

Case report

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**Cribriform-Morular Variant of Papillary Carcinoma:  
 Association with Familial Adenomatous Polyposis -  
 Report of Three Cases and Review of Literature**

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**Abstract**

We describe a rare variant of papillary thyroid carcinoma (PTC), the Cribriform-Morular Variant (C-MV). A handful of cases have been described in the literature of this entity. They exhibit the morphologic features of a distinctive papillary neoplasm along with solid, cribriform, and squamoid-morular areas. The cribriform and morular features make this a separate entity which could be mistaken for a high grade aggressive thyroid neoplasm. These lesions are usually associated with familial adenomatosis polyposis (FAP) but rarely may be sporadic. We report three cases that we have encountered.

**Key words**

thyroid neoplasm, papillary thyroid carcinoma, cribriform, squamoid, morular

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## 1. Report of cases

### Case 1

Patient was a 32 year old G1P0 white female who presented with an enlarging painless lump in her neck for the preceding two years. Ultrasound revealed a large, lobulated, right lobe mass. Serum level showed: TSH-0.4  $\mu$  IU/ml, T3-1.88ng/ml (N: 0.6-1.81 ng/ml), free T4-1.2 ng/dl (N: 0.8-1.8 ng/dl) and 24 hour radio active iodine uptake-37%. She underwent a total thyroidectomy and is currently on adjuvant radioactive iodine. She also underwent a proctocolectomy for multiple colonic polyps and colonic carcinoma.

### Case 2

Patient was a 14 year old Latin American female with a gradually enlarging right neck mass for 2 years. CT scan showed several bilateral lesions. Fine needle aspiration showed normal follicular cytology. Serum level showed: TSH-1.31  $\mu$  IU/ml, T4-0.92ng/ml (N: 0.6-1.81 ng/ml), free T4-2.6 ng/dl (N: 0.8-1.8 ng/dl) and 24 hour radio active iodine uptake-28%. She underwent a total thyroidectomy with subsequent radioactive ablation. There is no family history of colonic polyposis.

### Case 3

Patient was a 34 year old asymptomatic HIV positive female with bilateral neck masses. Fine needle aspiration of the left lobe lesion showed papillary carcinoma. Serum level showed: TSH-1.92  $\mu$  IU/ml, free T4-1.1 ng/dl (N: 0.8-1.8 ng/dl) and 24 hour radio active iodine uptake-31%. She underwent a total thyroidectomy with subsequent radioactive ablation. She had a colectomy for multiple colonic polyps.

### Gross Pathology

Specimens revealed well-circumscribed, somewhat lobulated tan masses ranging from 1.5-2 cm with multiple satellite nodules. There was no lobe predilection. There was no necrosis or hemorrhage seen. The remainder of the thyroid was lobulated and beefy. Few lymph nodes were also identified.

### Microscopic Pathology

The typical nuclear features of PTC could be seen. They were complex branching papillary structures lined by cuboidal cells. The nuclei were hyperchromatic, optically clear with longitudinal grooves and showed eosinophilic, intranuclear and cytoplasmic inclusions as in classic PTC (Fig 1). Some lesions showed an intricate blending of several histological patterns (Fig 2). Cribriform areas had back-to-back follicles with anastomosing bars and arches of cells in the absence of intervening fibrovascular stroma and accounted for 30-50% of the lesions (Fig 3). The solid areas, which were approximately 20-30%, consisted of whorls of cells that form squamoid morules or nests that typically do not show any keratinization or intercellular bridges (Fig 4). No colloid or psammoma bodies were found in the tumors. Case 3 also showed foci of tall and columnar cell features.

## 2. Comment

Cribriform-Morular Variant (C-MV) of PTC is a rare morphologic entity. It was first described by Harach et al. [1] in association with FAP as a distinctive tumor. A total of 44 cases have been documented so far (See Table1). We describe three cases, in two of which the patients have FAP. Case 2 was lost to follow-up.

