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Isolated Calvarial Metastasis from Follicular Thyroid Carcinoma: A Diagnostic and Surgical Challenge

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Abstract: ***Follicular Thyroid Carcinoma is characterized by hematogenous spread and has a higher propensity for skeletal metastasis compared to other differentiated thyroid carcinomas.[5,6] Calvarial metastasis, however, remains an exceptionally rare presentation and may occur years after definitive treatment.[2,7] We report a rare case of isolated calvarial metastasis in a 62-year-old female previously treated for follicular thyroid carcinoma with total thyroidectomy and RAI therapy 2.5 years earlier. She presented with a progressively enlarging right parieto-temporo-occipital scalp swelling associated with headache and intermittent blurring of vision. Imaging revealed a solitary osteolytic calvarial lesion, and histopathological examination confirmed metastatic follicular thyroid carcinoma.[2,3] This case highlights the indolent yet metastatic potential of follicular thyroid carcinoma and emphasizes the importance of long-term surveillance in treated patients. Reporting such rare presentations may improve clinical awareness, facilitate early recognition of unusual metastatic sites, and support timely multidisciplinary management for improved patient outcomes.[8,9,10]***

Keywords: Follicular thyroid carcinoma, Calvarial metastasis, Skeletal metastasis, Thyroid cancer recurrence, long term surveillance

1. Introduction

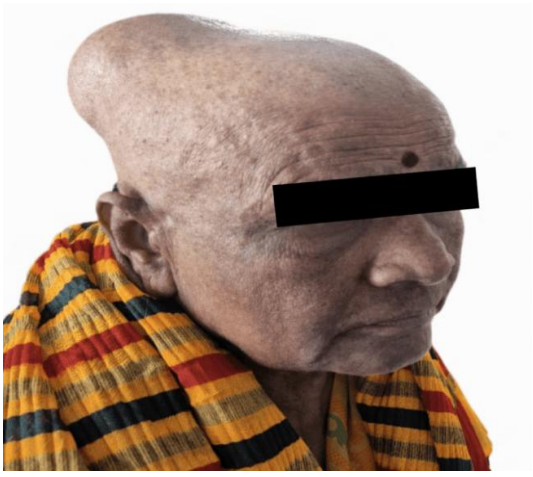
Differentiated Thyroid Carcinoma is the most common endocrine malignancy, with Follicular Thyroid Carcinoma representing a smaller but clinically significant subtype characterized by hematogenous dissemination.[1] Unlike papillary thyroid carcinoma, FTC demonstrates a greater tendency for distant spread due to vascular invasion, most commonly involving the lungs and bones.[5,6] Although skeletal metastases are well recognized in FTC, calvarial involvement remains exceedingly rare and is often detected late because of the indolent course of the disease.[2,7] Calvarial metastasis may present as a slowly enlarging scalp swelling and can mimic benign cranial lesions, leading to diagnostic delay. Such lesions are clinically important because they may indicate persistent or recurrent systemic disease even in previously treated patients. The rarity of isolated skull metastasis from FTC contributes to limited literature regarding its clinical presentation and diagnostic considerations.[7,9] We report a rare case of isolated calvarial metastasis occurring 2.5 years after definitive treatment for follicular thyroid carcinoma. This case highlights the importance of maintaining a high index of suspicion for metastatic disease in any new skull swelling in patients with a prior history of thyroid carcinoma and reinforces the need for prolonged surveillance and timely evaluation of unusual metastatic presentations.[8,10,11].

2. Case Report

A 62-year-old female presented with complaints of a progressively enlarging swelling over the right parieto-temporo-occipital region for a duration of one year. The swelling was insidious in onset and gradually increased in size. It was associated with headache and intermittent blurring of vision. There was no history of seizures, vomiting, focal neurological deficits, or trauma.

The patient had a significant past history of follicular thyroid carcinoma, for which she underwent total thyroidectomy 2.5 years prior, followed by RAI. She had been on thyroxine suppression therapy (125 mcg daily) since then and was on regular follow-up.

