HISTOPATHOLOGICAL TRANSFORMATION IN MEDULLARY THYROID CARCINOMA (MTC) WITH POORLY DIFFERENTIATED THYROID CARCINOMA (PDTC)
(A Case Study of Aggressive Thyroid Cancer in An 18-Year-Old Female)

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ABSTRACT

Medullary Thyroid Carcinoma (MTC) is a type of thyroid cancer originating from C cells, while Poorly Differentiated Thyroid Carcinoma (PDTC) is a more aggressive form with poor differentiation. The transformation between these two types can affect prognosis and treatment strategies. This study analyzes an 18-year-old female patient presenting with neck swelling and difficulty swallowing. The initial diagnosis of MTC was established through fine-needle aspiration biopsy (FNAB), and after surgical resection, histopathological analysis was conducted to evaluate any transformation to PDTC. Histopathological findings revealed MTC areas with high calcitonin-producing C cells. However, there were also areas exhibiting characteristics of PDTC, including increased mitotic activity, necrosis, and loss of calcitonin expression. This transformation indicates a shift from a more indolent cancer form to a more aggressive one. The transformation from MTC to PDTC in a young patient underscores the importance of careful monitoring and thorough histopathological evaluation. Appropriate management and understanding of these changes are crucial for improving treatment outcomes. Further studies are needed to elucidate the molecular mechanisms underlying this transformation.

Keyword: *Medullary Thyroid Carcinoma, Poorly Differentiated Thyroid Carcinoma, Aggressive Cancer, Radioactive Iodine, Genomic Profiling, Targeted Therapy.*

INTRODUCTION

Thyroid cancer is categorized into various types, with medullary thyroid carcinoma (MTC) and poorly differentiated thyroid carcinoma (PDTC) being among the most aggressive forms. MTC originates from C-cells of the thyroid and is unresponsive to radioactive iodine therapy (RAI), which is typically used for other types of thyroid cancers. The patient in this case study, a young female, demonstrates the challenges associated with aggressive thyroid cancer, highlighting the necessity of timely diagnosis, appropriate therapy, and genetic profiling.

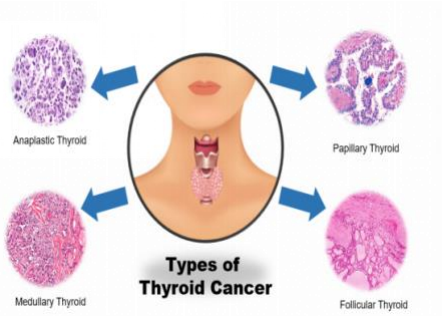


Figure 1. Type of Thyroid Cancer (A)

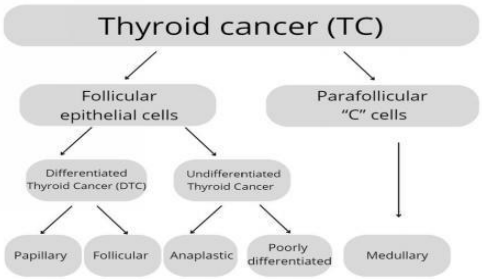


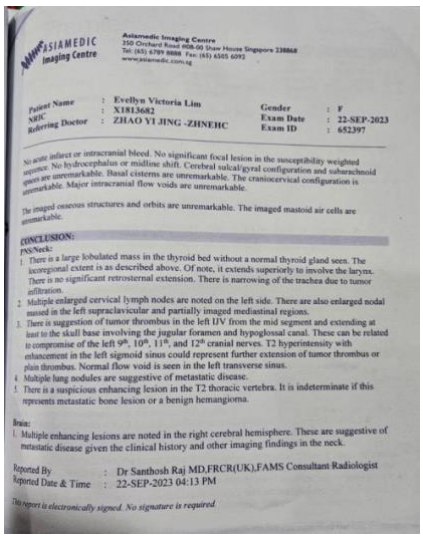
Figure 2. Type of Thyroid Cancer (B)

CASE PRESENTATION

An 18-year-old female from Pekanbaru, Riau, was diagnosed with a large thyroid mass (>6 cm) in March 2023. A subsequent CT scan revealed a 9 cm mass in the left thyroid lobe and multiple metastatic nodules in the lungs.

Figure 3. Ilustration of Radioactive Liquid Therapy to Treat Thyroid Cancer

She underwent total thyroidectomy in May 2023, with histopathology confirming medullary thyroid carcinoma (MTC).


