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Bone and Lung Metastasis of Papillary Thyroid Carcinoma in 64-Year Old Man

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A B S T R A C T

Thyroid nodules are a common clinical problem. Epidemiologic studies have shown the prevalence of palpable thyroid nodules to be approximately 5% in women and 1% in men living in iodine-sufficient area but high resolution ultrasound can detect thyroid nodules in 19%-68% depending to age of patients. The patient is a 64 year old man who was presented to our medical center 7 year after a right hemithyroidectomy due to a large nodule. Fine needle aspiration of the thyroid nodule demonstrated Adenomatous goiter. Pathology of the nodule was follicular variant of papillary thyroid carcinoma with capsular invasion and the patient didn't any follow up until 8 months ago who came to this center with pain in left Humerus. Lung and bone metastases are a relatively uncommon finding in patients with well differentiated thyroid cancer. Radio Iodine therapy of Iodine-avid bone metastases has been associated with improved survival and should be employed although Radioactive Iodine is rarely curative. Patients undergoing radio Iodine therapy for bone metastases should also be considered for directed therapy of bone metastases that are visible of anatomical imaging. This may include surgery, external beam radiation therapy, and other focal treatment modalities.

Introduction

Thyroid nodules are a common clinical problem. Epidemiologic studies have shown the prevalence of palpable thyroid nodules to be approximately 5% in women and 1% in men living in iodine-sufficient area but high resolution ultrasound can detect thyroid

nodules in 19%-68% depending to age of patients.(1)

The clinical importance of thyroid nodules rests with the need to exclude thyroid cancer which occurs in 7%-15% of cases depending on age, sex, radiation exposure history family history and other factors.(1)

Patients with differentiated thyroid carcinoma have a 10 years Survival rate of 80-95% however when distant metastasis are present, the overall 10 years survival rate is 40%.(2,3) A more recent study shows that survival drops to 14% for patients older than 40 years with bone and lung metastases.(4,5) After the age of 40 years 10% of patients with papillary thyroid carcinoma, 25% of patients with follicular thyroid carcinoma develop distant metastases.(5,6)

Although follicular thyroid carcinoma accrues for less than 15% of all differentiated thyroid cancers, it has an incidence of bone metastases of 7-20%.(5,7) Bone metastases are much less common in papillary thyroid cancer. (8)

The case

The patient is a 64 year old man who was presented to our medical center 7 year after a right hemithyroidectomy due to a large nodule. Fine needle aspiration of the thyroid nodule demonstrated Adenomatous goiter. Pathology of the nodule was follicular variant of papillary thyroid carcinoma with capsular invasion and the patient didn't any follow up until 8 months ago who came to this center with pain in left Humerus. Radiology reports of left arm demonstrated osteolytic lesion in left Humerus with thin cortex and expansion of lesion. (Figure 1)

Three phasic bone scan with Tc99m-MDP (Methylene Di-Phosphonate) showed increased radiotracer distribution and uptake in proximal third of left arm, which was localized to proximal of left humeral shaft on delayed images. Whole body bone scan also showed mild hyperactivity in dorsal spine, knees and ankles, which most likely were due to degenerative changes (figure 2a and b).

The exploration has revealed a mass measuring 5cm involving the proximal site of the left arm, having a solid appearance.

Macroscopic examination has consisted of fragments of gray-brown elastic and osseous tissue measuring 1x0.5x0.5 cm.

Histological examination of tissue sections has revealed proliferation of neoplastic cells in the papillae with fibrovascular cores. Papillae lined by cuboidal cells, the nuclei of neoplastic cells were overlapping with finely dispersed optically clear chromatin. Also there were micronucleoli and some intranuclear inclusions with occasional grooves. Tumor was surrounded by bone tissue.

The resected tissues have also subjected to Immunohistochemistry. The tumor cells were strong positive for thyroglubin and some of them were positive for TTF1 but none reactive for EMA.

The pathological evaluation has revealed the diagnosis of metastatic thyroid papillary carcinoma. Figure 3

In physical examination right and left lobe of thyroid was normal without nodule and lymphadenopathy. Thyroid ultrasonography revealed remnant of thyroid tissue in bed of both lobes (right lobe 15×9.5×8.5 mm and left lobe 21×18×17mm without nodule and neck lymphadenopathy). Laboratory assessment showed raised serum

thyroglobulin (150 ng/ml) in the presence of euthyroid state (TSH: 3.9 mIu/L) without anti-thyroglobulin antibodies. He didn't use levothyroxine at all.

After these evaluations the patient underwent to total thyroidectomy. Pathological examination of second thyroid surgery showed normal thyroid tissue without any malignancy. TSH and Thyroglobulin were matured 30 days after total thyroidectomy (TSH was 3 mtu/nl and thyroglobulin =158 ng/ml).

