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(CASE REPORT)

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A solitary brain metastasis from papillary carcinoma of thyroid: Case report

Unais CT *, Yatin V Raiyani and M Balamurugan

Department of Neurosciences, Apollo Specialty Hospital, Teynampet, Chennai, India.

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Abstract

Background: Brain metastasis from papillary thyroid carcinoma is very rare and has a bad prognosis. There is no standard diagnostic treatment protocol for brain metastatic papillary thyroid carcinoma. Here we present a case report of Solitary brain metastasis from papillary carcinoma.

Case report: A 52-year-old woman who had undergone a near total thyroidectomy with left functional neck dissection and high-dose radioiodine therapy for papillary thyroid carcinoma with regular follow-up. She presented with headaches with raised intracranial pressure symptoms. Magnetic Resonance Imaging (MRI) of brain revealed left temporal space occupying lesion. I^{131} scan was negative. She underwent a craniotomy and a gross total excision of the lesion. Histopathological diagnosis confirmed as papillary thyroid carcinoma.

Conclusion: This is a rare case of brain metastasis from papillary thyroid cancer. MRI is the best imaging tools for screening and diagnosis when compared to other techniques. Surgery and stereotactic radiosurgery are the main treatments.

Keywords: Papillary Thyroid Carcinoma; Brain Metastasis; I-131 Scan; Radiosurgery

1. Introduction

Papillary Thyroid Carcinoma (PTC) is the most common form of thyroid cancer which arises from follicular cells of thyroid gland. It has a good prognosis as compared to other forms of thyroid carcinoma. [1] The average age of incidence is middle age adults with female preponderance. The metastasis is less common and usually spread to regional lymph nodules. Distant metastases to lung and bone are very rare and can only be identified in 1-7% of cases. [2] It is extremely uncommon for papillary thyroid cancer to spread to the brain 0.1-5 %, suggested an aggressive disease and has poor prognosis. Early diagnosis and treatment of brain metastasis can help for long term survival. Management of brain metastases from thyroid papillary cancer is controversial. [3] In this case report, we present the histologically confirmed clinical characteristics of a solitary case of brain metastasis originating from papillary thyroid carcinoma.

2. Case report

A 52-year-old lady presented with swelling in the neck in June 2021. She was diagnosed with papillary carcinoma of the thyroid with regional lymph node metastasis. A fine needle biopsy (FNAC) of the cervical lymph node revealed metastatic papillary thyroid carcinoma. She underwent a near-total thyroidectomy and a left functional neck dissection in June 2021. Post-surgery, she received I-131 high-dose radiation ablation therapy given under rhTSH protocol (134 mCi) on July 2021. She was symptomatically free for 15 months with normal serum thyroglobulin level and was managed with Thyroxine 150 mg daily. In December 2022, she presented with a moderate-intensity headache associated with vomiting and blurring of vision for the past two weeks. On clinical examination, she had grade one

* Corresponding author: Unais CT

papilledema with normal higher mental and lobar functions. Her serum thyroglobulin was markedly high (1,432 ng/mL). She was evaluated with I-131 whole body scan which showed no significant residual functioning thyroid tissue in the neck and no demonstrable tracer avid metastasis (Figure 1). On further evaluation, MRI brain showed a left temporal T2/flair hyperintense, contrast-enhancing lesion with significant perilesional oedema and mass effect (Figure 2).

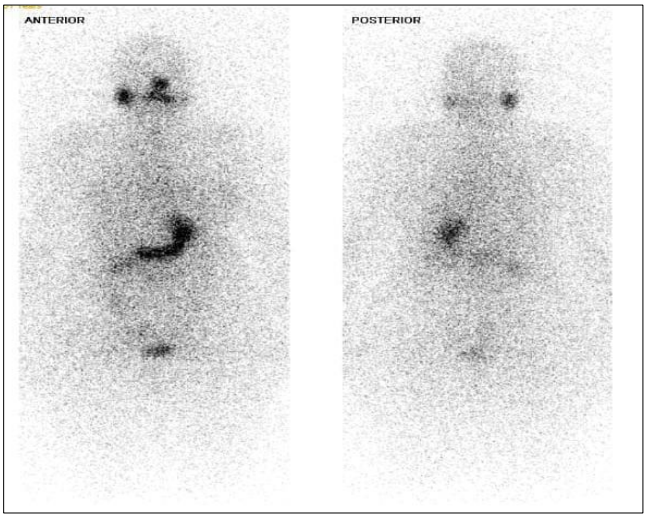

Figure 1 I-131 Whole Body Scan showing no significant uptake in neck and other regions.

