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# **Case Report**

# **STERNAL METASTASIS OF DIFFERENTIATED THYROID CANCER: REPORT OF THE THREE CASES**

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#### **ABSTRACT:**

Bone metastasis is the second most commonly involved site for differentiated thyroid cancer (DTC) and 20% of these bone metastases are present in the sternum. Considering the radioiodine treatment (RIT) insensitivity of bone metastases, surgical treatment has been recommended by many surgeons. This report describes three cases of sternal metastases from DTC managed by surgery involving partial sternectomy followed by reconstruction of the chest wall with PTFE mesh. The surgical resection of sternal metastases in patients with DTC could be recommended since it could be curative, provide symptomatic palliation, or allow more effective RIT in concurrent metastases.

KEY WORDS: Bone metastasis, thyroid cancer, radioiodine treatment, case report

#### **INTRODUCTION**

Papillary and follicular carcinomas commonly known together as differentiated thyroid cancers (DTC) are accepted as one of the most curable cancers and are associated with a reasonable prognosis. Distant metastases are uncommon at initial presentation, but may ultimately develop in up to 20% of patients. The most common site for metastasis is lungs followed by bone, liver, and brain. The frequency of patients diagnosed with DTC and presenting initially with distant metastatic disease ranges from 1 to 9%. Bony metastases have been reported to occur in 1-4% of all cases of DTC [1].

Radioiodine ablation of metastases is an option, but it is reported to cure only 7% of patients with bone metastases [2]. DTC is a relatively slow-growing malignancy, and surgical treatment might provide a palliation for several years or even have a chance of being cured. Complete surgical resection of bony metastases offers the best chance for prolonged survival and has been recommended by several authors [3, 4, 5, 6]. These three cases are reported in order to evaluate the effectiveness of resection in the management of sternal metastases of DTC.

#### **CASES AND METHODS**

A total of three patients treated for sternal metastases of DTC in our clinic between 2000 and 2010 and were evaluated retrospectively. **Case 1** 

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A 67 years old female patient had undergone thyroidectomy in a local medical instution about 20 years ago, however, we were unaware of the details of surgical procedure (operative note and pathology report could not be obtained). The patient was admitted to a different instution with complaints of headache which lasted about two years with the diagnosis of intracranial mass operated by a brain surgeon. The final pathological report indicated follicular thyroid carcinoma metastasis in that instution. Completion of thyroidectomy and right modified radical neck dissection were then performed in the same clinic. Pathological examination results were reported as: widely invasive follicular carcinoma. When the patient was admitted to our clinic with residual tissue in the left lobe detected by Tc-99m thyroid scintigraphy, previous pathology specimens were re-examined in our center and the result was reported as follicular variant of papillary carcinoma. In the meantime, a growing mass was present on the sternum (Figure1a). Whole body bone scan, chest, and brain computer tomography (CT) were performed. Whole body scan revealed an irregular involvement activity in the cranium which was thought to be due to prior craniotomy sequel. Additionally, an irregular focal osteoblastic activity was detected in the right aspect and around manibrium sterni. Thorax CT revealed a sternal mass protruding both to external and internal cortex of manibrium sterni and the innominate vein also seemed to be invaded by the mass. Brain CT demonstrated hiperdensity in both parietal lobes due to prior operation. Then, magnetic resonance imaging (MRI) was performed in order to evaluate the relationship between the sternal mass and surrounding tissues. Thoracic MRI eliminated the possibility of vascular invasion. Left completion thyroidectomy, with the partial sternectomy was performed. The defect was reconstructed with a 10x15 cm PTFE mesh (Gore-Tex®), (Figure1b). Pathological report stated metastasis from thyroid papillary carcinoma. Then, the patient was referred to the endocrinology department for 131 iodine (I) whole body scan and radioactive iodine treatment (RIT) planning. RIT was administered once with a dosage of 154 mCi. She is still good in health at the postoperative 15th month. Case 2

A 53 year old male patient had undergone left lobectomy due to nodular colloidal goiter in a local hospital in 2005 and the pathology diagnose was reported as: nodular colloidal goiter in the material of left lobectomy and no malignant foci was detected. A mass became apparent on the chest wall approxiamtely three months later. The patient was admitted to our clinic with this complaint. Patient underwent neck and thorax CT scan. An approximately 6x5x5 cm heterogeneous sternal mass originating from the inferior right lobe of the thyroid gland was detected and was considered as a direct invasion to sternum in those images. Mass extending towards the mediastinum also destructed the sternum (**Figure2a**). Fine-needle biopsy of the mass on the sternum was reported as suspiciously positive. Complementary right lobectomy, right modified radical neck dissection, and partial resection of the sternum were performed with a T-shaped skin incision. The remainder sternum was reconstructed with a 10x15 cm PTFE mesh (Gore-Tex®), (**Figure2b**). The final pathology diagnose was reported as: "micro papillary carcinoma in two different foci in the right lobe of the thyroid gland and the invasion of papillary carcinoma to sternum."