3. Clinical Examination



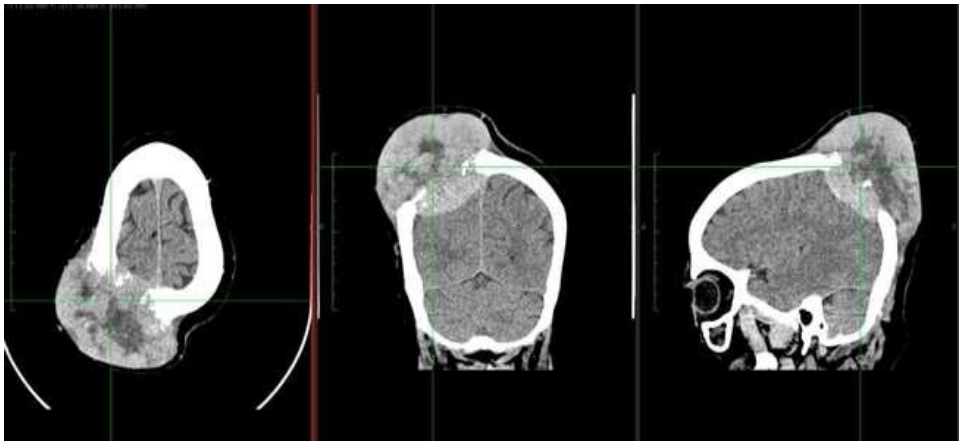
On local examination, a solitary swelling measuring approximately 8 × 10 cm was noted over the right parieto-temporo-occipital region. The swelling had well-defined margins, was firm in consistency, and pulsatile in nature. The

overlying skin appeared normal with no ulceration or discoloration. There was no local warmth or tenderness.

Neurological examination revealed no focal deficits. Cranial nerve examination was within normal limits, except for subjective complaints of intermittent visual blurring.

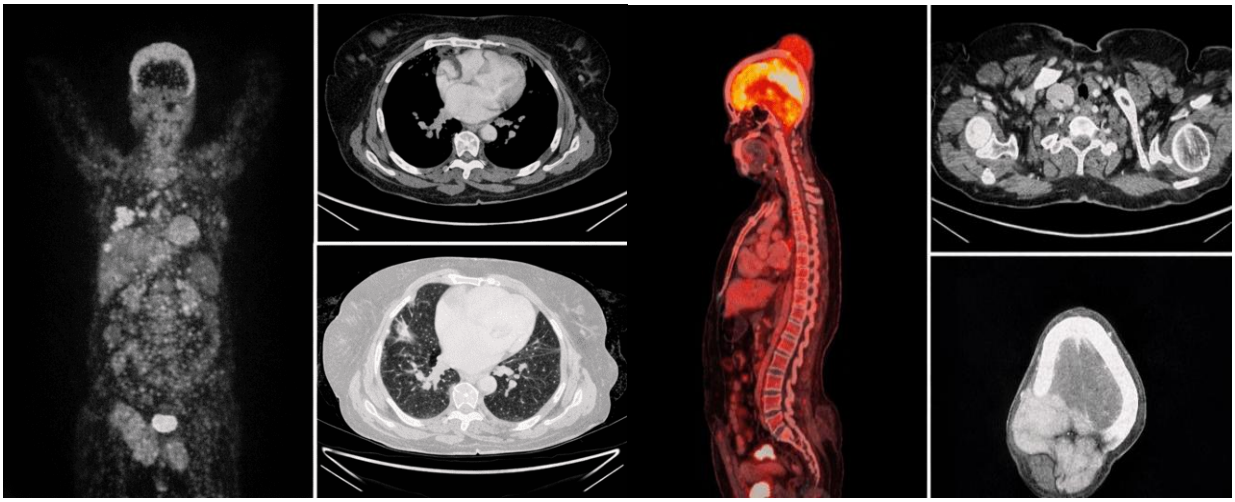
Investigations

Non-contrast CT (NCCT) Brain: Revealed a large osteolytic lesion involving the right parieto-temporo-occipital calvarium.

