

# Solid variant of papillary carcinoma thyroid in a child with no history of radiation exposure

Nishikant Damle, Soundararajan Ramya, Chandrasekhar Bal, Prashant Durgapal<sup>1</sup>

Departments of Nuclear Medicine, and <sup>1</sup>Pathology, AIIMS, New Delhi, India

## ABSTRACT

Solid variant is a rare and poorly characterized variant of papillary thyroid carcinoma (PTC) and comprises approximately 3% of PTCs. It is more common in children and has high propensity for extrathyroidal metastasis. It is seen in higher proportion in post-radiation PTCs and has been seen in more than one-third of post Chernobyl radiation induced PTCs in some studies. It usually presents with differential diagnosis of poorly differentiated carcinoma versus anaplastic versus medullary thyroid carcinoma versus metastasis from extrathyroidal malignancy on fine needle aspiration cytology. This report describes a case of solid variant of PTC in a child who had no history of radiation exposure and shows the importance to be given to histopathology when the pre-operative diagnosis is not clear.

**Keywords:** Histopathology, radiation exposure, solid variant of papillary carcinoma

## INTRODUCTION

Papillary thyroid carcinoma (PTC) is the most common thyroid cancer, representing approximately 80%-90% of all newly diagnosed thyroid cancers.<sup>[1]</sup> It is also the predominant cancer type in children (>90%).<sup>[2]</sup> The most common variants of papillary carcinoma include classical, follicular variant and tall cell variant. However, many other uncommon variants have been described including oncocytic, columnar cell, diffuse sclerosing and solid variant.<sup>[3]</sup> Of these, solid variant of papillary carcinoma thyroid is an entity that has been rarely described in the literature. The unique association between solid variant of papillary carcinoma thyroid and the Chernobyl nuclear accident in 1986 stimulated interest in its pathogenesis and prognosis. Although rare in adults this histopathology is frequently seen in children. The role of radiation exposure and the high prevalence of ret/PTC gene arrangements in solid variants supports the idea that it is a unique thyroid malignancy.<sup>[4]</sup> Nikiforov (1997) compared the morphological and genetic characteristics of 38 post-Chernobyl PTCs and among radiation-induced tumors, solid variant of papillary carcinoma was found in 37%, follicular in

29%, typical papillary in 18%, and mixed and diffuse sclerosing variants in 8% each.<sup>[5]</sup> It had a high propensity for extrathyroidal extension, and cervical lymph node metastases were found in up to 83% of patients.<sup>[6]</sup>

Solid variant of papillary carcinoma usually presents with a differential diagnosis, which includes poorly differentiated carcinoma, medullary carcinoma, anaplastic carcinoma, and metastatic carcinoma to the thyroid. It has a slightly worse prognosis than the classical papillary type but much better than poorly differentiated carcinoma. It has the same nuclear morphology and immunohistochemical profile as the classical papillary type.<sup>[7]</sup> Since it usually presents with a diagnostic dilemma and worse prognosis than classical variant, but much better than the other differentials mentioned above, histopathology should be given importance and this case report represents the same.

## CASE REPORT

A 12-year-old girl presented with a left sided neck swelling for 6 months and anterior neck swelling for 2 months, which were gradually increasing in size. She was clinically euthyroid. There was no history of any compressive symptoms. Local examination revealed a well-defined 2.5 × 2.5 cm nodule in the left lobe of thyroid and multiple enlarged left cervical lymph nodes. There was no contributory family history. Ultrasound examination of neck revealed enlarged thyroid lobes (L > R) with altered parenchymal echotexture with multiple nodular masses around the left lobe of thyroid and left cervical lymphadenopathy. She underwent a fine needle aspiration cytology examination (FNAC)

### Access this article online

#### Quick Response Code:



Website:  
www.ijnm.in

DOI:  
10.4103/0972-3919.106707

### Address for correspondence:

Dr. Nishikant A. Damle, Department of Nuclear Medicine, Room No. 59 A, A.I.I.M.S, New Delhi - 110 029, India.  
E-mail: nishikant\_damle@yahoo.com

of the left lobe lesion and the lymph nodes which suggested a differential of hurthle cell neoplasm versus medullary carcinoma thyroid. As a next step she was advised to follow-up with tumor markers for medullary carcinoma thyroid namely serum calcitonin and carcinoembryonic antigen (CEA) which were surprisingly within normal limits (serum calcitonin - 4.15 [normal limit < 11.5] and CEA - 1.7 [normal limits < 5]).

