A case of papillary microcarcinoma of the thyroid with abundant colloid (masquerading as colloid goiter with papillary hyperplasia): Cytological evaluation with histopathological correlation

ABSTRACT
Papillary thyroid carcinoma (PTC) is the most common malignant neoplasm of the thyroid. On fine-needle aspiration (FNA) cytology smears of conventional PTC, the background usually shows scanty, bubble gum-like colloid. But the macrofollicular variant and papillary microcarcinoma reveals abundant thin colloid in the background. We report a case of papillary carcinoma of thyroid in a 37-year-old female with abundant thin colloid, obscuring the nuclear morphology in many clusters, along with the presence of typical nuclear features within occasional clusters in FNA cytology and hence, masquerading as colloid goiter with papillary hyperplasia. Histopathological examination of the total thyroidectomy specimen revealed papillary microcarcinomatous focus in a background of nodular hyperplasia. The differential diagnosis of PTC should be entertained even in colloid-rich FNA smears if the typical nuclear features are present. Hence, a meticulous search for any fragment with nuclear features of PTC is mandatory before labeling the smears as benign nodular hyperplasia.

Key words: Abundant thin colloid; fine-needle aspiration (FNA) cytology; nuclear features; thyroid papillary microcarcinoma

Introduction
On fine-needle aspiration (FNA) cytology smears, conventional papillary thyroid carcinoma (PTC) usually presents with enlarged, oval, pale nuclei exhibiting crowding, powdery chromatin, occasional grooves, intranuclear cytoplasmic inclusions (INCI) in a background of scanty, stringy, ropy, or bubble gum-like colloid. The presence of abundant thin colloid is seen rarely in conventional PTC, which may lead to a misdiagnosis of nodular colloid goiter. We report a case of papillary carcinoma of the thyroid with abundant thin colloid obscuring the nuclear morphology in most of the clusters, along with the presence of typical nuclear features within occasional clusters in FNA cytology and discuss the diagnostic pitfalls associated with it.

Case Report
A 37-year-old female presented to the outpatient department with swelling in the region of the thyroid of 2 months duration. Clinical examination was suggestive of multinodular goiter. The serum thyroid profile revealed a euthyroid state.

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status and ultrasound showed multiple hypoechoic lesions in both lobes. FNA was performed by using 24-gauge needle and 1 mL of blood mixed colloid was aspirated. Three smears were prepared by the pathologist. One smear was air-dried and stained with May-Grünwald-Giemsa (MGG). The other two were alcohol-fixed and stained with Papanicolaou stain. On microscopic examination, the smears were highly cellular in a background of abundant thin colloid [Figure 1a]. Follicular cells were arranged in papillae and syncytial-like monolayers [Figure 1b] and these cells exhibited enlarged, oval, pale nuclei with nuclear crowding. In most of the clusters, the nuclear morphology was obscured by abundant colloid [Figure 1c]. Powdery nuclear chromatin, longitudinal grooves, and occasional INCI were appreciated in occasional clusters [Figure 2a] and hence, FNA smears were reported as colloid-rich smears with features suspicious of papillary carcinoma of the thyroid.

Subsequently, total thyroidectomy was performed. Macroscopically, the right lobe was 4 × 3 × 1.5 cm, the isthmus was 1 × 1 cm, and the left lobe was 5 × 3.5 × 3 cm. The external surface was smooth with intact capsule. The cut surface was nodular with colloid-filled cystic areas. In addition, the cyst wall in the left lobe showed an ill-defined firm area measuring 0.8 × 0.7 cm. On histopathological examination, thyroid follicles of varying sizes filled with colloid and a tiny focus of papillary arrangement of thyroid follicular cells exhibiting nuclear clearing, crowding, and grooving [Figure 2b] with psammomatous calcification were noted. Therefore, a report of nodular hyperplasia thyroid with a focus of papillary microcarcinoma was given. The postoperative course was uneventful and on 6 months follow-up, the patient was asymptomatic with no evidence of lymph node enlargement or any feature of metastatic event.

