

# $^{18}\text{F}$ -FDG PET/CT of Papillary Carcinoma in a Lateral Thyroglossal Duct Cyst

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**Abstract:** A 69-year-old man presented with bulging of the right oropharyngeal wall, which revealed cytopathologically malignant cells. The man underwent MRI and  $^{18}\text{F}$ -FDG PET/CT, which demonstrated a cystic parapharyngeal lesion with an  $^{18}\text{F}$ -FDG-avid soft tissue component and right cervical lymph node. The patient was operated on and showed thyroid cancer in normal thyroid tissue, compatible with a papillary thyroid carcinoma in a lateral thyroglossal duct cyst and 2 ipsilateral lymph node metastases. Despite its rarity, papillary thyroid carcinoma in a thyroglossal duct cyst should be kept as one of the differential diagnoses in patients presenting with parapharyngeal cystic lesion.

**Key Words:**  $^{18}\text{F}$ -FDG PET/CT, papillary carcinoma, parapharyngeal space, thyroglossal duct cyst

(*Clin Nucl Med* 2017;42: e371–e374)

Received for publication February 13, 2017; revision accepted April 7, 2017.  
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Conflicts of interest and sources of funding: none declared.

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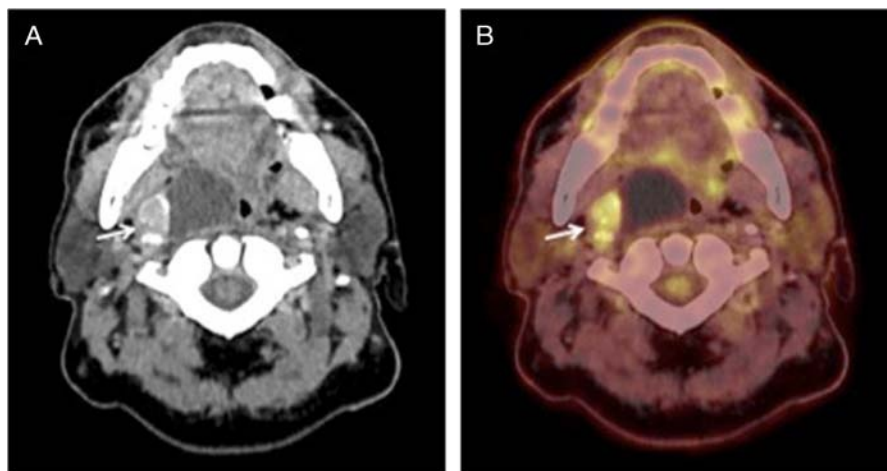
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ISSN: 0363-9762/17/4208–e371

