



Parotid Metastasis in a Case of Papillary Thyroid Carcinoma: Case Report and Review of Literature

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Abstract Papillary thyroid carcinoma (PTC) is the most common differentiated thyroid neoplasm. Common sites of regional and distant metastasis includes lymph nodes, lungs and bone. 51 year old female patient who was a known case of PTC with a history of multiple surgeries, radioactive iodine therapy (RAI) and oral chemotherapy presented with a painful right parotid mass. PET scan demonstrated FDG avid lesions in the right parotid gland, cervical lymph nodes and other distant sites. Cytology report showed features of metastatic PTC. Patient underwent extended total parotidectomy with facial nerve resection, skin and masseter muscle resection and extended radical neck dissection. Final histopathology (HPE) report showed metastatic papillary carcinoma thyroid. Patient is currently on oral chemotherapy and on regular follow up. PTC rarely metastasizes to parotid gland and such cases have to be treated with surgery alone or with a combination of surgery and RAI based on tumour burden.

Keywords Papillary thyroid carcinoma · Parotid mass · Metastasis to parotid · Tall cell variant

Introduction

Majority of metastasis to the parotid gland are from cutaneous tumours of the scalp, face, external ear, eyelids, or nose. Metastasis from primary sites below the head and neck region are uncommon and usually derived from carcinomas of the lung, breast, kidney, colon, and prostate [1].

The incidence of papillary thyroid carcinoma (PTC) from 1975 to 2012 increased from 4.8 to 13.3 per 100,000 [2]. PTC is the most frequent type of thyroid carcinoma encountered. Lymph node (LN) metastasis occurs in up to 80% of PTC cases [3]. Distant metastasis, however, is uncommon and occurs at a rate of 2% to 10% [2]. Metastasis of PTC to parotid gland is very rare [4]. Mathew et al. identified only five such cases in their case report [5].

Case Report

51 year old hypertensive and hypothyroid female patient, who was a follow up case of metastatic recurrent PTC presented to us with a swelling over the right parotid region. She had undergone total thyroidectomy in 1992, which was followed by four consecutive surgeries for removal of neck mass (no detailed data was available with the patient) in 2006, 2007, 2012 and 2015. She had received high dose radioactive iodine therapy (RAI) for a total dose of 600 millicurie. She had also received oral chemotherapy (sorafenib) from December 2017 to June 2018. Fiberoptic laryngoscopy (FOL) done in 2018 showed right vocal cord palsy. In February 2021 she had an episode of bleeding from the thyroid bed for which she received Hemostatic Radiotherapy (RT). From February 2021 to May 2021 she was on lenvatinib for multiple distant metastasis.

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On clinical examination, she had a 6×8 cm mass over the right parotid region with ulceration of the overlying skin. Facial nerve function appears normal. Fluorodeoxyglucose Positron Emission Tomography (FDG-PET) done in February 2022 showed FDG-avid lesion in right parotid measuring 6×4 cm along with a nodal mass involving levels Ia, Ib, parapharyngeal and supraclavicular nodes, right sided pleural effusion, diffuse pleural thickening and nodularity in the right hemithorax, multiple bilateral lung nodules, multiple mediastinal nodes and bone metastasis to bilateral iliac bone and femur (Fig. 1). Ultrasound (USG) guided fine needle aspiration cytology (FNAC) of the parotid mass

showed features of metastatic PTC. Cytological examination of pleural fluid also indicated features of metastatic PTC. Pre operatively thyroglobulin level was detected to be > 5160. Although the patient had multiple distant metastasis, the decision to go ahead with surgery was taken in view of reducing the tumour load.

