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Case Series

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Unmasking Malignancy: A Case Series of Papillary Microcarcinoma in Benign Thyroid Diseases

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ABSTRACT

Background: Papillary thyroid microcarcinoma (PTMC), defined as papillary thyroid carcinoma measuring ≤1 cm, is detected incidentally during pathological examination of thyroidectomy specimens removed for benign thyroid disorders. With thyroid surgeries and histopathological assessment, the detection of occult PTMC has increased, presenting management challenges without preoperative suspicion of malignancy.

Methods: We present a case series of three female patients (aged 36–45 years) who underwent total or subtotal thyroidectomy for benign thyroid conditions like Hashimoto's thyroiditis and multinodular goitres at a tertiary care centre. Relevant clinical findings were reviewed. All thyroidectomy specimens underwent gross examination with sampling, followed by tissue processing and microscopic evaluation using Haematoxylin and Eosin-stained sections.

Results: Histopathological evaluation revealed incidental classical papillary thyroid microcarcinoma in all cases, with tumour sizes of 0.8 cm (left lobe) in Hashimoto's thyroiditis, 0.7 cm (within a cyst) coexisting with follicular adenoma in multinodular goitre, and 0.4 cm (right lobe) in nodular colloid goitre. All tumours exhibited characteristic nuclear features (Orphan Annie eye nuclei, nuclear grooves, intranuclear inclusions). No aggressive variants or additional malignancy were identified.

Conclusion: PTMC was detected in three cases operated for benign conditions, underscoring the importance of meticulous grossing and submission of adequate tissue sections during pathological examination of benign thyroid specimens. Despite their indolent behaviour and excellent prognosis, the consistent finding of occult malignancy supports the preference for total thyroidectomy over subtotal surgical procedures in the management of benign multinodular or diffuse thyroid disease, ensuring both optimal endocrine control and oncological safety when incidental carcinoma is uncovered.

Key-words: Benign thyroid disease, Incidental thyroid carcinoma, Papillary thyroid microcarcinoma, Surgical pathology, Thyroid neoplasms, Thyroidectomy

INTRODUCTION

Incidental thyroid cancer (ITC) is a malignancy that is identified unexpectedly during histopathological evaluation of thyroid tissue removed for benign conditions, such as multinodular goiter or other non-cancerous thyroid disorders. [1]

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These tumours are most commonly papillary thyroid microcarcinomas (PTMC), defined by the World Health Organization as papillary thyroid carcinomas measuring 10 mm or less in their greatest dimension. PTMCs are generally considered low-grade malignancies, characterized by indolent biological behaviour, minimal aggressiveness, and a very low risk of distant metastasis. [2,3] Reports from multiple studies indicate a variable occurrence of incidental thyroid carcinoma, with detection rates ranging from 7% to 21.6% in surgically removed thyroid specimens. [1,4-6]

Recent global epidemiological studies have demonstrated a marked increase in the detection of

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small thyroid carcinomas, largely reflecting enhanced diagnostic intensity rather than a true rise in disease incidence.[7,8] Advances in ultrasonography and pathological sampling techniques have contributed significantly to the increased recognition of incidental PTMCs in thyroidectomy specimens.[9] Long-term follow-up studies confirm that most incidentally detected PTMCs show excellent disease-specific survival with minimal Progression [10]. Contemporary clinical guidelines increasingly emphasize risk-stratified approaches, including active surveillance for selected low-risk tumors.[11] Nevertheless, uncertainty persists regarding the optimal postoperative management of PTMC when it is discovered incidentally. [12] Molecular profiling studies further highlight the biological heterogeneity of PTMC despite uniform histologic appearance.[13] These findings reinforce the need to continue evaluating incidental PTMC in benign thyroid disease. [14]

Given the ongoing debate surrounding the detection and optimal management of occult thyroid carcinomas, this study aims to contribute further insight into the issue. Here, we report three cases of patients who were operated on for benign thyroid diseases and found to have ITC during histopathological evaluation, all of which were PTMC.

CASE PRESENTATIONS

CASE 1:

A 36-year-old woman presented with a two-year history of thyroid swelling and a nine-year history of hypothyroidism managed with levothyroxine 12.5 mcg. Apart from the presenting complaint, the patient had no noteworthy past medical or surgical history. Clinical and laboratory evaluation suggested Hashimoto's thyroiditis, for which the patient underwent total thyroidectomy. The specimen was submitted for histopathological examination.