Fig.1

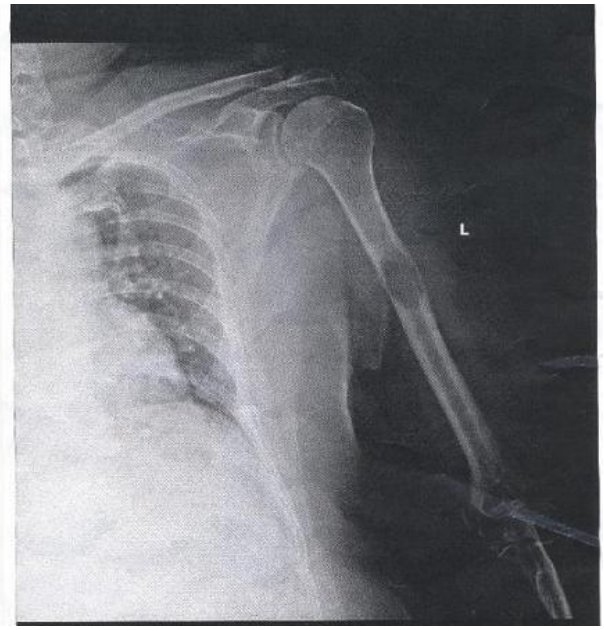


Fig.2a Blood Pool Bone Scan with Tc99m-MDP

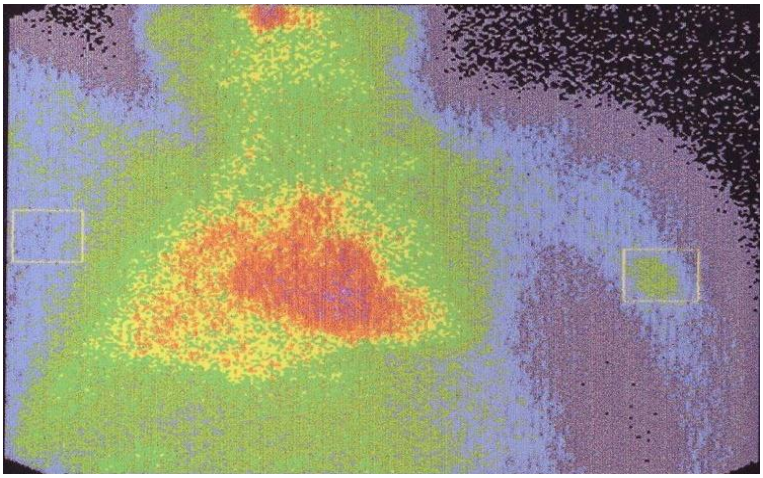


Fig.2b Whole Body Bone Scan with Tc99m-MDP

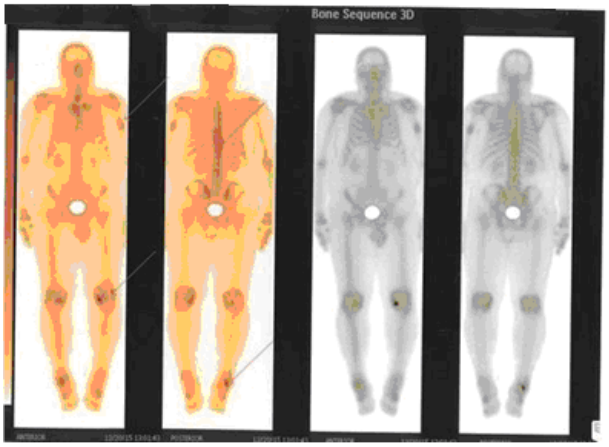


Fig.3

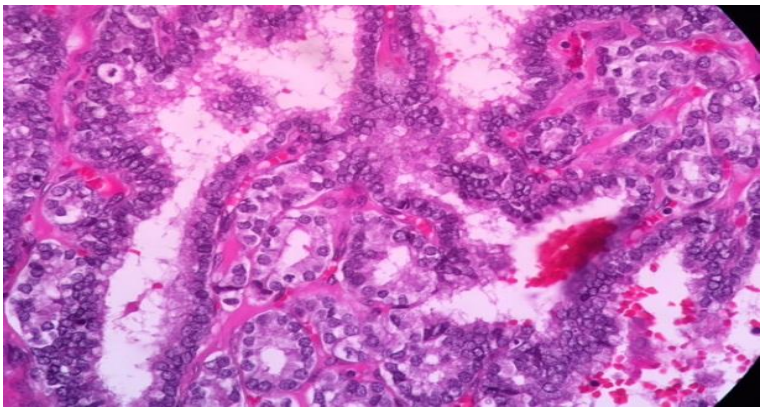


Fig.4 Whole Body Scan after treatment with I-131

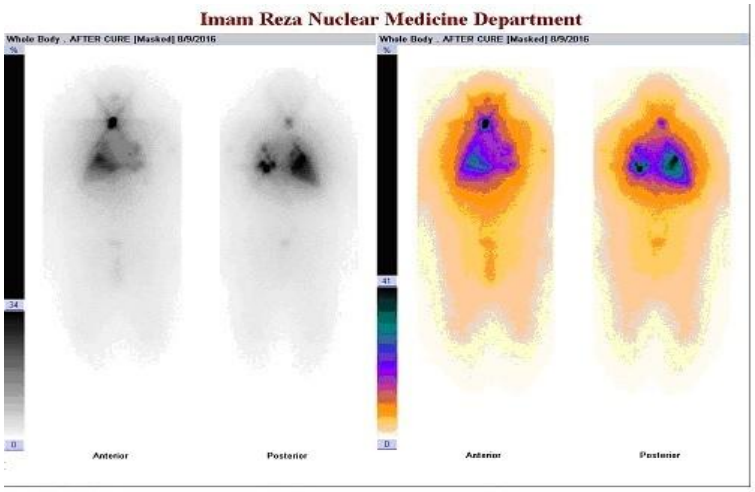
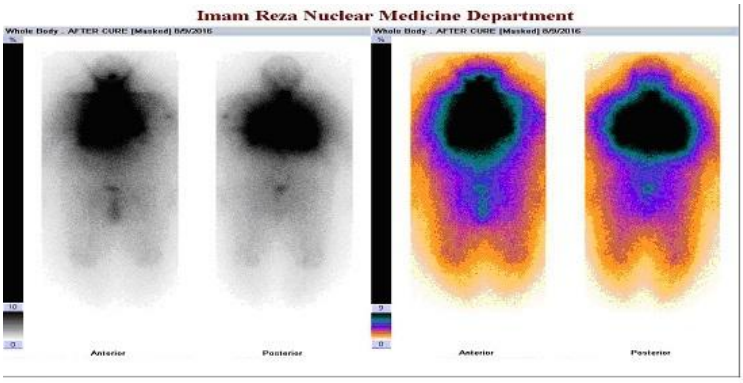


Fig.5 Whole Body Scan after treatment with I-131, Radioiodine uptake in metastatic lesion in left humeral lesion



Control neck ultrasonography revealed no evidences of thyroid tissue remnant. CT scan of neck and lung was performed and no abnormality was seen.

Functional metastases are very rare in papillary thyroid carcinoma and this picture was seen in follicular thyroid carcinoma. The patient's presentation with metastatic papillary thyroid carcinoma raised obvious question about the accuracy of his original papillary thyroid carcinoma diagnosis upon hemithyroidectomy seven years ago. Attempts to locate and review his pathological material were successful and papillary thyroid carcinoma was reported. He also received 20 GY external beam radiotherapy to left humerus. The patient underwent rh-TSH-stimulated I_{131} whole body dosimetry and received 200 mci-I_{131}. One week after oral administration of 200 mci I_{131} in other center, whole body scan performed.

Post-treatment whole body scan revealed prominent radioiodine uptake in bed of thyroid remnant and bilateral lung metastasis (figure 4).

There is also faint focal increased activity in proximal of left humerus in the region of known bone metastasis (figure 5).

Semiquantitative assessment revealed more radioiodine uptake in thyroid bed and lung lesions comparing to humeral bone lesion (Thyroid count/ Humeral lesion count = 13.5). Thyroglobulin and TSH after rh-TSH were 472 ng/ml and 100 mIu/ml respectively.