Two cases were women in their 30's and the third was a 14 year old. The lesions ranged from 1.5 to 2 cm and were associated with several satellite nodules. There was no lymph node metastasis, capsular or vascular invasion. Our cases are similar to that described by Cameselle-Teijeiro et al. [2] who first proposed the term and did a study on nine cases. All the cases were seen in women between ages of 16-30 years (mean: 21.3). The lesions were predominantly solitary and ranged from 1.5-5.6 cm. All except one showed vascular invasion. Two cases also showed lymph node metastasis. In that study, immunohistochemical stains were positive for thyroglobulin, epithelial membrane antigen, cytokeratin, vimentin, estrogen and progesterone receptors, bcl-2 and Rb proteins. Calcitonin and carcinoembryonic antigen were negative. Follow-up showed seven cases with no recurrences.

C-MV of PTC is commonly seen in young females usually less than 30 years of age. The lesions are encapsulated or well-circumscribed. While sporadic forms usually appear as an isolated tumors, the cases associated with FAP are often multifocal due to different somatic mutations added to the germline mutations [3]. They display the characteristic histologic pattern of cribriforming akin that seen in breast cancer with morules. Morules appear squamous with no keratinization or cellular bridges. There are also follicles showing papillary, trabecular and solid patterns.

There have been several cases showing germline mutations in the APC gene which have also been found in the colonic polyps. Hot spots on codons 1061, 1039 and 698 of the APC gene on exon 15 are frequently identified. It has been proposed that  $\beta$ -catenin immunohistochemistry is a feasible screening method to identify occult FAP in young patients with thyroid tumors [4]. Recently Xu B [5] suggested that accumulation of mutant  $\beta$ -catenin contributes to the development of C-MV of PTC. A handful of sporadic cases have also been documented [6]. Table 1 summarizes all the cases in the literature. Molecular studies were performed in all our cases and they did not show the hot spots of the APC gene.

C-MV carries a better prognosis than the other aggressive variants of PTC (tall cell, columnar, diffuse sclerosing and diffuse follicular) and poorly differentiated carcinoma. Tall cell variant lacks morular, cribriform and spindle cell areas. Columnar cell variant presents in older males. The encapsulated form of columnar cell variant is common in females and histologically shows greater overlap with C-MV but does not have the morules and cribriform pattern. Hyalinizing trabecular tumor shows a zellballen pattern in a hyalinized amyloid-like background. Poorly differentiated (insular) carcinoma shows areas mimicking cribriform structures but lacks morules and is associated with a higher proliferation index and necrosis.

This morphologic variant should be borne in mind by pathologists because of its characteristic pattern. The clinician should be alerted to exclude FAP along with appropriate family screening. In 25-30% of cases, this might provide the first indicator of an underlying FAP syndrome.

### Conflict of interest

The authors have declared that no conflict of interest exists.

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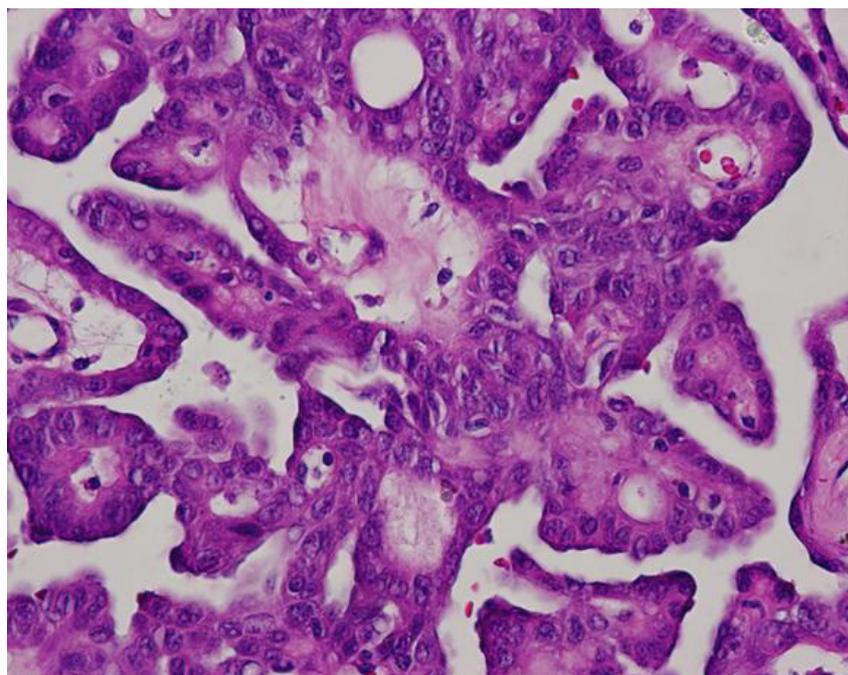
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**Tables and Figures**