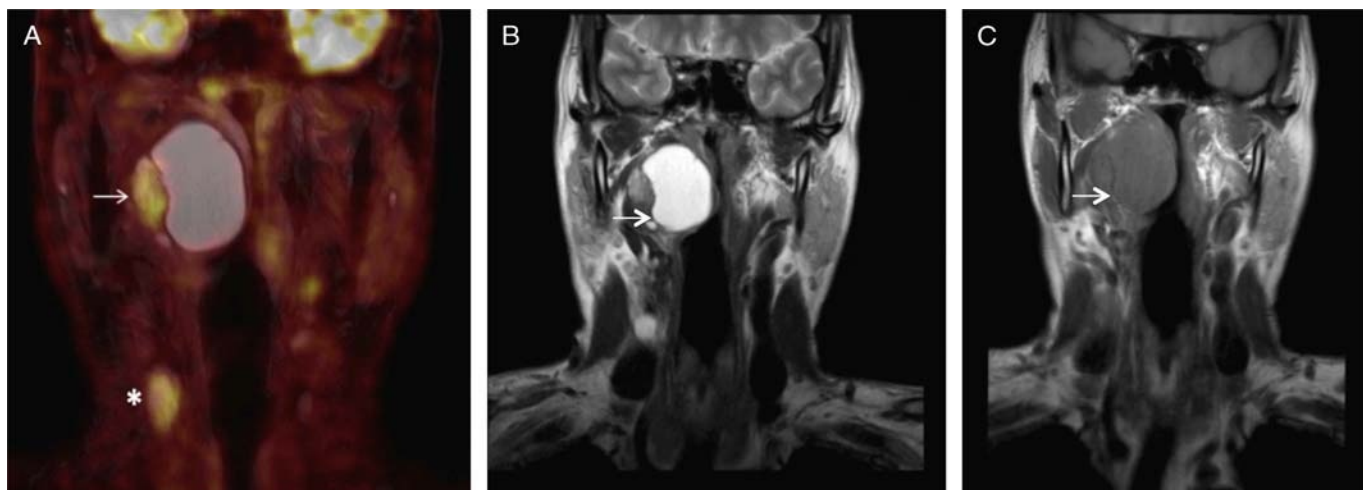
DOI: 10.1097/RLU.0000000000001712

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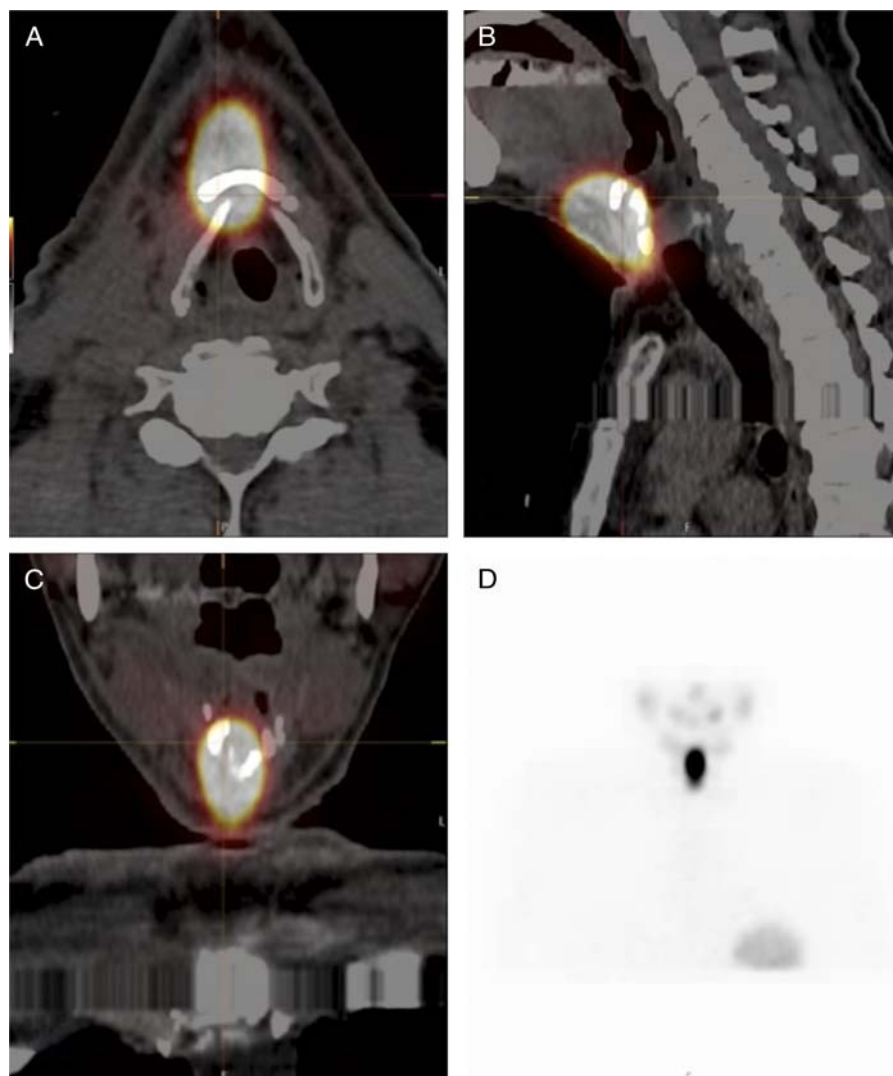
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**FIGURE 1.** Transaxial, contrast-enhanced CT (A) showing a parapharyngeal, cystic lesion with a partially calcified solid component bulging to the midline.  $^{18}\text{F}$ -FDG PET/CT (B) demonstrated moderate tracer uptake in the solid component of the cystic mass (arrow). The differential diagnosis of a parapharyngeal space lesion includes salivary gland tumors, with pleomorphic adenomas being the most common neurogenic tumors, among which paragangliomas are the most frequent cystic lymphangioma (cystic hygroma), branchial cleft cyst, and infectious or inflammatory lesions. Metastatic disease is a rare diagnosis for a parapharyngeal space tumor.<sup>1,2</sup>