Discussion

The case presented had features of high cellularity, occasional atypical papillary clusters, and thin colloid. High cellularity in thyroid cytology usually gives the suspicion of a neoplastic lesion. However, it is not the conclusive criteria to label it as a neoplastic lesion since adenomatous change in a nodular goiter also yields high cellularity.\(^2\)

The follicular cells of this case were arranged in the papillae, three-dimensional clusters, and monolayered sheets and hence, the differential diagnosis was nodular goiter with papillary hyperplasia and PTC. Usually, the architectural pattern varies depending on the type of PTC which includes: True papillary fragments, papillary-like fragments (papillary shape but lacking a fibrovascular core), swirls, microfollicles, and the monolayered sheets. The monolayered sheet is characteristic of PTC but mimics a flat sheet of the macrofollicular fragment of benign follicular nodules. The papillary hyperplasia in the nodular goiter may also mimic the papillae of PTC.\(^3,4\) It can be differentiated based on the arrangement of the cells in sheets (whether evenly spaced or overcrowding) and the nuclear features.\(^1\)

This case had abundant thin colloid in the background with cracking artefact. Usually in PTC, the background contains relatively scant, stringy, and ropy strands of bubblegum-like colloid. But abundant colloid may be seen in a macrofollicular variant and cases of papillary microcarcinoma, which may give rise to diagnostic pitfalls.\(^5,6\)

The cystic variant of PTC was also considered as one of the differential diagnosis. Cytological picture in cystic PTC usually shows thin, watery proteinaceous fluid admixed with blood, abundant histiocytes, hypervacuolated tumor cells exhibiting enlarged nuclei with powdery chromatin, nuclear overlapping, grooves, occasional INCI, and scanty colloid.\(^7\) Our case in contrast had only abundant thin colloid and no watery proteinaceous fluid.

Generally, the nuclear overlapping and crowding are important diagnostic features of PTC that help in distinguishing PTC cells

Figure 1: (a) Abundant thin colloid on FNA (MGG, ×100) (b) Papillary fragments with thin colloid and cracking artifact in the background (MGG, ×100) (c) Abundant colloid in the background obscuring the cytomorphological features of the papillary fragments on FNA (Pap, ×100)
from benign follicular cells.\textsuperscript{[1]} Despite the fact that cellularity and cellular arrangement of PTC are varied in different settings, the defining features of PTC are seen in the nuclei. PTC nuclei can be round or oval but are often highly irregular in contour with powdery chromatin rather than the coarse chromatin seen in benign follicular cells. INCI are seen in 50-100\% of the aspirates of PTC. Even though INCIs are a common finding in PTC,\textsuperscript{[8]} they are not specific for PTC as they are also seen in anaplastic carcinoma, medullary carcinoma, poorly differentiated carcinoma thyroid, and rarely in benign thyroid nodules.\textsuperscript{[9]}

Nuclear grooves are another important finding in PTC.\textsuperscript{[10]} Although characteristic of PTC, the nuclear grooves are not specific and can be seen in a variety of neoplastic and nonneoplastic thyroid lesions.

In the case presented, the nucleus of the cells in occasional clusters exhibited pale nuclei with crowding, overlapping, longitudinal grooves, and occasional INCI. These nuclear features gave us the clue that we were dealing with neoplastic lesion even in the presence of abundant thin colloid.

**Conclusion**

To conclude, in FNA smears, nuclear features are the more useful and important criteria for the diagnosis of PTC. Background colloid is variable in PTC, and is usually scanty and thick. But at times, abundant thin colloid may be seen especially in cases of PTC arising in the background of colloid goiter and in a macrofollicular variant of PTC. So, the differential diagnosis of PTC should be kept in mind, even in colloid-rich smears and a meticulous search for any fragment with typical nuclear features of PTC is essential before labeling it as a benign nodular hyperplasia.

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**Conflicts of interest**

There are no conflicts of interest.

**References**