The patient underwent extended total parotidectomy with removal of both the superficial and deep lobes of parotid gland along with the lower trunk of facial nerve. Extended radical neck dissection was done (level I-V, hypoglossal nerve sacrificed, external carotid artery ligated, sternocleidomastoid, internal jugular vein and spinal accessory

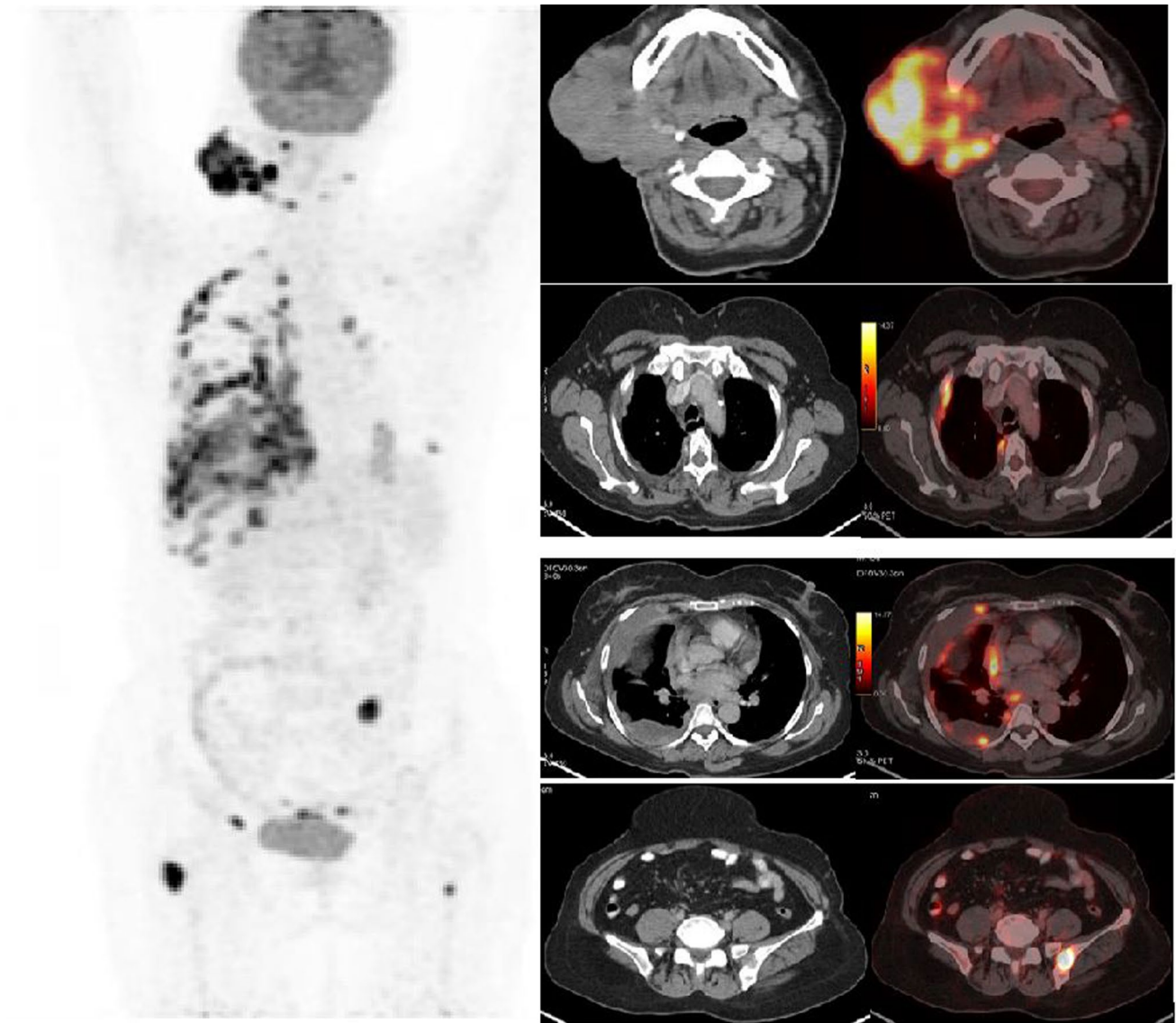
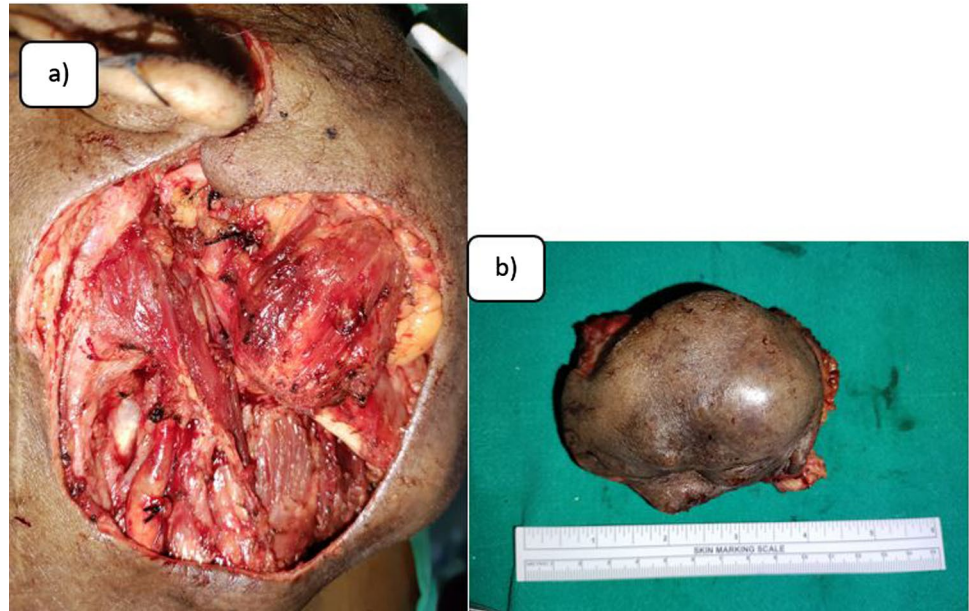


