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OBJECTIVE

To identify imaging modalities used for diagnosis and surveillance of patients with known succinate dehydrogenase (SDH) mutations who have been surgically treated for head and neck paragangliomas.

INTRODUCTION

- Head and neck paragangliomas typically present as slow-growing, painless lateral neck masses but can progress and manifest with functional deficits as a result of cranial nerve neuropathies and rarely Horner syndrome.¹
- Paragangliomas can be either sporadic or hereditary, with up to 50% considered familial in nature.²
- The majority of hereditary paragangliomas are associated with mutations in genes encoding succinate dehydrogenase (SDH), an enzyme that contributes to both the tricarboxylic acid cycle and the electron transport chain.
- Initial imaging evaluation is often accomplished with CT and/or MRI and often angiography for preoperative planning. Functional imaging techniques with PET scans are emerging as a sensitive modality for screening.^{3,4}
- Given the rarity and heterogeneity of paragangliomas, recommendations for tumor surveillance after resection, especially those with known carriers of identified mutations, have been variable regarding frequency and location.

METHODS

- Study design: Retrospective cohort study at an academic tertiary cancer hospital between the years 1963 and 2018
- Inclusion criteria:
 - 1) Diagnosis of a head and neck paraganglioma
 - 2) Known SDH mutation
 - 3) Management with surgical treatment
- Exclusion criteria:
 - 1) Management with observation and/or radiotherapy
- Data regarding demographics, gene mutation, imaging modalities used for diagnosis and surveillance, and recurrence or diagnosis of new primary were collected and analyzed.

RESULTS

- Total patients that met inclusion criteria: n=34 patients
- Most commonly utilized imaging modalities for diagnosis:
 - MRI: n=12, 35.3%
 - CT: n=11, 32.4%
- Most commonly utilized imaging modalities for surveillance:
 - MRI: n=14, 41.2%
 - PET/CT: n=9, 26.5%
 - 4 patients (11.8%) were lost to follow-up after initial surgical treatment
- 9 patients (26.5%) were diagnosed with a recurrence or new primary. Imaging modality for diagnosis:
 - MRI: n=5, 55.6%
 - PET n=2, 22.2%
 - CT n=2, 22.2%
- Mean time to recurrence or development of a new primary: 74 months (SD 20.2)
- Mode surveillance imaging interval time: 12 months

Age (years)	
<i>Mean</i>	36.7
<i>Median</i>	37.5
<i>Standard deviation</i>	14.5
Gender	
<i>Male</i>	16 (47.1%)
<i>Female</i>	18 (52.9%)
Race	
<i>White/Caucasian</i>	32 (94.1%)
<i>Hispanic/Latino</i>	2 (5.9%)
Behavior	
<i>Benign</i>	29 (85.3%)
<i>Malignant</i>	5 (14.7%)
Gene Mutation	
<i>SDHA</i>	1 (2.9%)
<i>SDHB</i>	19 (55.9%)
<i>SDHC</i>	4 (11.8%)
<i>SDHD</i>	10 (29.4%)

Table 1. Cohort demographics. 34 patients met inclusion criteria and were included in the analysis.

Surveillance Imaging Modality

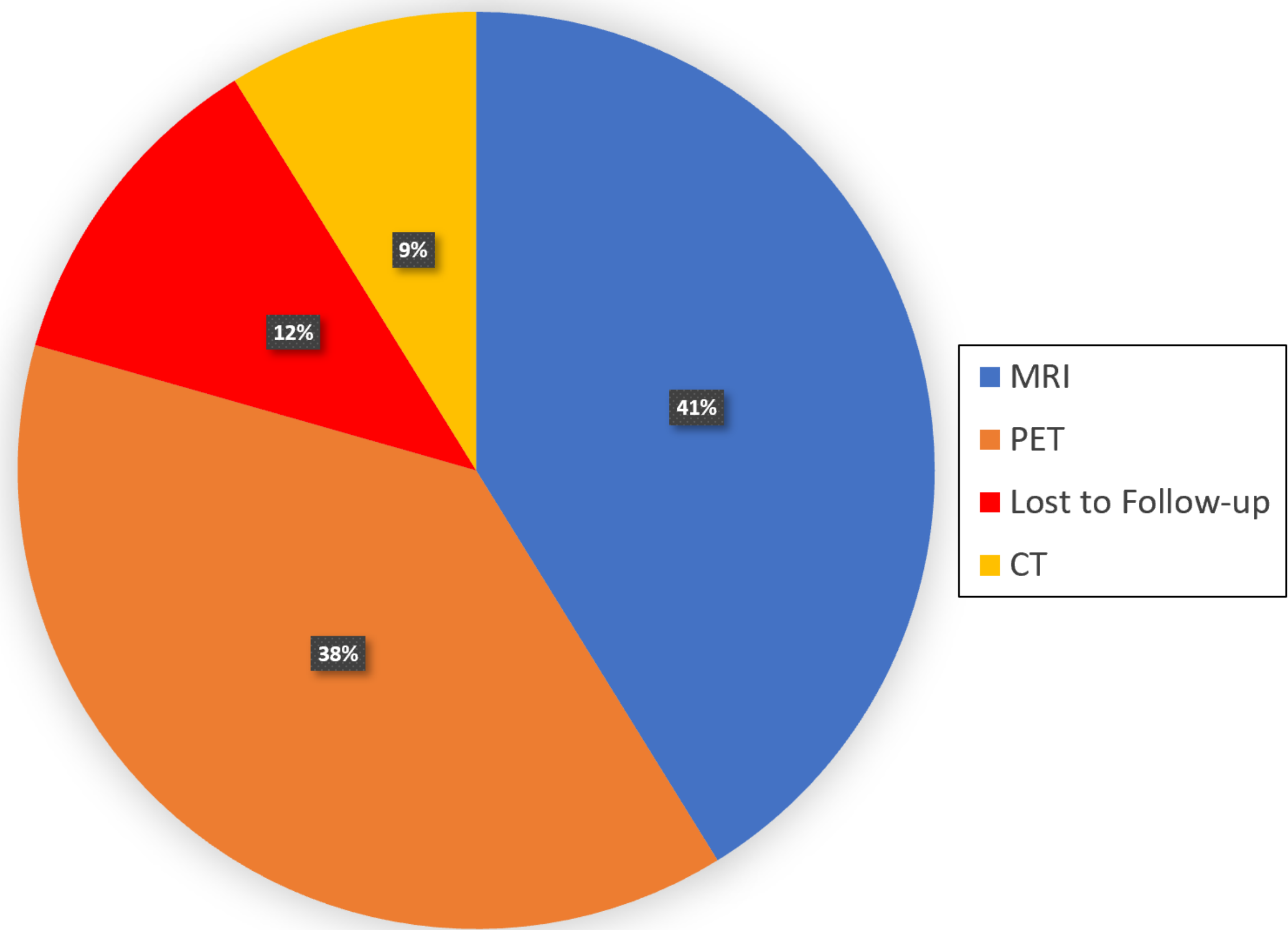


Figure 1. Imaging modalities utilized for surveillance after initial surgical treatment. The mode surveillance imaging interval time was 12 months.

DISCUSSION

- The characteristics of our cohort support the notion that regular imaging surveillance should be performed following surgical treatment of head and neck paragangliomas in patient with known SDH mutations.
- Functional imaging with PET/CT may be an effective and efficient modality for imaging surveillance in patients with head and neck paragangliomas, with more selective computed tomography and/or magnetic resonance imaging reserved for anatomic imaging and precise tumor localization for treatment planning purposes.
- Further prospective studies can characterize the efficacy of functional imaging for surveillance purposes.

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