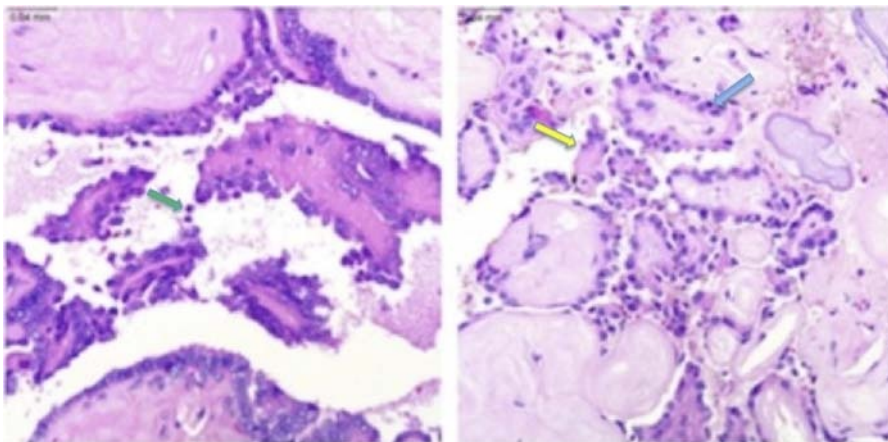
**FIGURE 2.** Coronal fused PET/MRI (A) demonstrated the thyroglossal duct cyst (TGDC) as a cystic mass with an  $^{18}\text{F}$ -FDG-avid soft tissue component (arrow), as well as  $^{18}\text{F}$ -FDG uptake in an ipsilateral lymph node metastasis (asterisk). The cystic component of the lesion showed hyperintense signal in the T2-weighted image (B) and hypointense signal in the T1-weighted image (C). Thyroglossal duct cyst is found in 7% of the population, consisting the most common congenital neck anomaly.<sup>3</sup> The majority of TGDCs are located in the midline adjacent to the hyoid bone.<sup>4,5</sup> Nevertheless, because of variable branching patterns of TGDC, less common sites, such as the one presented here, have been reported.<sup>4,6</sup> In approximately only 1% of all TGDCs, thyroid carcinoma may develop.<sup>7</sup> Despite the rarity of the diagnosis, the contribution of  $^{18}\text{F}$ -FDG PET/CT to the evaluation of papillary thyroid carcinoma (PTC) arising in TDGC has been demonstrated.<sup>8,9</sup> Moreover, other rare cases of lateral ectopic thyroid tissue revealed by nuclear medicine techniques have been documented.<sup>10</sup> The patient underwent resection of the parapharyngeal mass and ipsilateral selective neck dissection with frozen section revealing PTC, followed by total thyroidectomy and adjuvant radioiodine therapy. Pathology revealed a PTC, hobnail variant in nonmalignant thyroid parenchyma compatible with a thyroid cancer in a lateral TGDC, as well as 2 lymph node metastases and an incidental microcarcinoma in the left thyroid gland. Although the scenario of metastatic spread from this occult contralateral thyroid carcinoma cannot be formally excluded, 2 reasons make this hypothesis highly unlikely: first, incidental papillary microcarcinomas are extremely indolent lesions, and second, the PTC found in the TGDC demonstrates a rare aggressive PTC subtype, which is well in line with the observed lymph node metastases.



**FIGURE 3.** The posttherapy scan after adjuvant radioiodine <sup>131</sup>I therapy with transaxial (A), sagittal (B), and coronal (C) SPECT/CT, as well as planar scan (D), showed a focal uptake in the pyramidal lobe likely corresponding to a remnant of a thyroglossal duct. No other site of pathological tracer accumulation was depicted. Serum thyroglobulin (Tg) after operation but before radioiodine therapy was 0.42 ng/mL, whereas the anti-Tg antibody test was negative. Serum Tg was undetectable 3 months after radioiodine therapy (value <0.17 ng/mL).



**FIGURE 4.** Resected parapharyngeal mass showing parts of the ruptured cystic wall (arrow) and the solid component (asterisk).



**FIGURE 5.** Histology shows PTC hobnail variant next to classic PTC areas (not shown) in this TGDC. The tumor shows micropapillary architecture (yellow arrow) and loss of cellular polarity (blue arrow). The dissociation of tumor cells from the stroma can be easily appreciated (green arrow; hematoxylin-eosin stain, original magnification  $\times 200$ ).