The patient was referred to the endocrinology department for 131I whole body scan and RIT. RIT was administered twice starting from post-operative period until December 2010. The increasing dosages of RIT was started with 154 mCi and ended with 377 mCi

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whereas the scanning dose was 5 mCi. The whole body scan in December 2010 revealed images that could be related with metastases in lung, cranium, and nasal region. The patient is still alive and in our follow up.

Case 3

A 67 year old female patient was hospitalized in a thoracic surgery clinic with the complaint of swelling in sternum in April 2000. Thorax CT revealed two masses; one in manubrium sterni and the other in the left side wall of the chest. Thyroid cancer metastases were identified in the pathological examination of the incisional biopsy of the mass on the sternum. Then, a general surgery consultation was requested and the patient was evaluated. It was decided to remove the thyroid gland and manubrium sterni. Total thyroidectomy and partial sternectomy were performed with Kocher's classic 'Collar' and Sternal T incisions in July 2000. The sternal defect was repaired with a 10x15 cm PTFE mesh (Gore-Tex ®). The postoperative period was uneventful and she was discharged at postoperative 12<sup>th</sup> day. Left lateral thoracic wall resection (2nd metastesectomy) was planned for another session. Unfortunately, she died at post-operative 3rd month due to acute myocard infarction (AMI).



**Figure 1a.** Thorax CT revealed a Sternal Mass protruding external and internal cortex of Manubrium stern. Innominate Vein is also seems invaded by the mass



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Figure 1b. The exfoliating sternal metastatic tumor was seen at the operative field and manubrium stern and a bit of corpus sternum was resected.



Figure 2a. Thorax CT shows a round heterogenic mass originating from sternum

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Figure 2b. The prosthetic graft is seen under pectoral muscles, which stabilized the respiratory mechanics

#### DISCUSSION

Bone metastasis is the second most commonly involved site [1], and 20% of these bone metastases are present in the sternum [4]. Considering the radioiodine insensitivity of bone metastases, surgical treatment has been recommended by many surgeons [3, 4, 5, 6]. Even if there are multiple metastases, resection of bone metastases can allow more efficient RIT of visceral metastasis and has a favorable effect on prognosis and the patient's quality of life. We support this approach and always try to resect metastases whenever feasible, and we performed surgery in all patients in our current study.

Despite the indolent course of DTC, the appearance of bone metastasis indicates a poor prognosis [6]. Yangawa et .al [3] rewieved a total of ten previous case reports including one of their own case, and reported variable follow-up time (3 months - 4.5 years) in those reports. One of our cases (3<sup>th</sup> case) died due to AMI within the 3 months following the surgery. New metastases in lung, cranium, and nasal region were detected in one of our patient (2<sup>nd</sup> case) in the postoperative fifth year. Furthermore, this patient received RIT twice. The patient is still alive and in our follow up. First case is still good in health at the postoperative 15th month and received RIT once.

Yangawa et .al [3] also reported the tumor types in all previous cases. Six of them were folicullar carcinoma, and the rest four of them papillary tumor including three poorly differentiated with follicular type, whereas our three patients had papillary carcinoma including one follicular variant. Aproximately, half of patients in previous cases reconstructed with Marlex mesh, whereas only one Gore-Tex® graft was used for reconstruction. We used Gore-Tex® PTFE graft in all our cases, and no complication was occurred in the postoperative period due to mesh.

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## CONCLUSION

Although it is difficult to cure such DTC cases with sternal metastases, it could be suggested that the surgical resection if possible, not only as a curative measure but also for the potentiation of RIT for concurrent metastases.

**Conflict of interest statement**: Ali Kagan GOKAKIN, Mustafa ATABEY, Ayhan KOYUNCU, Melih KAPTANOGLU and Omer TOPCU have no conflict of interest.We were not supported by any firm or organisation etc..

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