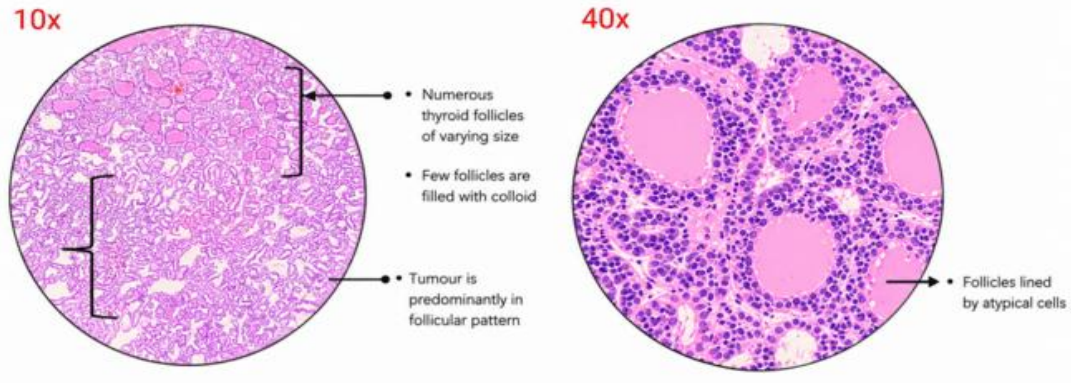


MRI Brain: Demonstrated an osteolytic calvarial lesion with both extracranial and intracranial components. Associated soft tissue extension noted.

FDG PET-CT: Showed increased FDG uptake in a hypermetabolic lytic lesion involving the right parietal bone. Presence of soft tissue component suggestive of metastatic etiology. No evidence of other distant metastases.



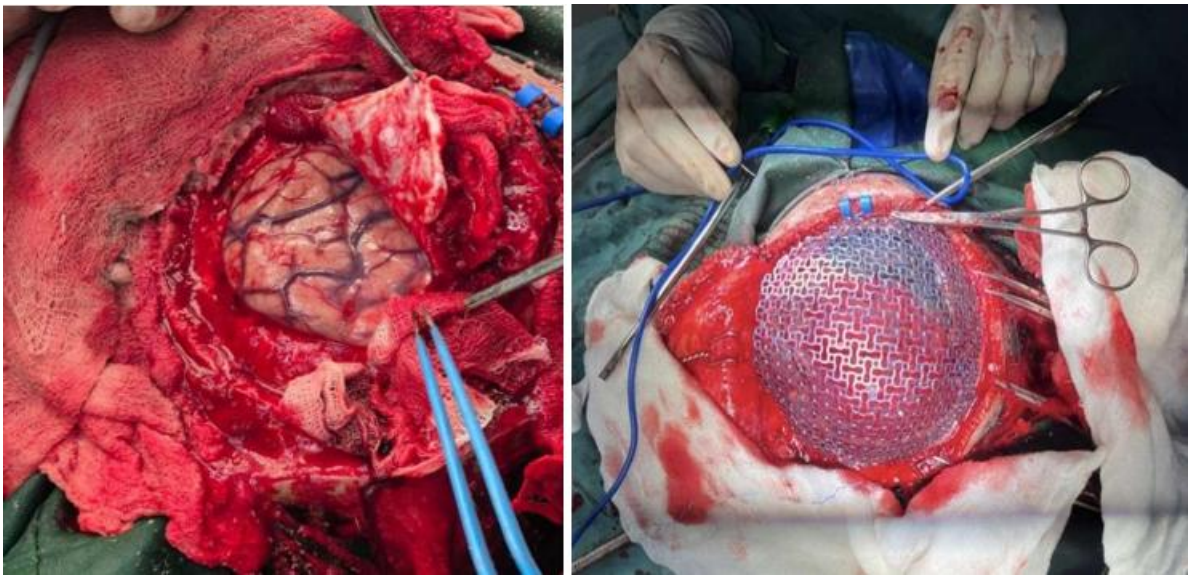
Histopathological Examination: Metastatic carcinoma of thyroid origin of follicular variant. Margins free of tumor.