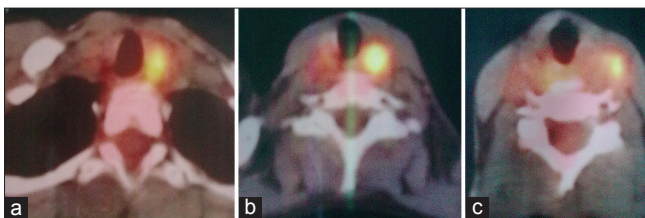
In view of the doubtful cytology report, the FNAC was again repeated and it showed features of papillary carcinoma thyroid with metastasis to left cervical lymph nodes. For metastatic work-up 18F-FDG PET/CT was done. It showed a large, irregular hypodense lesion in the enlarged left lobe of thyroid gland measuring  $1.8 \times 2.5$  cm with intense FDG uptake ( $SUV_{max}$  -2.4) suggested as primary site and loco-regional metastasis to multiple left cervical lymph nodes (level II, III, IV, VII) and left supraclavicular lymph nodes, which showed an increased FDG uptake [Figure 1a-c]. She underwent total thyroidectomy with left radical neck dissection and histopathologic examination of excised specimen showed grossly enlarged both lobes of thyroid with multiple greyish white areas. Multiple sections examined showed the presence of islands and cords of cells with bizarre, pleomorphic nuclei and dense inflammatory infiltrate and were initially reported as undifferentiated carcinoma with focal papillary areas with tumor reaching up to the capsule. However, since undifferentiated carcinoma is hitherto rarely reported in children, we reviewed the histopathology (HPE) again. It also showed solid nests of cells separated by fibrous septa and foci of calcification, round to oval vesicular nuclei, a moderate amount of eosinophilic cytoplasm and occasional nuclear grooves, features compatible with those of a "solid variant of PTC" [Figure 2 a-c]. Three weeks after the surgery she was referred for a whole-body radioiodine scan to us and the 24 h image after 2 mCi of radioiodine showed an iodine concentrating remnant with uptake of 0.22%. The child was treated with a dose of 30 mCi for remnant ablation and the post-therapy scan showed no additional iodine avid lesions.

## DISCUSSION

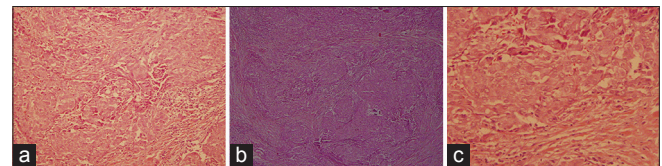
PTC is the most common thyroid cancer, representing approximately 80-90% of all newly diagnosed thyroid cancers.<sup>[1]</sup> It is usually seen in the 3<sup>rd</sup>-5<sup>th</sup> decade of life with a female preponderance of 2-3:1. The tumors tend to be biologically indolent and usually have an excellent prognosis.<sup>[8]</sup> Solid variant is a rare and poorly characterized variant of PTC and comprises

approximately 3% of PTCs.<sup>[7]</sup> A number of histologic variants of well-differentiated papillary carcinoma have been found to be associated with more aggressive tumor behavior. Tall cell, columnar cell, diffuse sclerosing, solid/trabecular, and insular variants of well-differentiated papillary thyroid cancer are all potentially more aggressive than conventional papillary thyroid cancer.<sup>[9]</sup> This variant contains predominantly solid architectural pattern, and > 75% that maintains the typical nuclear features of papillary carcinoma. This variant has propensity to extrathyroidal spread or lung metastasis. It was found to be more common in children and no difference in prognosis compared to papillary carcinomas.<sup>[10]</sup> RET/PTC3 is more often seen in children exposed to radiation and predominates in solid variant.<sup>[11]</sup> Our case was a 12-year-old female child with left cervical lymphadenopathy as the presenting finding solid variant of papillary carcinoma usually presents as a diagnostic dilemma. It presents with a differential diagnosis which includes poorly differentiated carcinoma, medullary carcinoma, anaplastic carcinoma, and metastases to the thyroid.<sup>[7]</sup> The case described by us also showed a differential of medullary carcinoma thyroid versus hurthle cell neoplasm initially on FNAC. It has been shown in multivariate analysis that histopathologic subtype is an independent prognostic factor in papillary carcinoma of thyroid. The clinical course of the solid variant however, is a matter of debate with many authors opining that these lesions behave like a typical papillary carcinoma and should not be designated as more aggressive.<sup>[12]</sup> A study by Akslen, *et al.*, revealed that tumor's with solid areas have an increased occurrence of mitotic figures and vascular invasion.<sup>[13]</sup> However, Nikiforov, *et al.*, (2001) reported a slightly higher frequency of distant metastases and less favorable prognosis in 20 patients with solid variant of papillary carcinoma, compared to a matched group of the classic variant. It is also important to distinguish this entity from poorly differentiated thyroid carcinoma, which has a reported lower survival rate compared with the solid variant of papillary carcinoma. The 10-year survival rate of patients with solid variant of papillary carcinoma is 90% compared to the classical variant which is 95%.<sup>[6]</sup>

To conclude, the clinical behavior of the solid variant is slightly worse and the survival rate is slightly less than classical variant of papillary carcinoma, moreover, definite diagnosis not always possible on cytology alone. The histopathology should be keenly reviewed, especially when patients in the pediatric age group present with two or more differentials on cytopathology and



**Figure 1:** (a-c) Axial section of PET/CT image showing increased FDG uptake in the left lobe of thyroid and left level 4 cervical node



**Figure 2:** Slides stained with Hematoxylin and Eosin in low power (a)  $\times 4$ , (b)  $\times 10$  view showing solid nests of cells separated by fibrous septa and foci of calcification, (c) Slides stained with Hematoxylin and Eosin in high power ( $\times 40$ ) view showing same nest with round to oval vesicular nuclei, moderate amount of eosinophilic cytoplasm and occasional nuclear grooves

solid variant of papillary carcinoma should be considered as one of the strong differential diagnosis.