Six months after I_{131} therapy and external beam radiotherapy of Humerus thyroglobulin was and TSH after withdrawal of levothyroxine. The patient was prepared for a second dose of 200 mci-I_{131} and his post therapy scan revealed intense activity within both Lungs and left humerus. His thyroglobulin had declined to with suppressed TSH on levothyroxine. He continues to undergo laboratory evaluation several times in one year and scheduled for annual imaging studies to evaluate his disease status. There are no plans to administer I_{131} unless there is evidence of disease progression.

Conclusion

Lung and bone metastases are a relatively uncommon finding in patients with well differentiated thyroid cancer.(9) Comprehensive imaging studies such as whole body bone scan, MRI, CT in addition to I_{131} whole body scan are in dictated in these patients to fully evaluate extent of

their disease and any improvement or progression in response to therapy.(10,11)

Published studies demonstrate that the presence of bone metastases dearly conveys a worse prognosis for patients with thyroid cancer.(12) Although radioactive iodine therapy remains the standard of care in patients with iodine avid tumor, its efficacy for bone metastases may be limited.(13,14)

Patients with skeletal metastases often require additional adjuvant therapy to alleviate symptomatic disease. (11,15). Pulmonary micro-metastases should be treated with radioactive iodine therapy and radioactive Iodine therapy should be repeated every 6-12 months as long as disease continues to concentrated radioactive Iodine and respond clinically because the highest rates of complete remission are reported in these subgroups. Radio iodine-avid macro-nodular metastases may be treated with radioactive Iodine and treatment may be repeated when objective benefit is demonstrated but complete remission is not common and survival remains poor.(14,16)

Radio Iodine therapy of Iodine-avid bone metastases has been associated with improved survival and should be employed although Radioactive Iodine is rarely curative.(17,18) Patients undergoing radio Iodine therapy for bone metastases should also be considered for directed therapy of bone metastases that are visible of anatomical imaging. This may include surgery, external beam radiation therapy, and other focal treatment modalities. (19)

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