

Utility of Ultrasound Examination for Neck Surveillance in Treated Head and Neck Squamous Cell Carcinoma at a Single Institution

Courtney Miller MD¹, Alex Karabachev MD², Luke Arnell MD¹, Peter Callas PhD², Damon Silverman MD¹, William Brundage MD¹, Michael Bazylewicz MD¹, Mirabelle Sajisevi MD¹

¹University of Vermont Medical Center, ²Larner College of Medicine at The University of Vermont

Introduction

- Imaging for work up and surveillance of head and neck squamous cell cancers (HNSCC) is not standardized and may involve computed tomography (CT), positron emission tomography (PET), and/or magnetic resonance imaging (MRI)
- The most accurate method for evaluating cervical lymph node metastasis remains controversial.
- Palpation is convenient with an accuracy of detecting nodal disease between 59% to 84% but remains largely dependent on the skill of the physician with added difficulty in the treated neck.¹
- The Neck Imaging and Reporting and Data System (NI-RADS) is a 4-tier classification proposed by the American College of Radiology for reporting surveillance imaging of treated HNSCC.
- NI-RADS is intended for contrast-enhanced cross-sectional imaging with or without FDG-PET/CT.^{3,4} It can be applied to both the primary site and cervical lymph nodes.
- The NI-RADS classification for the neck and associated suggested management is as follows:³