Fig. 1 Maximum intensity projection (MIP) image (a), axial sections of CT and fused PET/CT (b–k) showing FDG avid lesion in right parotid measuring 6×4 cm along with nodal mass involving level Ia, Ib, parapharyngeal and supraclavicular nodes, right pleural effusion,

diffuse pleural thickening and nodularity in right hemithorax, multiple bilateral lung nodules, multiple mediastinal nodes, bone metastasis to bilateral iliac bone and femur

Fig. 2 a Post-operative defect.
b Surgical specimen



nerve sacrificed, overlying skin removed). The post-operative defect (Fig. 2) was reconstructed using pectoralis major myocutaneous flap. The final specimen was sent for histopathological (HPE) examination.

The final HPE report showed an irregular lesion measuring $9 \times 6 \times 4$ cm almost replacing the entire parotid gland and morphology was consistent with metastatic PTC of tall cell variant, with lymphovascular invasion and perineural infiltration (Fig. 3a, b). All peripheral resected margins were free of tumour. 10/10 lymph nodes with metastatic papillary carcinoma having extracapsular extension was noted in the radical neck dissection specimen with the largest metastatic lymph node measuring 2.8 cm. Immunohistochemistry for thyroid transcription factor 1 (TTF1) and thyroglobulin (Tg) showed strong immunopositivity (Fig. 3c, d).

FDG-PET scan done 2 months post operatively showed minimal diffuse FDG uptake in the right hemithorax. There was no RAI uptake noted in any of the other sites of distant metastasis which were present in PET scan probably because the tumour had undergone de differentiation. On 6 months follow up, patient was doing well and was on oral chemotherapy (lenvatinib) as advised by the specialists in medical oncology.

Discussion

PTC is the most common variant of well differentiated thyroid cancer (DTC) [6]. Distant metastasis occurs only in 4 to 8% of PTC. The most common sites for distant metastasis is lungs followed by bone and the less common sites include breast, adrenal, pituitary, kidney, orbit, brain, malar bone, and jaw bone [7]. Parotid as a site of distant metastasis is

very rare for thyroid cancers. Occasionally, PTC with indolent behaviour has potential to transform into a poorly differentiated pattern, and the occurrence of parotid gland metastasis, in spite of its relative low occurrence, indicates that less differentiated tumours may spread to unusual regions [1].

Transformation to dedifferentiated form of papillary carcinoma occurs over time and is characterized by the following features—rapid growth, distant metastasis, tendency to recur and poor response to radioactive iodine therapy [8]. In the current case, this explains why the tumour did not show RAI uptake and was not responding to RAI therapy as it had already undergone dedifferentiation.

Tall cell variant has higher risk of locoregional and distant relapse with worse overall survival compared to the classical variant. Tall cell variant has shown to be an independent prognostic factor for disease-specific death [9]. Tall cell variant of PTC was detected in our case which is probably why the patient had multiple relapses and extensive locoregional and distant metastasis.