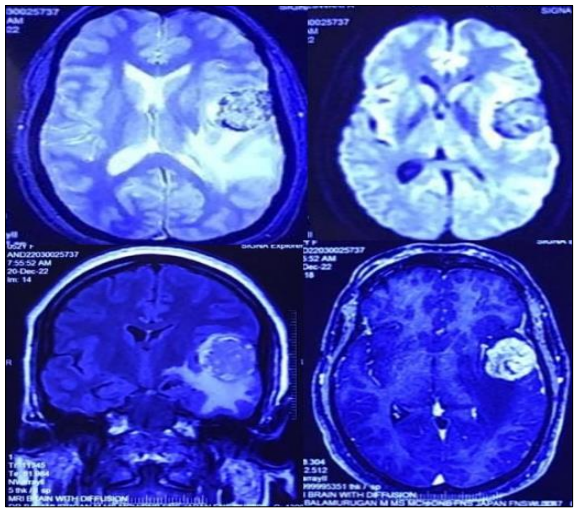

Figure 2 Pre-operative MRI Brain showing well-defined left temporal T2/flair hyperintense lesion with markedly contrast enhancement.

She underwent a left frontotemporal craniotomy and a gross total excision of the lesion in December 2022. Intraoperatively, the tumour was intra-axial without a dural invasion. The tumour was located in temepro-opercular regions and its was sub-pail and pinkish, soft to firm, and moderately vascular. Frozen was reported as a metastatic lesion with papillary features. The histopathology examination diagnosed as metastatic papillary carcinoma of thyroid. Radiation iodine scan revealed no brain uptake after surgery, and post-operative MRI brain revealed no residual lesion. Post surgery patient received adjuvant radiotherapy for brain metastasis (30Gy in 5 fraction) on January,2023.

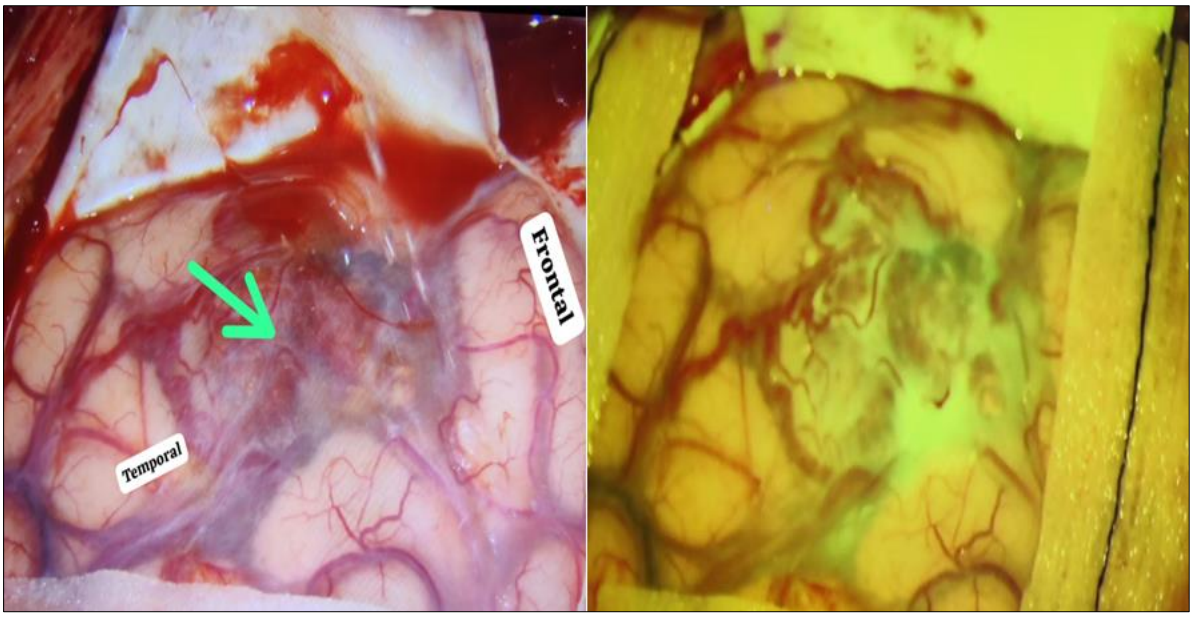

Figure 3 Intra-operative finding showing left tempero-opercular sub-pial fluorescein enhancing lesion without dural involvement

The patient is under regular follow-up, and there has been no evidence of progression till date with normal