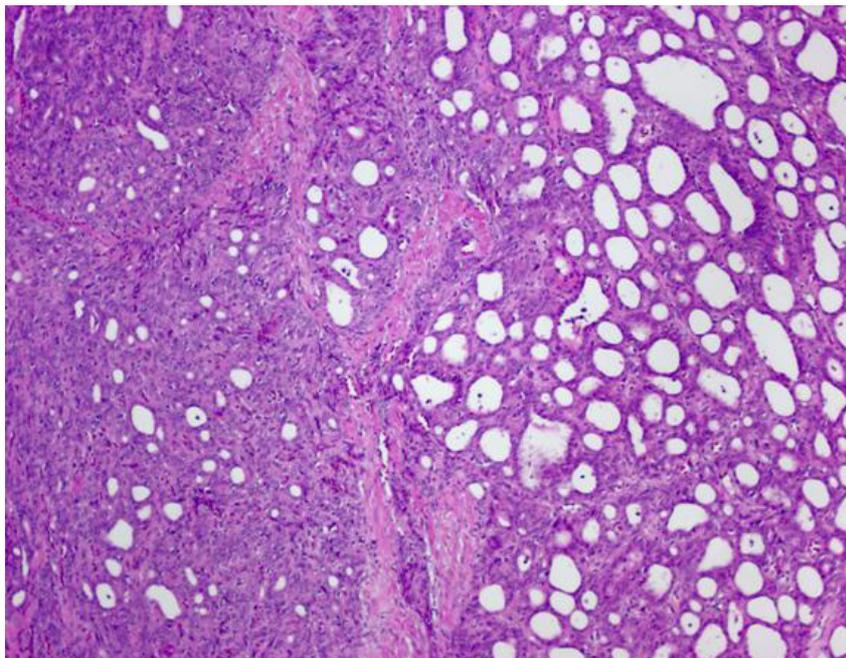
**Table 1**

| Cases                           | Sex/Age (yr) | FA P | Presentation                   | Main Features  | APC Mutation in thyroid                | Treatment  | Outcome                          |
|---------------------------------|--------------|------|--------------------------------|--|--|--|----------------------------------|
| Harach et al. [1]               | F/19         | Yes  | Right neck mass                | 16 separate nodules                                    | ND                                     | Total thyroidectomy  | A&W at 25 yrs                    |
|                                 | F/34         | Yes  |                                | 2 cm   | ND                                     |  |                                  |
|                                 | F/34         | Yes  |                                | 1 focus  | ND                                     |  |                                  |
|                                 | F/23         | Yes  |                                | 3 cm   | ND                                     |  |                                  |
| Cameselle-Teijeiro and Chan [2] | F/30         | No   | Right neck nodule at 6 months  | 22 mm  | Absent                                 | Hemithyroidectomy (R), Subtotal lobectomy (L), Radioactive iodine                        | A&W at 5 yr                      |
|                                 | F/16         | No   | Left neck nodule for 1 year    | 15 mm  | ND                                     | Total thyroidectomy, Radioactive iodine  | A&W at 14 yr                     |
|                                 | F/20         | No   | Left thyroid nodule            | 12 mm (R), 23 mm (L)                                   | ND                                     | Total thyroidectomy  | A&W at 4 yr                      |
|                                 | F/19         | No   | Right neck mass                | 19mm   | ND                                     | Total thyroidectomy  | Recent case                      |
| Yamashita et al.[7]             | F/21         | No   | Anterior neck mass             | 40 mm  | ND                                     | Surgical resection   | A&W at 1-2 yr                    |
|                                 | F/23         | No   | Anterior neck mass             | 50 mm, LN met +  | ND                                     | Surgical resection   | A&W at 1-2 yr                    |
|                                 | F/20         | No   | Anterior neck mass             | 56 mm  | ND                                     | Surgical resection   | A&W at 1-2 yr                    |
|                                 | F/21         | No   | Anterior neck mass             | 26 mm  | ND                                     | Surgical resection   | A&W at 1-2 yr                    |
| Mizukami et al.[8]              | F/16         | No   | Left neck nodule               | 20 mm  |  | Subtotal thyroidectomy and radical neck dissection                                       | A&W at 5 yr                      |
| Hizawa et al.[9]                | F/20         | Yes  | Right neck mass                | 18 mm  | Exon 15 at codon 1061                  | Hemithyroidectomy (R), and LN dissection   | A&W at 2 yr                      |
| Perrier et al.[10] 11/12 cases  | F/15-61 yrs  | Yes  | Bilateral : 5                  | 18 mm (0.2-5 cm) multicentric :8 2 cases with LN met's | All ND                                 | 5 Total thyroidectomy near total thyroidectomy 2 lobectomy 2 PO Iodine 10 T4 suppression | FU:&mos-30yr, 2 recurred 1 death |
| Soravia et al.[11]              | F/38         | Yes  | Bilateral mass                 | Multifocal (3-35 mm) capsular and vascular +           | Exon 15 at codon 698                   | Total thyroidectomy  | Recurred and died                |
|                                 | F/24         | Yes  | Bilateral mass                 | 20-35 mm, capsular invasion                            | Exon 15 at codon 698                   | Total thyroidectomy  | Recurred                         |
|                                 | F/51         | Yes  | Bilateral mass                 | 6-23 mm  | Exon 9 at codon 312                    | Total thyroidectomy  | NP                               |
| Fenton et al.[12]               | F/20         | Yes  | Diagnosis made retrospectively | Diagnosis made retrospectively                         | Exon 15 at codon 1061                  | Total thyroidectomy  | A&W at 14mos                     |
| Cameselle-Teijeiro et al. [6]   | F/27         | Yes  | Right neck mass x 14 mos       | 21 mm with capsular and angioinvasion                  | Exon 15 at codon 1309 somatic mutation | Total thyroidectomy  | A&W at 14mos                     |
| Cetta et al.[13]                | F/22         | Yes  | NP                             | Encapsulated   | Exon 15 at codon 1061                  | NP   | NP                               |
|                                 | F/20         | Yes  | NP                             | 8 mm   | Exon 15 at codon 1309                  | NP   | NP                               |
|                                 | F/36         | Yes  | NP                             | 11 mm  | Exon 15 at codon 1309                  | NP   | NP                               |
| Present Cases                   | F/32         | Yes  | Anterior neck                  | Multifocal   | In process                             | Total thyroidectomy  | Recent case                      |

