Single Large Institution Experience with Neck Imaging Reporting and Data System (NI-RADS) 3 Surveillance Computed Tomography: Incidence, Biopsy Rate, and Predictive Performance in Mucosal Head and Neck Squamous Cell Carcinoma (SCC)

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Introduction

- NI-RADS is a radiology reporting system for head and neck cancer surveillance. Imaging findings with high suspicion for recurrence are assigned Category 3 and biopsied if clinically indicated.

Category	Linked Recommendations
NI-RADS 1	**No evidence of recurrence**
NI-RADS 2	**Low suspicion for recurrence** (ill-defined, only mild or moderate FDG uptake)
NI-RADS 3	**High suspicion for recurrence** (discrete, new or enlarging, intense FDG uptake)
NI-RADS 4	**Known or established recurrence** (pathologically proven, clinical, or radiographic progression)

- **The purpose of the study is to determine the incidence of recurrent lesions and the positive predictive value of NI-RADS 3 in a large single-institution population of patients with mucosal based H&N SCC.**

- Five prior published studies that analyzed the PPV of NIRADS 3 had an average population size of 28 patients and tended towards heterogeneous H&N cancer populations with some including cutaneous malignancies.

Methods

- Neck CTs reported with NI-RADS between March 2018 and June 2023 were reviewed to identify patients undergoing surveillance for mucosal SCC assigned NI-RADS 3.

- Cancer recurrence was defined by either a positive pathology with biopsy or treatment of clinically determined recurrence. Cancer recurrence was then established by electronic medical record review.

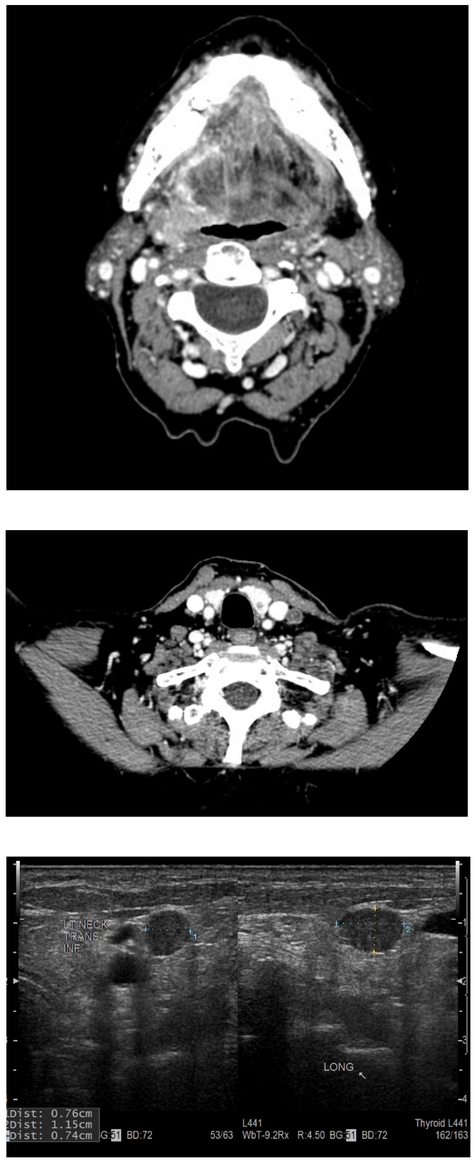
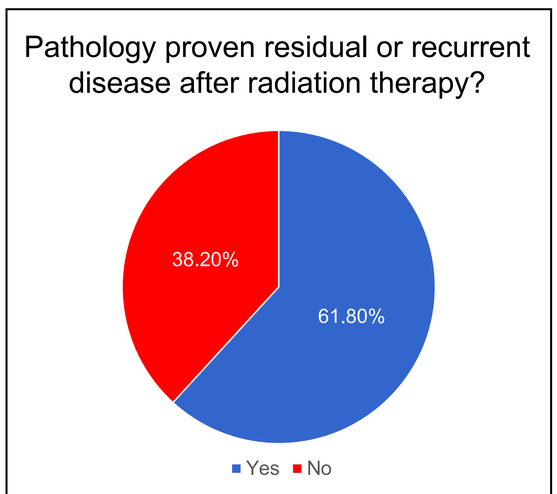
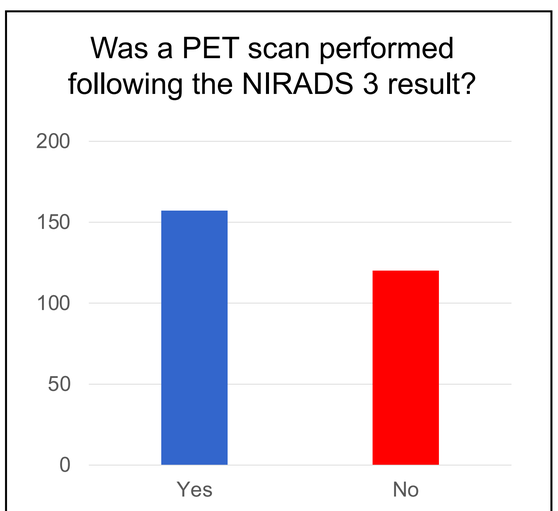