10-year disease-specific survival of classic PTC is 85–92% but with distant metastasis it reduces to 10–40% [10]. Poorly differentiated thyroid carcinoma has a 5-year overall survival of 65–85% [11].

Wu et al. found 3 cases (0.019%) of parotid metastasis in a review of 15,780 cases of thyroid carcinoma and in a systematic search of literature found that only 10 additional cases had been reported up to 2015. 8 of all 13 cases had papillary or follicular thyroid carcinoma with the remaining cases in patients with medullary thyroid carcinoma [12]. Less than 15 cases of parotid metastasis from thyroid cancer has been recorded in literature (Table 1) of which majority are from PTC.

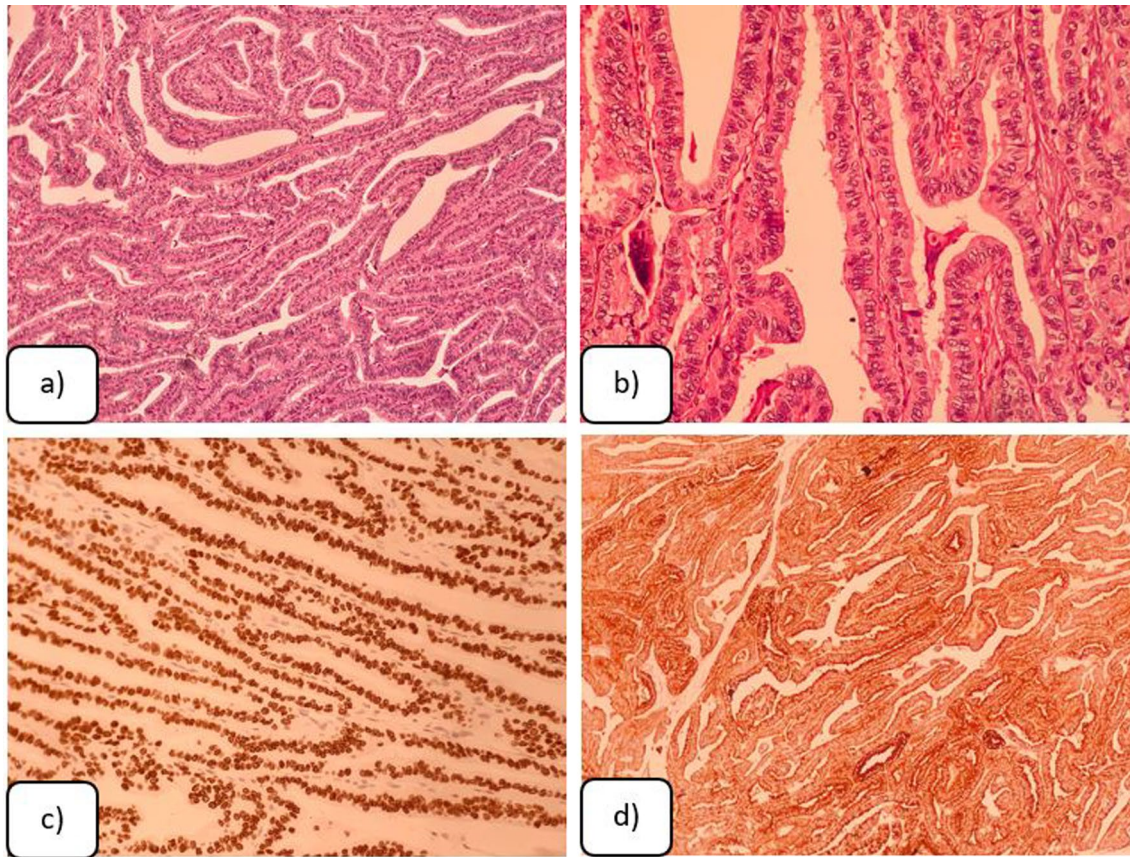


Fig. 3 **a** Haematoxylin eosin stained $\times 40$ shows a malignant papillary epithelial tumour with intranuclear grooves, morphologically suggestive of metastatic papillary carcinoma thyroid–tall cell variant. **b** Haematoxylin eosin stained $\times 200$, shows high power tumour cell

nuclei with nuclear clearing, nuclear overlapping with intranuclear inclusions. **c** $\times 100$ tumour cells show diffuse strong nuclear positivity for TTF1. **d** $\times 40$ tumour cells shows diffuse immunopositivity for thyroglobulin

Operable cases are best treated with surgery followed by RAI and add on chemotherapy or radiotherapy as required on a case to case basis. From the previous literature available, it is clearly demonstrated that majority of the patients with parotid metastasis were treated surgically and followed with RAI (Table 1).