Gross Examination- The thyroid measured 7.5 × 6.5 × 3 cm. The external surface was grey-brown, and sectioning revealed multiple well-circumscribed grey-white nodules, the largest measuring 2 × 1.5 cm.

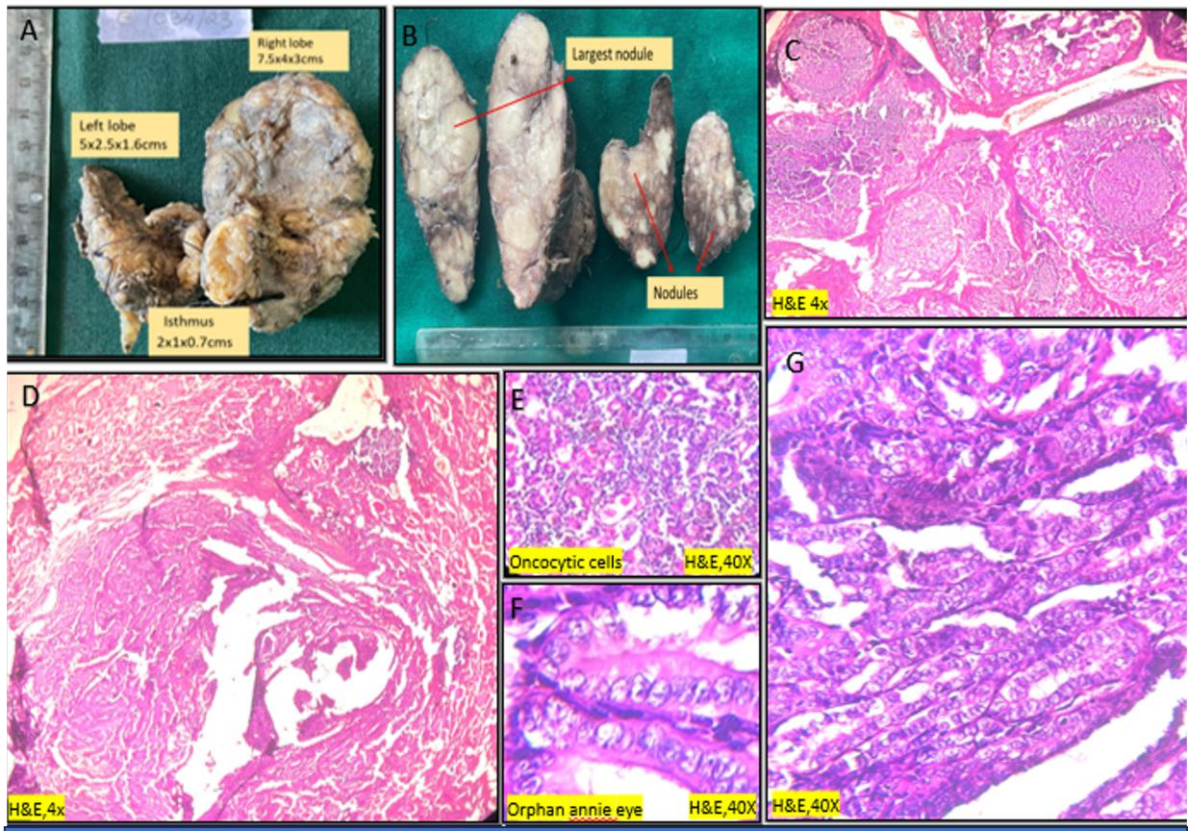

Fig. 1: (A&B) - Gross pictures of outer and cut surfaces showing multiple grey nodules; (**C&E)** showing area of Hashimoto thyroiditis and Oncocytic cells respectively (4x &40x, H&E); (**D)** - Foci of PTMC (4x, H&E); **(F&G)–** Microphotograph showing papillary pattern and nuclear features of PTMC (40x, H&E).

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Microscopic Findings- Histology showed atrophic thyroid follicles predominantly lined by oncocytic (Hürthle) cells with granular eosinophilic cytoplasm and mild nuclear pleomorphism, consistent with Hashimoto's thyroiditis. A discrete 0.8-cm focus in the left lobe displayed papillary structures with fibrovascular cores, lined by stratified columnar epithelium with moderate eosinophilic cytoplasm and classical nuclear features of papillary thyroid carcinoma, including clearing, grooves, and round to oval nuclei resembling "Orphan Annie eyes." Focal trabecular growth and infiltration into adjacent thyroid parenchyma were observed.

Final Diagnosis- Hashimoto's thyroiditis with classical papillary thyroid microcarcinoma.