Fig 1. The first two images depict post-treatment CT scans that were classified as NIRADS 3 for high suspicion of recurrence due to new or enlarging lesions with intense FDG uptake. The last image is a diagnostic ultrasound depicting a cervical lymph node in transverse and long axis views.



Counts/frequency: **Yes** (173, 61.8%), **No** (107, 38.2%)

Fig 3. This figure shows a pie chart distribution of pathologically proven recurrence following a classification of NI-RADS 3 on a post-treatment imaging scan.



Counts/frequency: **Yes** (157, 56.7%), **No** (120, 43.3%)

Fig 4. The figure displays the distribution of patients that obtained a PET scan following a NI-RADS 3 classification post-radiation treatment.

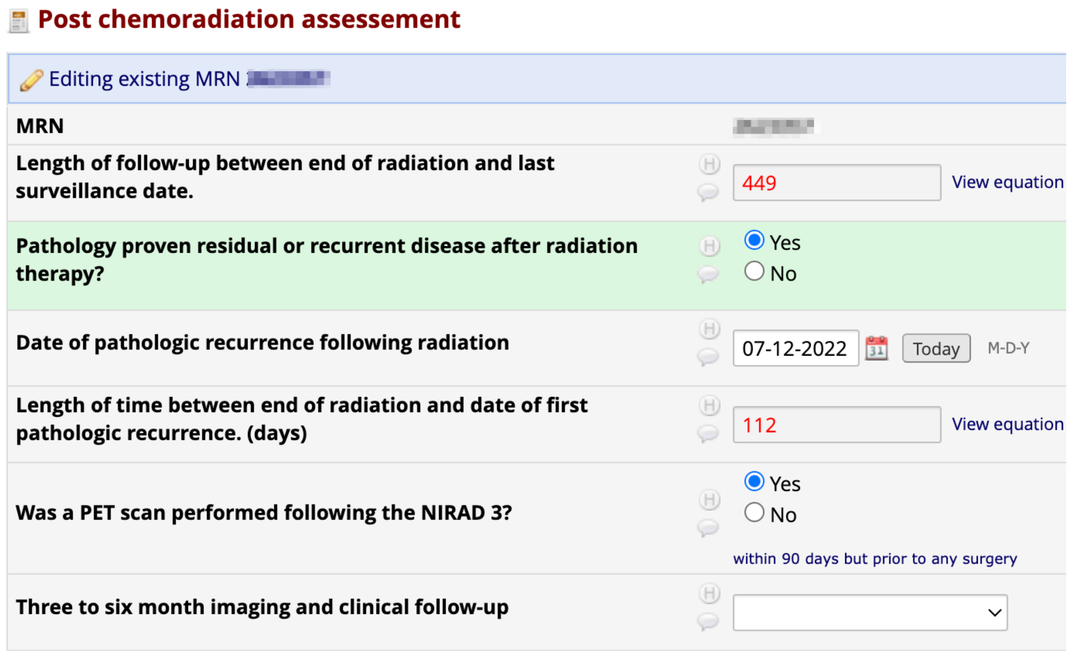


Fig 2. An example of the data collected for the post-chemoradiation REDCap survey using a patient's electronic medical record.

Results

- During the study period, 13,150 neck CTs were reported with NI-RADS, of which 400 (3.0%) CTs obtained in 313 patients (232 male, 81 female, mean age 66.3 years) formed the study cohort.

- 277 (88.5%) received treatment with definitive chemoradiation therapy. FDG PET/CT following the CT NI-RADS 3, but before biopsy, was performed in 81 (26%) of patients.

- Confirmed locoregional recurrence was identified in 169 cases (60.8%) with an additional seven cases treated as clinically determined recurrence.

Conclusions

- The incidence of NI-RADS 3 lesions in our cohort is 3%.

- The overall positive predictive value of NI-RADS 3 for recurrent SCC was 61% which was similar to prior smaller studies (mean = 64.2%).

- The incidence of NI-RADS 3 in our study population is smaller than previously reported, but still represented a substantial likelihood of recurrence supporting prior smaller studies.

- Differences in incidence of NI-RADS 3 may be related to the more homogeneous study population.

- This large-sample study demonstrates the utility of NI-RADS 3 classification and suggests the need for further research.

References

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