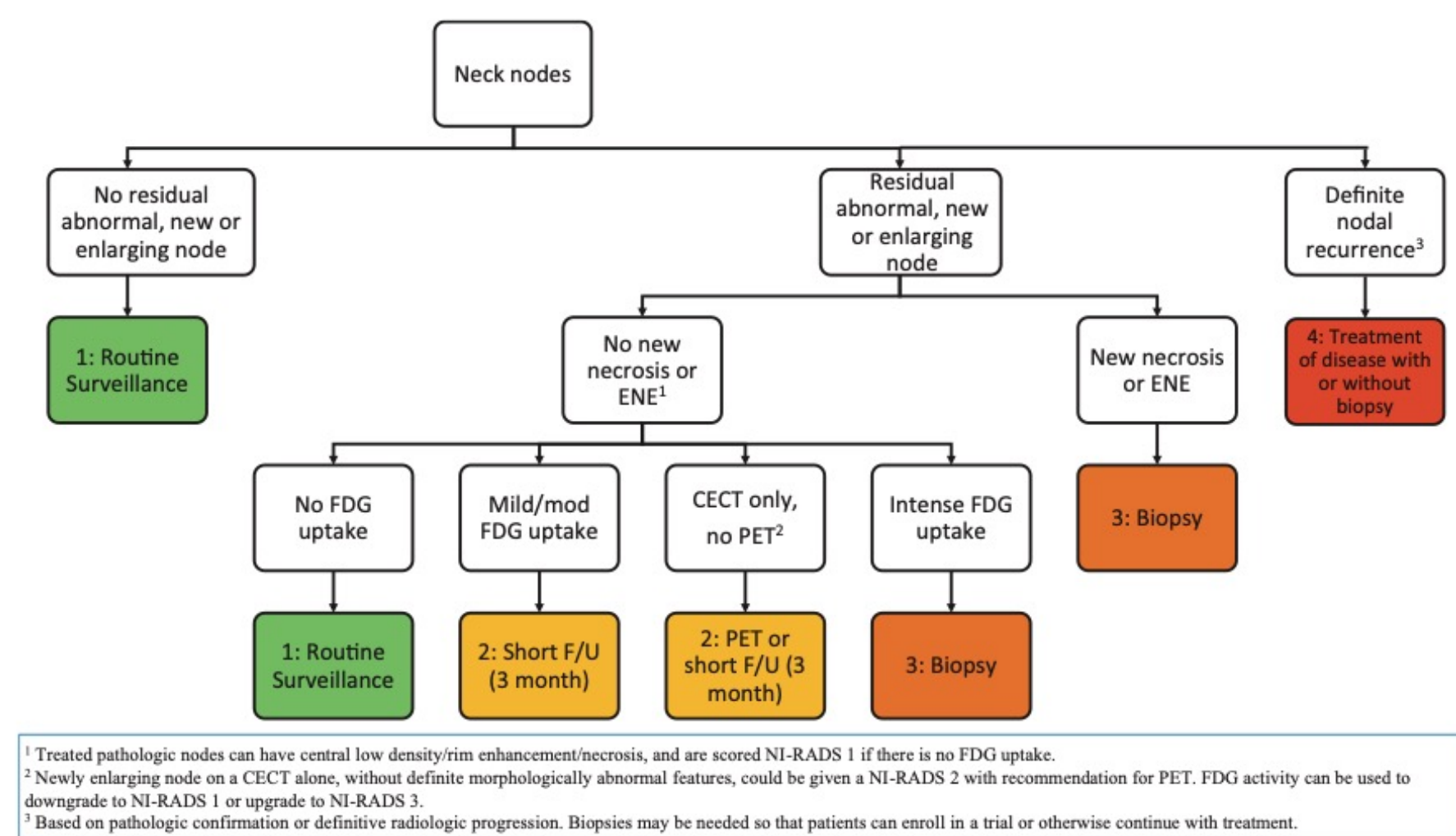


Fig 2. Flowchart depicting NI-RADS neck nodes category and management. Flowchart showing four categories on the basis of the ACR NI-RADS lexicon and categories to direct follow-up or biopsy. Explanatory notes appear at the bottom. FDG = fluorine-18-2-fluoro-2-deoxy-D-glucose; F/U = follow-up; NI-RADS = Neck Imaging Reporting and Data Systems.

- There is no such system in place for ultrasonography.
- Ultrasound has been shown to be an effective and less expensive means of predicting nodal metastasis for the initial workup of HNSCC when compared to CT, MRI and PET, however, further studies are needed to assess its use for surveillance of recurrent disease
- We sought to evaluate the pattern of ultrasound use for neck surveillance in patients with treated HNSCC and determine its impact on management

Methods

- Retrospective chart review was conducted of patients diagnosed with HNSCC who underwent definitive treatment at a single institution between 2013-2018.
- A patient list was generated from the electronic medical record (EMR) using HNSCC ICD 9/10 codes and CPT code 76536 (ultrasound, soft tissues of head and neck).
- Patients were included in the analysis if they had a post-treatment ultrasound or ultrasound-guided fine needle aspiration (FNA) within 3 months of other imaging such as CT or PET after completion of treatment.
- Patients who did not undergo definitive treatment, those with concomitant thyroid cancers or those with histology other than squamous cell carcinoma were excluded.
- Patient demographics and relevant clinical data were recorded including sex, age, diagnosis, pretreatment physical exam of the neck, pretreatment imaging, primary treatment, post-treatment imaging results, presence of recurrent disease and survival.
- If a NI-RADS score was not documented in the post-treatment CT/PET report, the imaging was reviewed and score provided retrospectively by a single neuroradiologist at the same institution.
- The pattern of ultrasound use in neck surveillance in this patient population and the impact of ultrasound findings on management were then evaluated.