SIAMEDIC Imaging Centre

Patient Name : Evellyn Victoria Lim
NRIC : X1813682
Referring Doctor : ZHAO YI JING -ZHNEHC
Gender : F
Exam Date : 22-SEP-2023
Exam ID : 652397

CONCLUSION:
CNS/Neck:
1. There is a large lobulated mass in the thyroid bed without a normal thyroid gland seen. The laterocentral extent is as described above. Of note, it extends superiorly to involve the larynx. There is no significant retrosternal extension. There is narrowing of the trachea due to tumor infiltration.
2. Multiple enlarged cervical lymph nodes are noted on the left side. There are also enlarged nodal masses in the left supraclavicular and partially imaged mediastinal regions.
3. There is suggestion of tumor thrombus in the left IJV from the mid segment and extending at least to the skull base involving the jugular foramen and hypoglossal canal. These can be related to compromise of the left 9th, 10th, 11th, and 12th cranial nerves. T2 hyperintensity with enhancement in the left sigmoid sinus could represent further extension of tumor thrombus or plan thrombus. Normal flow void is seen in the left transverse sinus.
4. Multiple lung nodules are suggestive of metastatic disease.
5. There is a suspicious enhancing lesion in the T2 thoracic vertebra. It is indeterminate if this represents metastatic bone lesion or a benign hemangioma.

Brain:
1. Multiple enhancing lesions are noted in the right cerebral hemisphere. These are suggestive of metastatic disease given the clinical history and other imaging findings in the neck.

Reported By : Dr Santhosh Raj MD,FRCR(UK),FAMS Consultant Radiologist
Reported Date & Time : 22-SEP-2023 04:13 PM

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Figure 4. Medical Record

Despite the initial diagnosis, the patient experienced a recurrence of a small mass in the surgery site, which was biopsied and confirmed as poorly differentiated thyroid carcinoma (PDTC) in June 2023. Further treatment with Radioactive Iodine (RAI) was questioned, as RAI is ineffective for MTC. A second opinion in Jakarta revealed additional metastatic masses in the lungs and pelvis. The patient was referred for third opinions in Singapore, where MRI scans confirmed multiple brain and neck masses. A tracheostomy was performed due to respiratory distress. By October 2023, the patient experienced worsening symptoms, including headaches, nausea, vomiting, and visual disturbances.

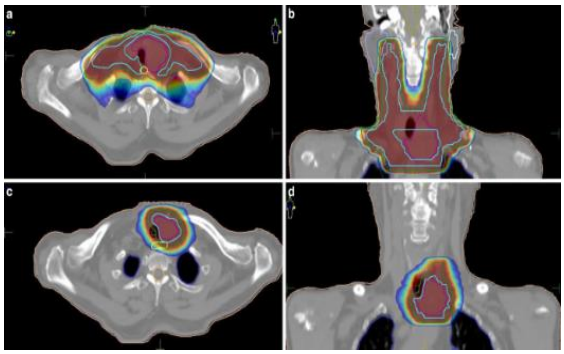

Figure 4. X-Ray View

Figure 5. X-Ray View Before Therapy

Figure 6. X-Ray View After Therapy

DISCUSSION

This case highlights several critical issues in the management of aggressive thyroid cancer. The delayed diagnosis and subsequent misapplication of RAI therapy resulted in further complications for the patient. The challenges in diagnostic imaging and histopathology are also noteworthy. Genetic and molecular profiling could have provided more tailored treatment options, but its high cost posed a barrier to its use. The limited efficacy of traditional therapies, like RAI, and the adverse effects of targeted therapy drugs such as Cabozantinib further compounded the patient's condition. The case underscores the importance of early and accurate diagnosis, the need for personalized treatment plans, and the role of molecular profiling in the management of rare thyroid cancers. Additionally, it highlights the financial burden on patients, especially when advanced therapeutic options are required but remain costly and often inaccessible.

CONCLUSION

This case illustrates the aggressive nature of MTC and the consequences of misdiagnosis and improper treatment. It emphasizes the need for more accurate diagnostic methods and personalized therapy in managing metastatic and poorly differentiated thyroid cancers. Moreover, the financial and logistical challenges of accessing advanced therapies like genomic profiling and targeted therapies must be addressed to improve patient outcomes. Early detection and personalized treatment plans, alongside patient education, are key to managing rare and aggressive cancers like MTC and PDTC.

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