case report Pathology

A CASE REPORT OF MEDULLARY THYROID CARCINOMA: CYTOLOGICAL FEATURES AND THE ROLE OF PROCALCITONIN IN PREOPERATIVE DIAGNOSIS

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ABSTRACT Medullary thyroid carcinoma (MTC) is an unusual neuroendocrine thyroid neoplasm.Cytological diagnosis is difficult,as other thyroid neoplasms can mimic MTC on fine needle aspiration cytology (FNAC).We present a case of MTCwhere the diagnosis was established by FNAC and semi-quantitativeprocalcitonin assay.FNAC showed a dispersed cell pattern,plasmacytoid morphology,cytoplasmic granules, and speckled chromatin. Calcitonin,the specific biomarker for MTC,has many drawbacks,which prompted us to measure serum procalcitonin.We are reporting this novel case because serum procalcitonin, a sepsis marker, is not routinely used as a marker for MTC.

KEYWORDS : Medullary thyroid carcinoma,plasmacytoid cells,calcitonin,procalcitonin

INTRODUCTION

Timely diagnosis of medullary thyroid carcinoma (MTC) is crucial, as early detection can improve prognosis.The main preoperative diagnostic tools are fine needle aspiration cytology (FNAC), ultrasonography, and serum calcitonin assay. Here, we report a case of MTC that was diagnosed by FNAC,aided by semi-quantitative procalcitonin (PCT) assay.

CASE REPORT

A 21-year-old woman presented with swelling in the front of the neck.Physical examination showed a solitary nodule measuring 2 ×2cm in the left lobe of the thyroid.There were no palpable cervical lymphnodes. Her maternal grandmother died of thyroid neoplasm30 years previously, but no reportswere available.Thyroid function test results were normal. Ultrasonography showed an iso- to hypoehoic lesion with increased vascularity in the left lobe of the thyroid.FNAC was performed using a non-aspiration technique with a23-gaugeneedle.Smears were prepared and stained using the Papanicolaou method.

Microscopy revealed cellular smears[Figure 1]. The cells werepre dominantly plasmacytoid[Figure2]and dispersed with no clustering or syncytial pattern of arrangement. The individual cells had moderate to abundant cytoplasm and eccentric nucleiwith speckled chromatin[Figure3].Prominent nucleoli were visible in some cells.Binucleate cells and some spindle cells were noted.

These cytological features raised the suspicion of MTC.Instead of serum calcitonin, which requires stringent conditions for sample storage and transport,we performed asemi-quantitative procalcit oninassayby an immunochromatographic method. In this test, the color intensity of the band is directly proportional to the PCT concentration of the sample, which is interpreted with the help of reference card. A red band was observed, indicating PCT ≥2µg/L.This suggested a diagnosis of MCT, and the patient was referred to a higher center for treatment. The serum calcitonin assay performed there showed markedlyelevatedcalcitonin levels.Histo pathology confirmed MTC.

DISCUSSION

Eventhough MTC has definitepreoperative diagnostic tools,[1]the detection rate is lower than other thyroid malignancies. Cytological typing ofMTC can be achieved with a high degree of accuracy,but it can also be mistyped, as various types ofthyroid malignancies have similar morphologic features.[2]

Generally, MTC aspirates are cellular with a dispersed cell pattern;[3]syncytial patterns are common, and papillary and follicular patterns are usually not present. The cells are very pleomorphic, beingsmall round to cuboidal, plasmacytoid, triangular polyhedral, and spindle shaped.[3],[4]The cytoplasm demonstrates coarse azurophilic granules with Romanowsky stain.[3]The nuclei are usually eccentric, having punctate chromatin and inconspicuous nucleoli.Binucleation and multinucleation are also common features. Occasionally, cytoplasmic inclusions are present, andamyloid can be demonstrated in the background.[3],[4]

The differential diagnosesin our case included Hurthle cell neoplasms,hyalinizing trabecular tumor, oncocytic variant of papillary thyroid carcinoma,and malignant melanoma.When an aspirate shows a dispersed monomorphic pattern ofplasmacytoid cellswith no other features definitively pointing to any specific thyroid malignancy, it is prudent to perform a biochemical marker assay to excludeMTC.[4]

Calcitonin, the specific biochemical marker for MTC,is produced by cleavage and posttranscriptional modification of procalcitonin.[5], [6]The bioactive form of the hormone isa 32-aminoa cidmonomeric peptide with a disulfide bridge at the amino terminus.Several limitations compromise the utility of calcitonin in preoperative diagnosis, including the following:[7]

1)The serum levelsof calcitonin may vary markedly during the day, reflectingthe pulastile secretion of the hormone.

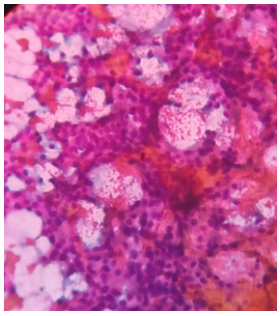
2) Calcitonin is rapidly degraded by serum proteases at room temperature.A 50% decrease in serum calcitonin levels has been observed in samples that are not processed properly.

Therefore, in less well-equipped laboratory spaces, it is not easy to perform a reliable calcitonin assay. This can lead to a delay in diagnosis.ThePCT assay does not have these issues.[7],[8], [9]SerumPCT levels are very low in healthy individuals(< 0.05 ng/mL), andPCT levels >0.25 ng/mL have been observed in patients with MTC.[9]PCT has an independent invitro half-life of 20-24 hours, and it does not need to be kept on ice or frozen. Evidence also suggests that some MTCs preferentially secrete PCT, the monitoring of which is becoming a method of choice for tumors failing to secrete calcitonin adequately.[10]

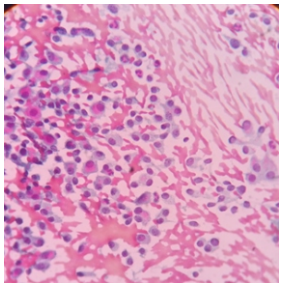
CONCLUSION

The characteristic cytologic features of MTC are adispersed cell pattern with varying cell morphology (plasmacytoid/ spindle/sma llcell),eccentric nuclear position,azurophilic granules in the cytoplasm, and speckled chromatin.Since these overlap with the features of other thyroid neoplasms, it is advisable to assay

biochemical markers. A semi-quantitative PCT assaycan be helpful in situations where the calcitonin assay is not readily available.



[Figure 1] FNAC smears showing increased cellularity(Pap stain,10X)



[Figure 2] FNAC smear showing dispersed cell pattern(Pap stain 40X

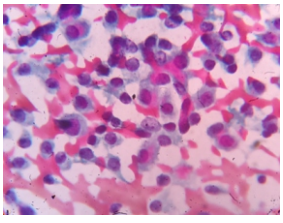


Figure 3]FNAC smears showing plasmacytoid cells with eccentric nuclei and speckled chromatin.(Pap stain100X]

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