymphatic or hematogenous route and more rarely by direct invasion spreading from cervically lymph nodes [1,2]. Considering our case’s history, patient’s initial presentation was thyroid cancer with bilateral neck lymph nodes invasion undergoing operation thrice and radioiodine treatment thrice. It was possibly that

Figure 2: 1st radioiodine treatment.

Figure 3: 2nd radioiodine treatment.

Figure 4: Thyroid echo showed neck mass recurrent.

Figure 5: 3rd radioiodine treatment showed an uptake at sternal area.

Figure 6: MRI: a sternal mass.

Figure 7: PET revealed low uptake at sternal area.

Figure 8: 3rd operative finding: a) operative field, b) the sternal mass.
the sternal metastasis was by direct invasion spreading from cervical lymph nodes. The pathological report of the 3rd operation (Figure 9) was sternal invasion with intact bone cortex, indicating the metastasis was via hematogenous route instead of direct invasion. The prognosis of differentiated thyroid cancer is good and 10-year survival is over 90%. The metastasis of thyroid cancer is mainly in the bones and lungs. Even though the recent data are limited, the 5 and 10-year overall survival of bone metastasis by in differentiated thyroid cancer is 61% and 27%, respectively [2-10]. Radioiodine therapy is the gold standard treatment for metastatic thyroid cancer; however, poor uptake of the agent limits its usefulness. The radioiodine therapy is effective for lung metastases, but bone metastases can’t be cured with radioiodine therapy alone [4-18]. Therefore, surgical intervention is strongly recommended (Figure 10). Nevertheless, metastasectomy is only indicated when there is a single metastasis, the primary thyroid cancer is totally resectable, and patient’s general state is adequate. In short, the complete resection of the sternal metastasis could be curative, provide symptomatic palliation, prolong overall survival and allow effective radioiodine treatment to pulmonary and visceral metastasis or local recurrence.

To detect the lesions, the PET may be adopted. It is reported that dedifferentiated thyroid cancer has more aggressive behavior and less iodine avidity. It may be due to the loss of expression of sodium iodide symporter. Dedifferentiated thyroid cancer might be negative finding at thyroid scan with the loss of iodine avidity but positive finding at PET. Therefore, PET has a role in identifying the extent and entity of thyroid cancer, aiding and guiding the further management [15-20]. Comparing to developed distant metastasis after initial presentation, initial distant metastases has a better prognosis. Furthermore, the old diagnosis age (especially older than 60 years old), type of pathology (follicular is worse than papillary), and no iodine-avidity increase the risk of recurrence and death [20-22]. Surgical extirpation of the solitary bone metastasis of thyroid cancer is recommended for improved survival and life quality. Stojadinovic et al. [23] showed that complete metastasectomy may be associated with improved survival for localized distant disease. Zettinig revealed excision of the bone metastasis is a significant prognostic factor for improved survival of distant metastases confined to bones: It is concluded that without extra-skeletal distant metastasis, the complete resection of bone metastases may improve the prognosis. Our case is the local recurrence of thyroid papillary carcinoma with sternal invasion, which was managed successfully by partial sternal resection.

In conclusion, surgical intervention may be a favored treatment for bone metastasis by thyroid cancer to prolong overall survival.

References


