Continuing Medical Education Article

Radioiodine Scintigraphy with SPECT/CT: An Important Diagnostic Tool for Thyroid Cancer Staging and Risk Stratification

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Disclosure

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Target Audience

This article contains information of value to nuclear medicine physicians and physicians in training (residents and fellows) and physicians specialized in endocrinology and endocrine surgery.

Objectives

On successful completion of this activity, participants should be able to describe:

1. Apply risk-stratification criteria for determining the postoperative management of thyroid cancer patients.
2. Identify patterns of regional and distant metastases on radioiodine imaging studies and determine the prognostic significance of the findings.

3. Integrate information obtained from preablation radioiodine scintigraphy in the risk stratification and postoperative staging of thyroid cancer patients.

Questions

1. According to the AJCC TNM 7th edition, a 56-y-old patient with a 3.5-cm intrathyroidal papillary thyroid cancer and 5 metastatic lymph nodes excised from the left lateral neck (cervical level III compartment) and no evidence of distant metastases is:
   A. Stage 3.
   B. Stage 4A.
   C. Stage 4B.
   D. Stage 4C.

2. According to the AJCC TNM 7th edition, a 16-y-old patient with multifocal papillary microcarcinoma (all tumor foci < 1 cm) with 45 metastatic lymph nodes excised from the central and bilateral neck (cervical level VI and bilateral II–III–IV compartments) and no evidence of distant metastases is:
   A. Stage 1.
   B. Stage 2.
   C. Stage 3.
   D. Stage 4C.

3. According to the ATA risk stratification, which of the following criteria defines high risk for disease recurrence?
   A. Primary tumor with aggressive histology or vascular invasion.
   B. Cervical lymph node metastases or $^{131}$I uptake outside the thyroid bed on the posttherapy scan.
C. Microscopic invasion of tumor into the perithyroidal soft tissues at initial surgery.

D. Thyroglobulinemia out of proportion to what is seen on the posttherapy $^{131}$I scan.

4. Current American Thyroid Association guidelines for thyroid cancer management recommend AGAINST $^{131}$I ablation in which patients?

A. Patients with grossly invasive thyroid cancer or primary tumor larger than 4 cm.
B. Selected patients with 1- to 4-cm tumors confined to the thyroid, who have documented node metastases or other high-risk features.
C. Patients with multifocal tumors smaller than 1 cm (microcarcinomas) without high-risk features.
D. Patients with distant metastases.

5. In all patients, but most importantly in the pediatric population, the advantages of fusion imaging with SPECT/CT have to be balanced against which DISADVANTAGE?

A. Higher radiation dose.
B. Difficult identification of radioactivity within normal anatomic structures.
C. Misidentification of benign foci of uptake in the neck region.
D. False-positive interpretations related to physiologic processes.

6. After total thyroidectomy, focal radioiodine uptake in the midline neck localized on SPECT/CT to the tip of the hyoid bone is MOST likely to be due to:

A. Thyroglossal duct cyst.
B. Thyroid bed remnant.
C. Thyroglossal duct remnant.
D. Delphian node metastasis.

7. Which statement BEST describes the effect of SPECT/CT on diagnostic test performance as compared with planar radioiodine scintigraphy?
A. SPECT/CT increases reader confidence.
B. SPECT/CT identifies frequent anatomic abnormalities in the neck.
C. SPECT/CT increases sensitivity for disease detection.
D. SPECT/CT increases specificity for disease detection.

8. Preablation radioiodine SPECT/CT for completion of staging and risk stratification in thyroid cancer patients after total thyroidectomy is MOST LIMITED for:
   A. Determination of primary tumor (T) status.
   B. Detection of nodal metastasis (N).
   C. Detection of soft-tissue distant metastases (M).
   D. Detection of osseous metastases.

9. What is the purpose of remnant ablation in patients with thyroid cancer after total thyroidectomy?
   A. Eliminate suspected but unproven metastatic disease.
   B. Eliminate normal residual functional thyroid tissue.
   C. Obtain a good-quality posttherapy scan.
   D. Eliminate known locoregional and distant metastases.

10. In what percentage of patients does preablation radioiodine scintigraphy change management?
    A. 0%–20%.
    B. 21%–60%.
    C. 61%–80%.
    D. 81%–100%.