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Original Research Article

Cystic Thyroid Lesions on Fine Needle Aspiration Cytology: Cytomorphological Spectrum, Risk of Malignancy and Diagnostic Limitations

Veeksha Venugopal[1], S.B. Patil[2], Subhashini H. Bevinakatti[3]

[1]Assistant Professor, Department of Pathology, Kidwai Memorial Institute of Oncology, Bangalore, Karnataka, India

[2]Professor, Department of Pathology, J J M Medical College, Davangere, Karnataka, India

[3]Assistant Professor, Department of Pathology, Hassan Institute of Medical Sciences, Karnataka, India

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Corresponding author: Dr. Subhashini H. Bevinakatti

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Abstract

Background: Cystic change in the thyroid is common and is generally regarded as a favourable finding, yet a proportion of cystic thyroid nodules harbour malignancy, most often papillary thyroid carcinoma. Cyst fluid dilutes the cellular yield of fine needle aspiration cytology (FNAC) and is a recognised source of both false negative and false positive diagnoses.

Aims: To describe the cytomorphological spectrum of cystic thyroid lesions, estimate the frequency of malignancy in cystic thyroid nodules, and analyse discordant cyto-histopathological diagnoses.

Materials and Methods: Thirty-seven cystic thyroid lesions were identified among 90 palpable cystic head and neck lesions aspirated over two years (June 2018 to May 2020) in a prospective study at the Department of Pathology, J.J.M. Medical College, Davangere. Aspirations were performed with a 23-gauge needle; smears were stained with H&E, Papanicolaou and Giemsa stains and reported using the Bethesda System. Histopathological correlation was performed wherever thyroidectomy specimens were received.

Results: Thyroid cysts were the commonest cystic lesion of the neck (41.1%). Of the 37 cases, 31 (83.8%) were colloid goitre with cystic degeneration (Bethesda II), four (10.8%) were papillary thyroid carcinoma with cystic change (Bethesda VI) and two (5.4%) were follicular neoplasm with cystic change (Bethesda IV/V), giving a malignancy frequency of 16.2%. Benign cystic goitre showed a female preponderance and right-lobe predominance. Histopathological correlation was available in 22 colloid goitre cases (concordant in 20), in three of four papillary carcinomas (all concordant), and in one follicular neoplasm, which proved to be nodular colloid goitre. One cytologically benign goitre was reclassified as colloid goitre with micropapillary carcinoma on histopathology.

Conclusion: FNAC reliably characterises cystic thyroid nodules, but sampling error in paucicellular cyst fluid may cause false negative diagnoses, and reactive atypia of cyst-lining cells may cause overdiagnosis. Careful attention to nuclear features, the background, re-aspiration of residual nodules and clinico-radiological correlation are essential.

Keywords: Thyroid Cyst; Colloid Goitre; Papillary Thyroid Carcinoma; Follicular Neoplasm; Bethesda System; FNAC.

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Introduction

Cystic change is one of the commonest degenerative phenomena in the thyroid and may occur in both benign and malignant conditions.

Although cystic transformation is generally interpreted as a favourable finding, published series report malignancy in 3–25% of cystic thyroid nodules, with an average of about 14%, and papillary thyroid carcinoma shows cystic change in up to a quarter of cases. The low but real incidence of malignancy in thyroid cysts has generated sustained interest in defining the nature of these lesions before surgery. FNAC is the established first-line investigation of thyroid nodules, but cystic lesions pose particular difficulties: aspirates are frequently diluted, hypocellular and dominated by macrophages, so that a neoplasm lining part of the cyst wall may be missed, while degenerative

and reparative atypia in cyst-lining cells may mimic malignancy.

The present study analyses the cytological spectrum, malignancy risk and cyto-histological discordances among cystic thyroid lesions encountered in a prospective series of cystic head and neck masses.

Materials and Methods

This analysis derives from a prospective study of 90 palpable cystic lesions of the head and neck aspirated in the Department of Pathology, J.J.M. Medical College, Davangere, between June 2018 and May 2020.

A lesion was considered cystic when fluid was aspirated and cyst macrophages were identified. Lesions yielding frank blood, vascular malformations, patients with bleeding diathesis and non-cooperative patients were excluded. After clinical evaluation and informed consent, aspiration was performed with a 23-gauge needle attached to a 5 ml syringe under aseptic precautions; residual masses were re-aspirated. Smears from centrifuged sediment were fixed in 95% ethanol and stained with H&E and Papanicolaou stains; air-dried smears were stained with Giemsa. Thyroid aspirates were categorised according to the Bethesda System for Reporting Thyroid Cytopathology. Thyroidectomy specimens, where received, were processed routinely and stained with H&E for correlation. Statistical analysis used SPSS version 20.

Results

Of the 90 cystic head and neck lesions, 37 (41.1%) arose in the thyroid, making it the commonest site of cystic change in the neck.

Thirty-one cases (83.8% of thyroid cysts; 34.4% of all cystic lesions) were benign colloid goitre with cystic degeneration, and six (16.2%) were neoplastic: four papillary thyroid carcinomas with cystic change and two follicular neoplasms with cystic change (Table 1).