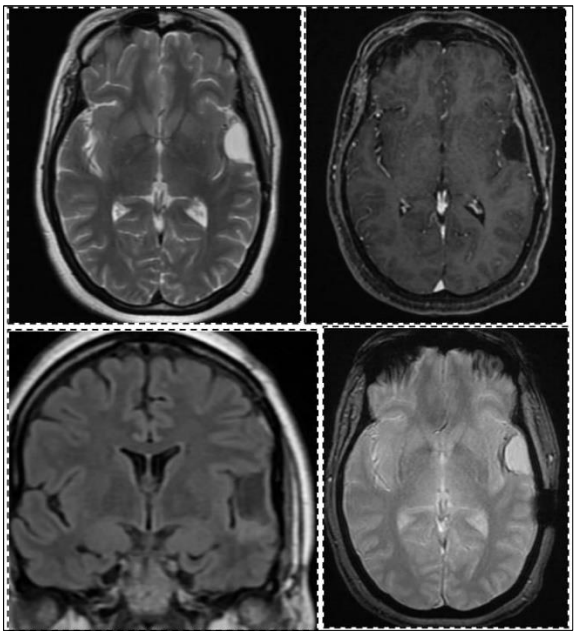

Figure 4 Post operative follows up MRI at 12 months showing no residual lesion

Figure 5 Follow up CT Brain after 18 months showing no recurrence of the tumor

3. Discussion

Papillary Thyroid Carcinoma (PTC) is the most prevalent subtype of thyroid cancer. It has a favourable prognosis, with a 97.8% survival rate for nonmetastatic lesions. [4] Metastases are infrequent and typically manifest in adjacent lymph nodes. Distant metastases from PTC manifest primarily in the lungs and bones. Brain metastases originating from papillary thyroid carcinoma are exceedingly uncommon but critical to detect due to their detrimental prognostic implications.

The most common brain metastatic site in papillary thyroid carcinoma is the cerebral hemisphere, followed by the cerebellum and sellar region. Solitary metastatic lesion is rare. Nonspecific symptoms include headache, focal neurologic impairment, cognitive dysfunction, seizures, and stroke are indicative of brain metastases (3). The patient with papillary thyroid carcinoma has a good prognosis, with an average 10-year survival rate. The MACIS scale, AGES, and TNM stages are the prognostic indicators. Patients diagnosed with brain metastases are categorised into high-risk categories in all staging systems and have a poor prognosis of less than one year (4,5)

Iodine 131 full body scans for PTC patients are screening test for brain metastases in addition to other distant metastases, but it less sensitive for brain lesions, because of less uptake of Iodine 131 (6). Salvati et al. documented a case series of 12 patients who had a solitary brain metastasis, and none of them exhibited any positive results in the iodine 131 full body scan (7). Furthermore, to confirm the location of brain metastatic lesions, 131I-SPECT/CT is advised (8). Despite greater sensitivity and specificity than other imaging modalities, magnetic resonance imaging (MRI) is the recommended method for evaluating brain metastases (9, 10).

The choice of treatment for brain metastases in PTC are variables and depending clinical, radiological, nutritional and performance status of the patient. The surgical resection, radiation therapy, radio iodine therapy are the treatment modalities. When it comes to symptomatic, isolated focal, or less than three tumours with good performance status, neurosurgical excision appears to be the main course of treatment. Retrospective investigations by McWilliams RR et al and Tsuda K et al have confirmed that overall survival is much longer in the group with resectable brain metastases than in the group with unrespectable brain metastases (9,10). Following surgery, the second course of treatment could be radiation therapy, which includes focused external beam radiation therapy, SRS, or whole-brain radiation therapy (11), between these, SRS is an effective local treatment option that can be used for minor, many, and deep metastases (12). It is unknown how radioiodine therapy in PTC affects the prognosis of brain metastases. According to Sheu et al., radioiodine in conjunction with other therapeutic approaches may enhance a patient's quality of life in a tiny percentage of cases. (13) According to Le Ngoc Ha1et al., tumours that absorb radioiodine typically have a better prognosis than tumours that do not. (14)

Based on reviews of the above reports, the present case is suitable for surgical resection because the lesion is solitary. The whole-body iodine 131 scan shows no evidence of active residual or recurrence of the lesion; therefore, MRI is the best diagnostic tool for detecting metastatic lesions.

4. Conclusion

It is quite uncommon for papillary thyroid cancer to spread to the brain. It is essential to use histology or radioiodine investigations for diagnosis detection and confirmation because of the negative prognostic significance. A combination of MRI, 18F-FDG PET/CT with contrast enhancement, and 131I-SPECT/CT can be used to screen for brain metastases. For patients with symptomatic, solitary, or less than three metastatic tumours and a good performance status, surgery is the main therapy option. Multiple tiny, deeply localised metastatic tumours are candidates for SRS. In addition, radioiodine may play a part in prognostic prediction and in combination therapy with other modalities.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest while conducting the study.

Statement of informed consent

Informed consent was obtained from study participant included in the study.

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