Results

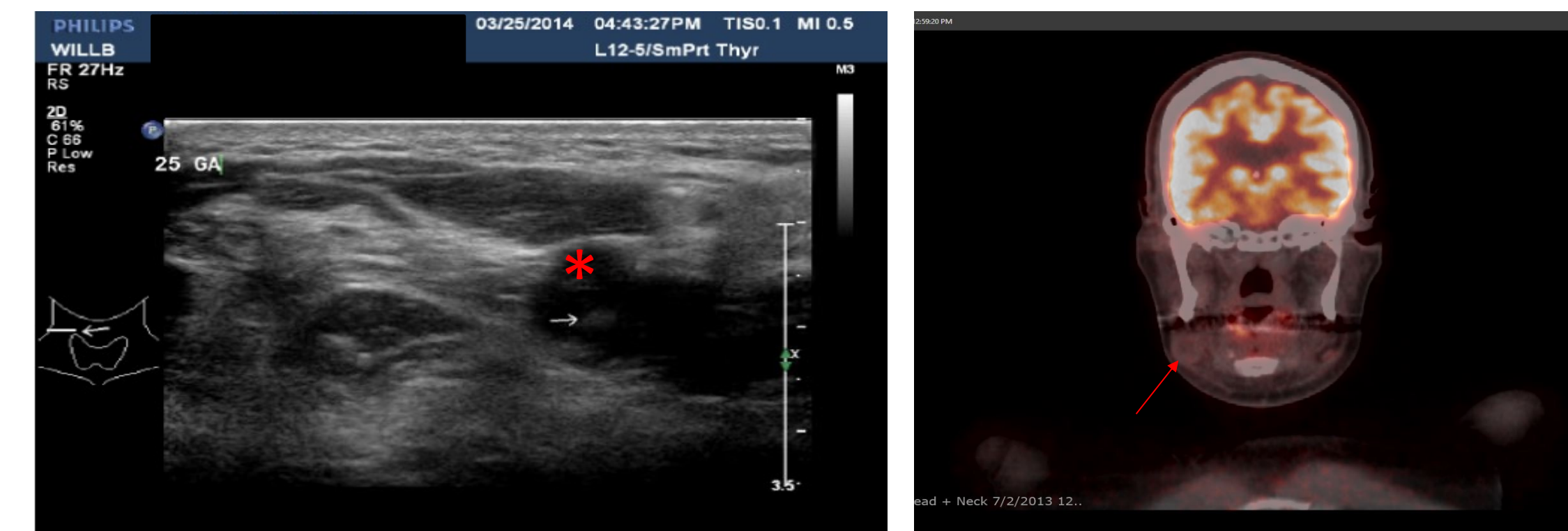
- 190 patients initially identified via EMR as having a HNSCC ICD-9/10 code and documented CPT code 76536
- 60 patients met inclusion criteria
- Diagnosis: oral cavity SCC (20%), oropharyngeal SCC (63%), laryngeal SCC (7%), nasopharyngeal SCC (5%), unknown primary (5%).
- 2 groups identified: those who underwent post-treatment ultrasound prior to other imaging and those where ultrasound was performed after post-treatment CT or PET
- Only significant difference identified between the 2 groups was indication for ultrasound as indicated by an asterisk in **Table 1**
- Of patients who underwent ultrasound first:
 - 5 out of the 9 who underwent FNA/biopsy had a positive result prior to PET/CT making them a NI-RADS 4
 - 5 patients underwent neck dissection due to concerning ultrasound findings without undergoing prior biopsy and final pathology was positive in 1/5 cases. 3/5 were categorized as NI-RADS 1 (only 1 case positive for persistent disease), 1/5 NI-RADS 2 and 1/5 NI-RADS 3.
 - 10 patients had no evidence of disease (NED) on US and PET/CT (NI-RADS 1).
- Of patients who underwent ultrasound following other imaging:
 - In patients with NI-RADS 1 imaging, ultrasound provided additional reassurance in 6/8 cases. 1/8 underwent FNA, which was ultimately negative, and the other received chemotherapy later in their treatment course for recurrent disease.
 - In cases of NIRADS 2 imaging, ultrasound provided reassurance in 9/15 cases who remained NED. 5/15 underwent FNA/biopsy and pathology confirmed disease in 1, while the last patient underwent neck dissection without prior biopsy and final pathology was negative.
 - Ultrasound confirmed suspicious findings in all patients with a NIRADS score of 3 or 4. Final pathology was positive in 5/8 patients who underwent biopsy or salvage surgery.
- **Examples 1-3** briefly illustrate some patient cases included in this study and demonstrate the role in-office ultrasound played in their clinical course

	Ultrasound first: N (%)	
	Yes (n=27)	No (n=33)
Age, mean (SD)	64 (13)	64 (8)
Sex		
Female	7 (26%)	6 (18%)
Male		
Indication		
Palpable adenopathy *	23 (85%)	3 (9%)
Surveillance	4 (15%)	8 (24%)
FNA guidance	9 (33%)	10 (30%)
Residual disease on post-treatment CT/PET/MRI*	0 (0%)	26 (78%)
Diagnosis		
Oral cavity	6 (22%)	6 (18%)
Oropharyngeal	17 (63%)	21 (64%)
Laryngeal	1 (4%)	3 (9%)
Nasopharyngeal	0 (0%)	3 (9%)
Unknown primary	3 (11%)	0 (0%)
T stage		
1,2	20 (83%)	24 (73%)
3,4	4 (17%)	9 (27%)
N stage		
0	4 (15%)	4 (12%)
1	5 (19%)	6 (18%)
2,3	18 (67%)	23 (70%)
Primary treatment		
Surgery	9 (33%)	5 (15%)
RT/CRT	18 (67%)	28 (85%)
NI-RADS score		
1	15 (55%)	8 (24%)
2	3 (11%)	15 (45%)
3	2 (7%)	8 (24%)
4	5 (18%)	2 (6%)
FNA or biopsy	9 (33%)	11 (33%)
Positive pathology	7 (77%)	5 (45%)
Neck dissection done without prior biopsy	5 (18%)	3 (9%)
Positive pathology	1 (20%)	1 (33%)