CASE 2:

A 45-year-old woman presented with a six-month history of anterior neck swelling. Apart from the presenting complaint, the patient had no noteworthy past medical or surgical history. Clinical and radiologic evaluation suggested multinodular goitre, and the patient underwent total thyroidectomy.

Gross Examination- The right lobe measured 4.5 × 3 × 2 cm, and the left lobe 4 × 2 × 1.5 cm. The external surface was grey-brown and nodular. Sectioning revealed multiple colloid-filled nodules and a large hemorrhagic cyst in the left lobe. A solid nodule measuring 1.6 cm was observed in the right lobe.

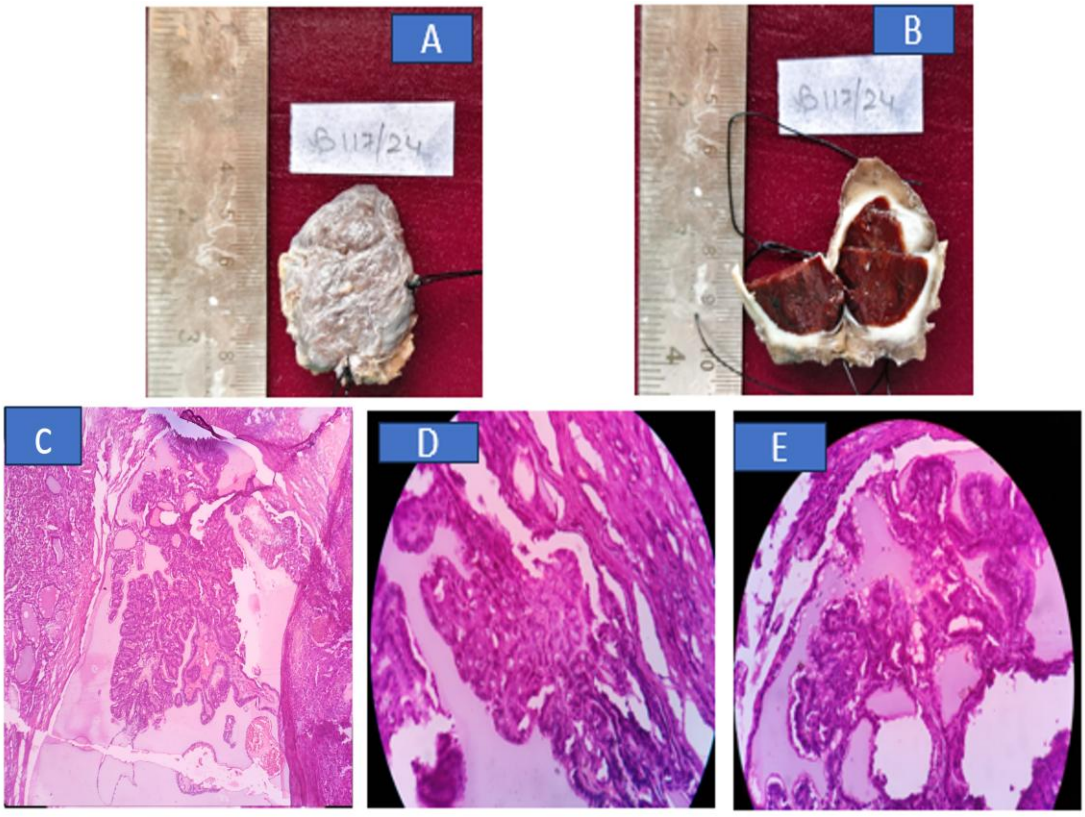

Fig. 2: (A&B)- Gross pictures of outer and cut surface of left lobe showing colloid-filled nodule; **(C)** - Microphotograph showing cyst containing PTMC (10x, H&E); (**D&E)**-Papillary fronds lined by tumor cells showing nuclear features of PTMC (40x, H&E).

Microscopic Findings- Sections demonstrated variably sized colloid-filled follicles, with cystic changes containing colloid and macrophages. One cystic lesion contained a 0.7-cm papillary proliferation lined by tumor cells showing nuclear overlapping, elongation, irregular nuclear contours, chromatin clearing, nuclear grooves, and occasional intranuclear cytoplasmic inclusions, consistent with papillary microcarcinoma. The solid nodule comprised microfollicles lined by cuboidal to low columnar cells with focal Hürthle cell change, without capsular or vascular invasion, consistent with a follicular adenoma.

Final Diagnosis- Multinodular goitre with papillary microcarcinoma and coexisting follicular adenoma (right lobe).