Table 1: Spectrum of cystic thyroid lesions (n = 37)

Cytological diagnosis	Bethesda category	Number	Percent of thyroid cysts
Colloid goitre with cystic degeneration	II	31	83.8
Papillary thyroid carcinoma with cystic change	VI	4	10.8
Follicular neoplasm with cystic change	IV / V	2	5.4
Total	—	37	100.0

Colloid Goitre with Cystic Degeneration: Patients ranged from 20 to 65 years with a female preponderance, and the right lobe was most often involved. Swellings measured 3–5 cm and had been present for 15 days to one year. Aspirates (0.5–1 ml) were colloid or haemorrhagic. Smears showed moderate cellularity with cyst macrophages (19 cases) and colloid (18 cases) as the dominant features, together with normal follicular epithelial cells, degenerated red cells and leucocytes; hyperplastic follicular cells, Hürthle cell change and mild anisonucleosis were each seen in single cases. Histopathological correlation was possible in 22 cases and confirmed nodular colloid goitre in 20. One case proved to be colloid goitre with micropapillary carcinoma and another follicular adenoma; both discordances were attributed to sampling error in cystic, paucicellular aspirates.

Papillary Thyroid Carcinoma with Cystic Change: Four cases (10.8% of thyroid cysts) occurred in patients aged 22–46 years, three of them female, all presenting with nodular thyroid swellings of 3–6 cm of one to five months' duration; aspirates were blood-tinged. Smears showed tumour cells in papillae with karyomegaly, anisonucleosis and nuclear grooves in all cases; pseudoinclusions (two cases), intranuclear inclusions (one) and psammoma bodies (one) were also identified against a background of cyst macrophages, colloid and degenerated red cells. Histopathological correlation, available in three cases, confirmed papillary thyroid carcinoma in all, with papillae, nuclear overlapping, chromatin margination, orphan-Annie nuclei, grooves and pseudoinclusions.

Follicular Neoplasm with Cystic Change: Two cases occurred in women aged 26 and 35 years presenting with thyroid swellings of two to three months' duration; 0.5–1 ml of haemorrhagic fluid was aspirated. Smears were cellular, with macrofollicles and microfollicles composed of cells showing hyperchromatic nuclei, anisonucleosis and inconspicuous nucleoli, occasional Hürthle cell change, scant colloid and occasional cyst macrophages.

Histopathology was available in one case and showed nodular colloid goitre without atypia — an interpretation error reflecting the known tendency of hyperplastic and cystic nodules to mimic follicular neoplasm.

Discussion

Thyroid cysts were the commonest cystic lesion of the neck in this series, and colloid goitre with cystic degeneration was the leading individual diagnosis, in agreement with the series of Sahni et al. and

Shekhar et al., both of which also found a female preponderance. The 16.2% frequency of malignancy in cystic thyroid nodules accords with the 14% average reported by de los Santos et al. and with the 14% of malignant cystic thyroid swellings recorded by Cusick et al.; in contrast to the male predominance of malignancy in the latter study, malignant change in our series was commoner in females, a difference plausibly related to ethnicity and study population.

Cystic papillary thyroid carcinoma accounted for 10.8% of thyroid cysts, similar to the experience of Sahni et al., and the characteristic nuclear features — grooves, pseudoinclusions and psammoma bodies — remained identifiable despite cystic dilution. The literature nonetheless documents sampling error, rather than misinterpretation, as the principal cause of false negative reports in cystic papillary carcinoma, and our single false negative — a micropapillary carcinoma within a cystic goitre — conforms to this pattern. Re-aspiration of any residual mass after cyst drainage, and ultrasound-guided sampling of the solid component, are the practical safeguards.

The false positive direction of error is equally instructive. One of our two cytological diagnoses of follicular neoplasm proved to be nodular colloid goitre. Zhu et al. attributed such false positives to interpretation error in benign lesions mimicking neoplasia — adenomatous hyperplasia, thyroiditis and cystic lesions — and to suboptimal specimens, and Malheiros et al. likewise cautioned that atypia in smears from cystic lesions with a paucicellular background should be interpreted with great restraint. Recognition of atypical cyst-lining cells and their degenerative background helps distinguish benign cystic nodules from neoplasms and avoids unnecessary operations. Follicular neoplasm remains a grey zone on cytology in any case, as capsular and vascular invasion cannot be assessed on FNAC.

Conclusion

FNAC characterises the great majority of cystic thyroid nodules accurately and identifies the minority that are malignant, most often cystic papillary carcinoma. Its principal limitations in this setting are sampling error in hypocellular cyst fluid, which may yield false negative diagnoses, and degenerative atypia, which may prompt overdiagnosis. Awareness of these pitfalls, systematic re-aspiration of residual nodules, cautious interpretation of atypia against a cystic background, and correlation with clinical and sonographic findings allow cystic thyroid lesions to be managed on a sound preoperative footing.

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