## REFERENCES

- Boone RT, Fan CY, Hanna EY. Well-differentiated carcinoma of the thyroid. *Otolaryngol Clin North Am* 2003;36:73-90.
- Schlumberger M, Pacini F. Childhood and pregnancy. In: *Thyroid Tumors*. Paris: Nucleon; 2006. p. 227.
- Lloyd RV, Buehler D, Khanafshar E. Papillary thyroid carcinoma variants. *Head Neck Pathol* 2011;5:51-6.
- Oertel JC, Oertel YC. Pathology of miscellaneous and unusual cancers of thyroid. In: Wartofsky L, Nostrand DV, editors. *Thyroid Cancer: a Comprehensive Guide to Clinical Management*. 2<sup>nd</sup> ed. Totowa-New Jersey: Humana; 2006. p. 561.
- Nikiforov YE, Rowland JM, Bove KE, Monforte-Munoz H, Fagin JA. Distinct pattern of ret oncogene rearrangements in morphological variants of radiation-induced and sporadic thyroid papillary carcinomas in children. *Cancer Res* 1997;57:1690-4.
- Sywak M, Pasiacka JL, Ogilvie T. A review of thyroid cancer with intermediate differentiation. *J Surg Oncol* 2004;86:44-54.
- Nikiforov YE, Erickson LA, Nikiforova MN, Caudill CM, Lloyd RV. Solid variant of papillary thyroid carcinoma: Incidence, clinical-pathologic characteristics, molecular analysis, and biologic behavior. *Am J Surg Pathol* 2001;25:1478-84.
- Basu S, Nair N, Borges AM. Aggressive behaviour of solid arrangement pattern in differentiated papillary carcinoma of thyroid. *J Assoc Physicians India* 2003;51:408-11.
- Silver CE, Owen RP, Rodrigo JP, Rinaldo A, Devaney KO, Ferlito A. Aggressive variants of papillary thyroid carcinoma. *Head Neck* 2011;33:1052-9.
- Maaferi EL. Thyroid cancer. In: Becker KL, Bilerikian JP, Bremmer WJ, Hung W, Kahn CR, Loriaux DL, *et al.*, editors. *Principles and Practice of Endocrinology and Metabolism*. 3<sup>rd</sup> ed. Philadelphia: Lippincott Williams and Wilkins; 2001. p. 386.
- Sheikh SS. An update and review of oncogenes, tumor suppressor genes, and other Tumor markers in thyroid carcinoma. In: Milton CA, editor. *Trends in Thyroid Cancer Research*. Vol. 37. New York: Nova Science Publishers; 2007. p. 188.
- Moreno-Egea A, Rodriguez-Gonzalez JM, Sola-Perez J, Soria-Cogollos T, Parrilla-Paricio P. Multivariate analysis of histopathological features as prognostic factors in patients with papillary thyroid carcinoma. *Br J Surg* 1995;82:1092-4.
- Akslen LA, LiVolsi VA. Prognostic significance of histologic grading compared with subclassification of papillary thyroid carcinoma. *Cancer* 2000;88:1902-8.

**How to cite this article:** Damle N, Ramya S, Bal C, Durgapal P. Solid variant of papillary carcinoma thyroid in a child with no history of radiation exposure. *Indian J Nucl Med* 2011;26:196-8.

**Source of Support:** Nil. **Conflict of Interest:** None declared.

## New features on the journal's website

### Optimized content for mobile and hand-held devices

HTML pages have been optimized of mobile and other hand-held devices (such as iPad, Kindle, iPod) for faster browsing speed.

Click on [**Mobile Full text**] from Table of Contents page.

This is simple HTML version for faster download on mobiles (if viewed on desktop, it will be automatically redirected to full HTML version)

### E-Pub for hand-held devices

EPUB is an open e-book standard recommended by The International Digital Publishing Forum which is designed for reflowable content i.e. the text display can be optimized for a particular display device.

Click on [**EPub**] from Table of Contents page.

There are various e-Pub readers such as for Windows: Digital Editions, OS X: Calibre/Bookworm, iPhone/iPod Touch/iPad: Stanza, and Linux: Calibre/Bookworm.

### E-Book for desktop

One can also see the entire issue as printed here in a 'flip book' version on desktops.

Links are available from Current Issue as well as Archives pages.

Click on  View as eBook