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CASE 3:

A 44-year-old woman presented with a midline neck swelling of gradual onset over 4–5 years. No additional relevant medical or surgical history was noted. Clinical evaluation suggested nodular colloid goitre, and the patient underwent subtotal thyroidectomy.

Gross Examination- The left lobe measured 5 × 3.5 × 1 cm, and the right lobe 5 × 3 × 1 cm. Both lobes contained multiple colloid-filled nodules. A distinct grey-white solid nodule measuring 0.4 cm was noted in the upper portion of the right lobe.

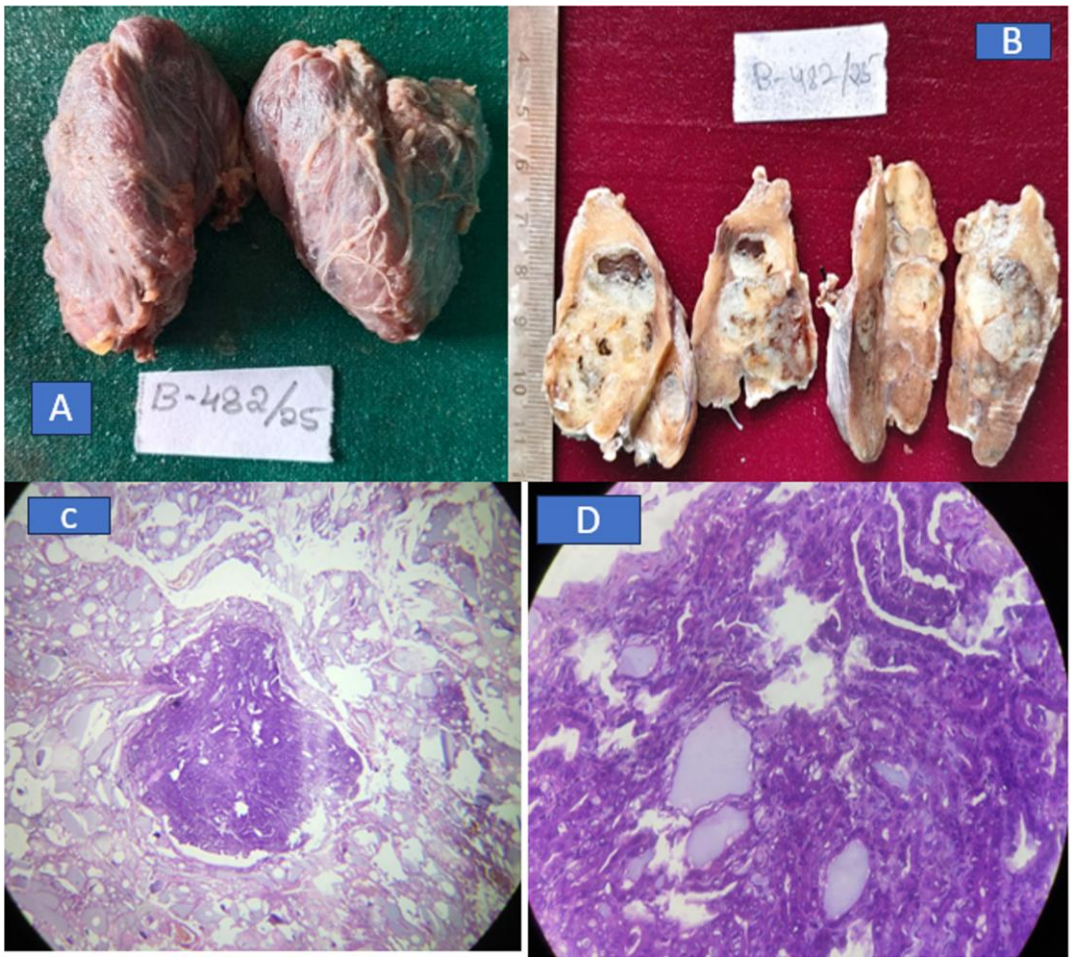

Fig. 3: **(A&B)** - Gross images of outer and cut surface of the thyroid gland with multiple colloids filled and grey white nodules; **(C)** - Microphotograph showing foci of PTMC (4x, H&E); **(D)** - Microphotograph showing papillae lined by tumor cells with features of PTMC (40x, H&E).

Microscopic Findings- Sections from both lobes revealed multiple nodules composed of colloid-filled follicles lined by flattened to low cuboidal epithelium, with occasional cystic dilation. A hyperplastic nodule was noted in the left lobe. The right-lobe solid nodule demonstrated well-circumscribed papillary structures with fibrovascular cores, lined by tall columnar cells exhibiting nuclear clearing, grooves, and intranuclear cytoplasmic inclusions. Surrounding stroma showed fibrosis, chronic inflammatory infiltrate, and focal haemorrhage.