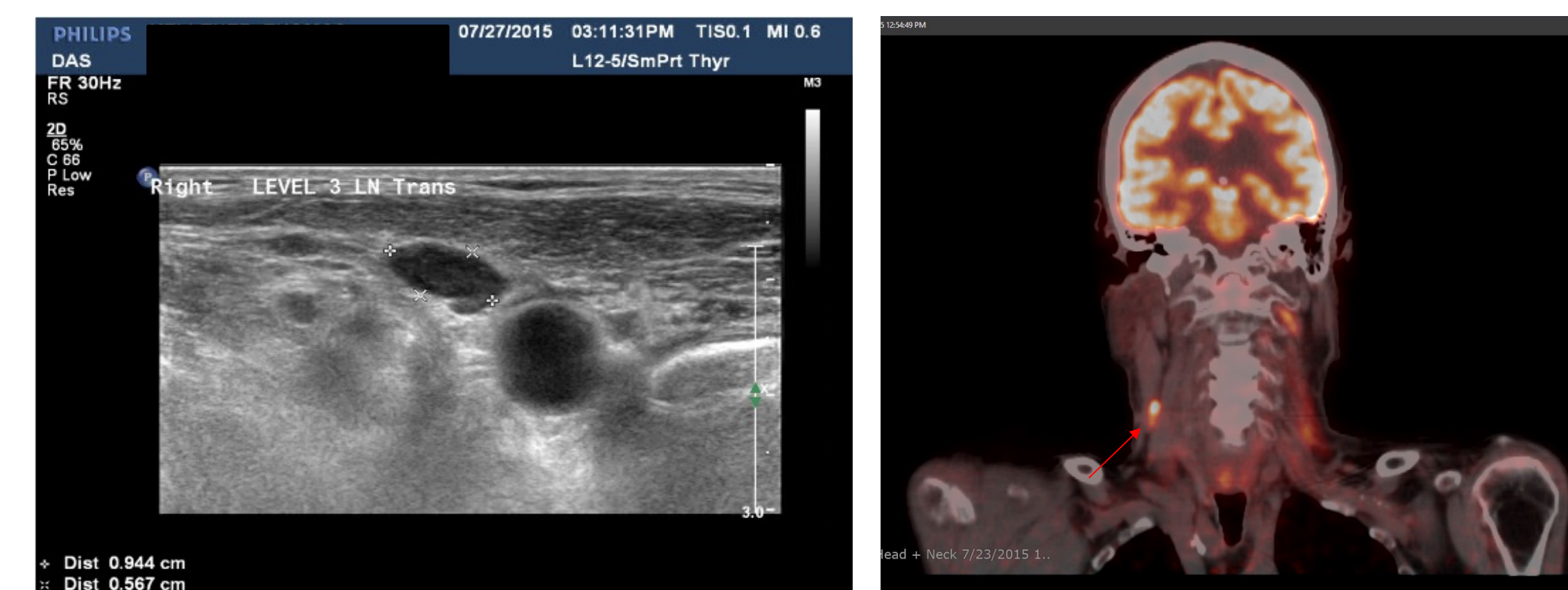
Table 1. Clinicopathological Data

Conclusions

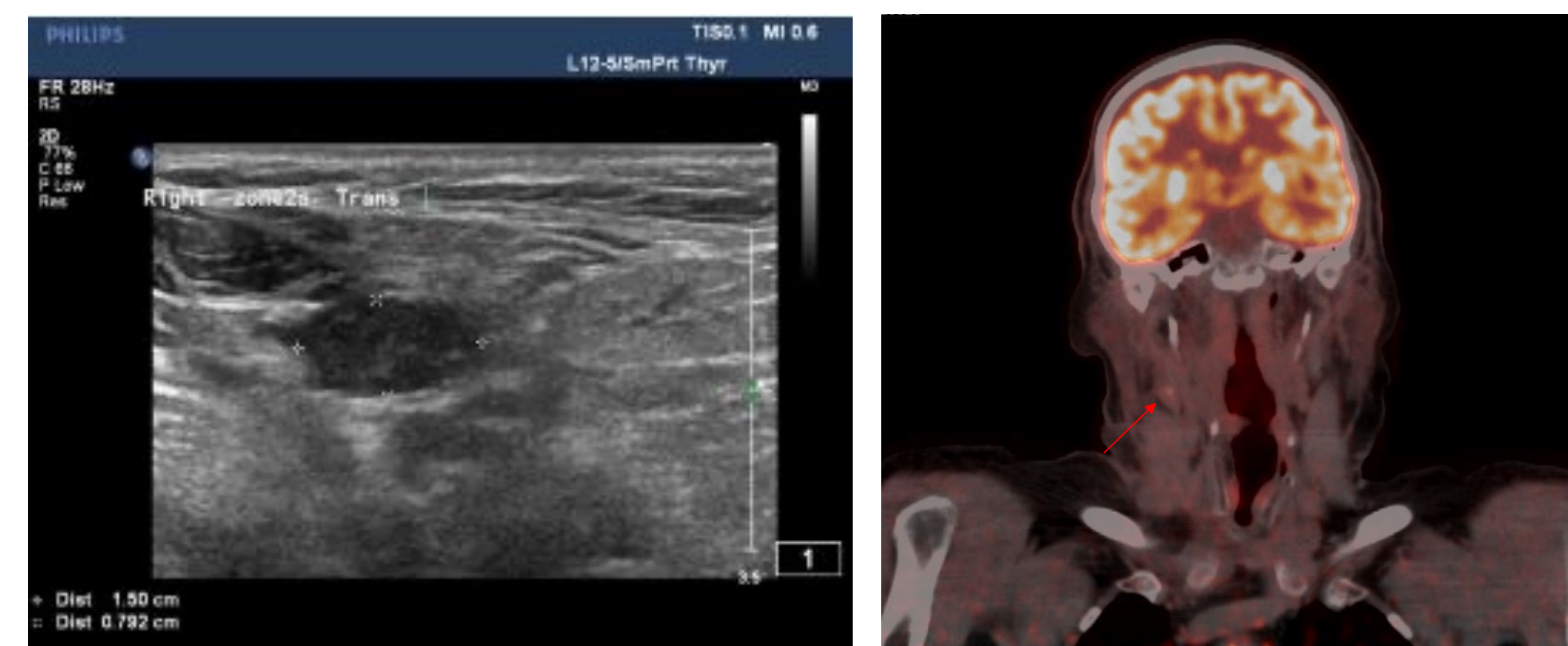
In-office ultrasound is most commonly performed at our institution when there is persistent post-treatment palpable adenopathy or there is concern for residual disease on post-treatment PET or CT. When both ultrasound and PET show suspicious adenopathy, there is increased likelihood of persistent/recurrent disease. Ultrasound was able to provide reassurance in certain cases of equivocal or concerning findings on CT or PET thereby preventing the need for additional intervention such as biopsy or neck dissection. Although small sample and retrospective in nature, these data suggest that ultrasound may be a useful adjunct in neck surveillance for HNSCC.



Example 1. 53 year old male with T3N2cM0 HPV+ SCC of the right tonsil treated with CRT. Patient underwent serial in-office ultrasound due to palpable adenopathy starting 1 month after completion of treatment. 3-month post-treatment PET was categorized as NI-RADS 1 (red arrow pointing towards PET-negative adenopathy). Persistent PET-negative adenopathy was surveilled every 3 months using in-office ultrasound (red asterisk). Ultrasound-guided FNA was done approximately 11 months after completion of treatment due to interval enlargement of the node. This was positive for SCC. Patient then underwent right levels 1-4 neck dissection.



Example 2. 64 year old male with T2N2cM0 SCC of the supraglottis treated with RT. 3-month post-treatment PET was categorized as NI-RADS 2 (red arrow indicates FDG-avid node). Due to the concerning appearance on ultrasound, ultrasound-guided FNA was performed instead of repeating imaging in 3-months as suggested by NI-RADS recommendations. FNA was positive for SCC. The patient ultimately underwent right levels 2-4 neck dissection with final pathology revealing 2 of 17 lymph nodes positive for SCC.



Example 3. 79 year old male with a history of T2N2bM0 SCC of the right tonsil treated with RT. Post-treatment PET was categorized as NI-RADS 2. Persistent PET-negative adenopathy (red arrow) was followed with serial in-office ultrasounds every 4 months until adenopathy resolved around 1 year after completion of treatment. He remains NED.

References

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