Management

The patient underwent craniectomy with complete excision of the calvarial lesion. Intraoperatively, the lesion was found to be highly vascular with involvement of both the outer and inner tables of the skull, along with soft tissue extension.

Following complete excision, cranioplasty was performed using a titanium mesh to reconstruct the skull defect.



Outcome and Follow-up

The postoperative period was uneventful. The patient showed symptomatic improvement with resolution of headache and no new neurological deficits. She was advised further oncological evaluation and continued follow-up with endocrinology and oncology for adjuvant management and surveillance.

4. Discussion

Follicular Thyroid Carcinoma is well known for its tendency toward hematogenous dissemination, in contrast to papillary thyroid carcinoma, which predominantly spreads via lymphatics.[1] This biological behavior is attributed to vascular and capsular invasion, facilitating distant metastasis, most commonly to lungs and bones.[1,2]

Bone metastases from FTC are typically osteolytic, hypervascular, and expansile, leading to progressive bone destruction and local mass effect.[3,4] While the axial skeleton is most commonly involved, calvarial metastasis remains a rare presentation and is often associated with long-standing disease.[2,5]

The pathogenesis of skull metastasis involves tumor embolization through systemic circulation with deposition in the diploic space of skull bones, which possess rich vascular channels.[5,6] These lesions frequently involve both the outer and inner tables of the skull, with possible extracranial and intracranial extension, as observed in our case.[6,9]

Clinically, such metastases present as slowly enlarging scalp swellings, occasionally associated with headache or visual disturbances due to local compression effects.[2,6,7] In our patient, the presence of a large pulsatile swelling with headache and intermittent visual blurring, in the absence of focal neurological deficits, is consistent with previously reported presentations.

Radiological evaluation typically demonstrates osteolytic lesions with soft tissue components on CT, while MRI provides better delineation of intracranial extension.[2,6] FDG PET-CT is valuable in identifying metabolically active lesions and assessing for additional metastatic disease.[4] In this case, imaging findings strongly suggested metastatic involvement, and importantly, no other distant metastases were identified, indicating a rare solitary calvarial metastasis.

Histopathological examination remains the gold standard for diagnosis. In the present case, histopathology revealed metastatic carcinoma of thyroid origin, follicular variant, with tumor-free surgical margins, thereby confirming the diagnosis and adequacy of surgical excision. The identification of follicular architecture further supports the hematogenous metastatic pathway characteristic of FTC.[1,2]

Management of calvarial metastasis from FTC is multimodal, including surgical excision, radioactive iodine therapy, external beam radiotherapy, and thyroid hormone suppression.[3,4] Surgical resection is particularly beneficial in solitary, symptomatic lesions, as it provides both definitive diagnosis and therapeutic relief.[6] Reconstruction using titanium mesh, as performed in this case, offers structural stability and satisfactory cosmetic outcomes.[9]

Although the presence of bone metastasis is generally associated with a poorer prognosis, patients with solitary, completely resected lesions may have improved outcomes with appropriate adjuvant therapy.[3,10,11]

This case emphasizes the need for long-term surveillance in patients with FTC and highlights the importance of considering metastatic disease in any new skull swelling, even years after initial treatment.[8]

5. Conclusion

Solitary calvarial metastasis from follicular thyroid carcinoma is a rare but important clinical entity that may

present years after initial treatment. Such lesions can mimic benign conditions, leading to delayed diagnosis if not carefully evaluated.

This case highlights the importance of maintaining a high index of suspicion in patients with a history of thyroid malignancy presenting with new skull swellings. Imaging modalities such as CT, MRI, and FDG PET-CT are essential for diagnosis and assessment of disease extent, while histopathological confirmation remains the gold standard, as demonstrated in this case.

Surgical excision with clear margins, followed by appropriate reconstruction, plays a crucial role in management, especially in solitary lesions, providing both diagnostic and therapeutic benefit.

Early recognition and a multidisciplinary approach are key to improving outcomes and ensuring better quality of life in these patients.

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