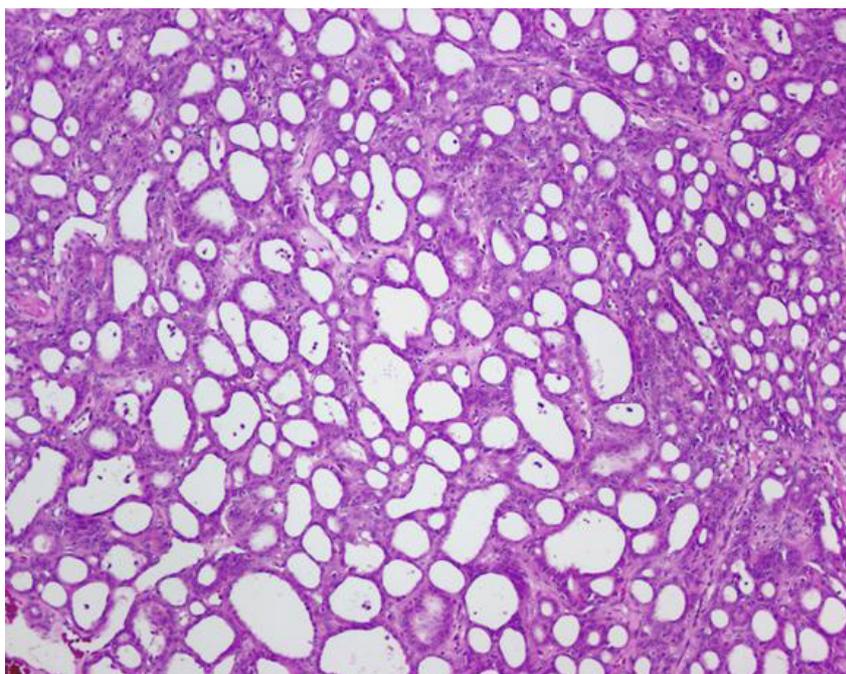
**Fig 1**



**Fig 2**



**Fig 3**



**Fig 4**