Parotid gland metastasis in DTC is best treated with total thyroidectomy with central and/or bilateral lymph node dissection and parotid tumour resection [22].

This case report emphasizes on considering metastatic PTC as a differential diagnosis for parotid neoplasms. It is important to take careful history and proper clinical

examination in such cases. Essential radiological imaging and FNAC are important tools in reaching the diagnosis [23].

Conclusion

Recurrent or metastatic papillary thyroid carcinoma should be considered as an important differential for parotid neoplasms of unknown primary. Metastasis to parotid gland from thyroid cancer, seems to be an indication of aggressive disease with high frequency of lung and bone metastasis with poor survival. In long standing cases, dedifferentiation is an important factor responsible for non-response to RAI. Reduction of tumour burden is the main treatment aim in such cases and the treatment modalities include surgery, RAI and chemotherapy based on multiple factors as discussed in the article.

Table 1 Cases reported in literature of parotid metastasis in thyroid carcinoma

Authors	Age/sex	History of thyroid cancer	Clinical picture	Variant of thyroid cancer	Treatment	Follow up
Markitziu et al. [13]	67/f	Thyroidectomy for FVPTC—2 years	Left Parotid mass	FVPTC	Irradiation and chemotherapy	Alive and disease free—18 months
Kini et al. [1]	67/f	PTC—31 years	Left parotid mass	Columnar cell variant of PTC	Excision of mass	Lost to follow up
Mathew et al. [5]	45/f	None	Right parotid mass	Classical variant of PTC	Total thyroidectomy + right modified radical neck dissection + right radical parotidectomy	Lost to follow up
Malhotra et al. [14]	70/f	None	Right parotid mass	FVPTC	Near total thyroidectomy with superficial parotidectomy followed by RAI	Not mentioned
Hafez et al. [15]	61/m	18 months Post total thyroidectomy with right radical neck dissection followed by RAI	Right parotid mass	Classical variant of PTC	Excision of parotid mass with left comprehensive neck dissection with left axillary dissection	Not mentioned
Farahmandfar et al. [16]	70/m	None	Right parotid mass	Poorly differentiated PTC	Superficial parotidectomy and lymph node dissection followed by total thyroidectomy with neck dissection	Died due to disease—8 months
Alzarraa et al. [17]	78/f	None	Left parotid mass	FTC	RAI	Alive and disease free—14 months
Stanley et al. [18]	19/7	MTC—Total thyroidectomy with central compartment clearance 5 years ago	Right parotid mass	MTC	Surgery of parotid mass	Alive and clinically disease free—12 months
Conway et al. [19]	61/m	None	Right parotid mass	MTC	Surgery	Alive and with disease—13 months
Petros et al. [20]	68/m	MTC—Total thyroidectomy with central compartment clearance 10 years back	Right parotid mass	MTC	Surgery of parotid mass	Alive and disease free—2 years
Juan et al. [21]	30/m	None	Right parotid mass	PTC	Surgery	Not mentioned
Cao et al. [12]	61/M	PTC—28 years back—underwent right thyroidectomy with regional lymph node dissection Local recurrences after 12 and 17 years	Right parotid mass	PTC	Surgery + RAI	Alive with disease—3.5 years
	71/F	FTC—25 years, subtotal thyroidectomy with central compartment clearance	Left parotid mass	FTC	Surgery + RAI	Alive with disease—8 years
	54/M	MTC—Left thyroidectomy with neck dissection—4 years ago, bone metastasis 6 months following surgery—received RT and radioactive strontium	Left parotid mass	MTC	Surgery	Death due to disease—39 months

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Declarations

Conflict of interest There is no conflict of interest amongst the authors of the study.

Ethical Approval The study is conducted abiding the ethical standards of the institution.

Informed Consent A written and informed consent was taken for the procedure.

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