Final Diagnosis- Multinodular goitre with incidental papillary microcarcinoma (right lobe).

DISCUSSION

Papillary thyroid microcarcinoma (PTMC) is generally an incidental thyroid carcinoma (ITCs) associated with an indolent clinical course; its detection has increased substantially due to the rising number of thyroid surgeries and enhanced diagnostic scrutiny. Consequently, the clinical relevance and optimal management of these small, occult carcinomas remain subjects of ongoing debate.[7]

In this case series, papillary thyroid microcarcinoma was identified incidentally in patients who underwent surgery for clinically benign thyroid diseases. A notable observation is that all tumours were small,

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intrathyroidal, and detected only on detailed histopathological examination, underscoring that occult malignancy may remain clinically silent despite thorough preoperative assessment, such as fine-needle aspiration cytology. This finding reinforces the concept that the true burden of PTMC is closely linked to pathological examination practices rather than clinical presentation alone.[14,15]

An important contribution of this study lies in highlighting the critical influence of grossing technique and sampling adequacy on the detection of PTMC. More than half of the tumors in this series measured between 1 and 5 mm, sizes that are easily overlooked without extensive tissue sampling. Prior studies have demonstrated wide variability in reported ITC incidence, which may reflect inconsistencies in specimen processing and reporting rather than genuine epidemiological differences.[16] The absence of standardized histopathological protocols in many published reports underscores the need for uniform guidelines to improve diagnostic yield and inter-study comparability.

Histologically, all tumours in this series were low-risk variants, predominantly classical papillary carcinoma, with no evidence of follicular carcinoma or poorly differentiated carcinoma. This observation aligns with the existing literature, which indicates that most incidental PTMCs exhibit favourable morphological features and limited biological aggressiveness. [3,13,16] The lack of high-risk histological patterns in incidentally detected tumors further supports the view that these lesions represent a distinct, low-risk subset within the spectrum of differentiated thyroid carcinomas.

From a clinical perspective, the incidental identification of PTMC raises important management considerations. Although long-term outcomes are excellent, disease-specific mortality of approximately 1% has been reported, and concerns remain regarding multifocality and bilateral involvement.[6] In this context, total thyroidectomy offers several advantages, including complete pathological evaluation and avoidance of repeated surgery. [8],[9] The findings of this study support the rationale for total thyroidectomy in selected patients undergoing surgery for benign thyroid disease, particularly when comprehensive histological assessment is desired.

Equally significant are the practical implications for surgical pathology practice. The detection of incidental PTMC depends heavily on meticulous gross examination and the submission of an adequate number of tissue sections, especially in multinodular and inflammatory thyroid diseases. [16] Failure to adhere to rigorous sampling protocols may lead to underdiagnosis, potentially altering postoperative management and long-term follow-up strategies.

Given that the PTMCs identified in this series were small, non-invasive, and lacked aggressive histological features, total thyroidectomy without routine central neck dissection appears to be an appropriate management approach.[17] This strategy is consistent with current American Thyroid Association recommendations for low-risk, clinically node-negative differentiated thyroid carcinomas.[18] The present study therefore reinforces a risk-adapted approach that balances oncologic safety with avoidance of overtreatment of incidental thyroid carcinoma and emphasize the need for harmonized surgical and pathological practices to optimize patient outcomes.

CONCLUSIONS

This case series highlights clinically relevant occurrences of incidental papillary thyroid microcarcinomas detected during histopathological evaluation of thyroidectomy specimens removed for benign diseases. All three cases involved papillary microcarcinomas with classical histological features and an indolent morphological profile, underscoring the subtle and often occult nature of these lesions. The findings reinforce the critical role of meticulous gross examination and adequate tissue sampling in identifying small, clinically unsuspected malignancies that may otherwise remain undetected. Although papillary thyroid microcarcinoma is generally associated with an excellent prognosis, its incidental discovery continues to raise important considerations regarding optimal surgical management and postoperative follow-up. The absence of aggressive histological variants or poorly differentiated carcinomas in this series supports current recommendations favouring conservative surgical approaches in selected low-risk cases. Overall, this study emphasizes the importance of standardized pathological processing and reporting to ensure accurate diagnosis, guide appropriate clinical decision-making, and avoid both underdiagnosis and overtreatment of incidental thyroid malignancies.

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