SELF ASSESSMENT MODULE ON HEAD & NECK CANCER:
IMAGING LANDMARKS, POST TREATMENT COMPLICATIONS, AND PET-CT/MR
Presented by Hugh D. Curtin, MD, Bronwyn E. Hamilton, MD, Laurie A. Loevner, MD

SELF ASSESSMENT QUESTIONS WITH RATIONAL & REFERENCES

Lecture 1: Imaging Landmarks of Head and Neck Cancer, Hugh D. Curtin, MD

QUESTION 1: Perineural spread from a carcinoma of the roof of the mouth is most likely to involve which of the following:

A) pterygopalatine fossa
B) the trigeminal fat pad
C) the foramen ovale
D) stylomastoid foramen
E) glossal mylohyoid gap

Correct Answer = A

Rationale:
The greater and lesser palatine nerves extend from the pterygopalatine fossa through small canals to the respective foramina on the oral surface of the hard palate. There are many minor salivary glands along the roof of the mouth and adenoid cystic cancer is common. Adenoid cystic carcinoma often exhibits perineural spread.

QUESTION 2: Which one of the following statements regarding marginal mandibulectomy is true?

A) marginal mandibulectomy can be performed if less than one centimeter of the medullary space is involved.
B) marginal mandibulectomy can be performed if the cortex of the mandible shows slight irregularity where the tumor abuts the bone.
C) a marginal mandibulectomy can be performed if the tumor is limited to the mandible inferior to the mylohyoid line.
D) a marginal mandibulectomy can be performed if the tumor extends though the cortex of the mandible anterior to the mental foramina.
E) lymphadenopathy is a contraindication for marginal mandibulectomy.

Correct Answer = B

Rationale:
A marginal mandibulectomy removes the upper margin of the mandible. Only very minor erosion of the cortex is allowed for this procedure to be curative. Extension into the medullary space is a contraindication. A cancer of the oral cavity arises above the mylohyoid muscle and so first reaches the bone above the mylohyoid line (attachment of the muscle)

References for Questions 1-2:
Los Angeles Radiological Society
64th Annual Midwinter Radiology Conference
January 21-22, 2012 – Pasadena Convention Center
SELF ASSESSMENT MODULE ON HEAD & NECK CANCER:
IMAGING LANDMARKS, POST TREATMENT COMPLICATIONS, AND PET-CT/MR

Lecture 2: Imaging of Post-Treatment Complications of the Head and Neck,
Bronwyn E. Hamilton, MD

QUESTION 3: All of the following imaging findings support a diagnosis of suspected mandibular radionecrosis EXCEPT:
1. Gas in the mandible
2. Rim-enhancing fluid collections in the masticator space
3. PET avidity
4. Mixed osteolysis and sclerosis
5. Bone fragmentation or fracture

Correct Answer = 3

Rationale:
PET avidity is a nonspecific finding that may be seen in ORN and/or infection!

References:

QUESTION 4: Expected imaging findings in the early (1st three months) post-radiated neck may include all of the following EXCEPT:
1. Diffuse soft tissue edema
2. Marked enhancement of salivary tissue
3. Enlargement and rim enhancement of pre-existing thyroglossal duct remnants
4. New intraosseous gas
5. Intense mucosal enhancement

Correct Answer = 4

Rationale:
Intraosseous gas is not expected since it is COMPLICATION not an expected finding, AND because radionecrosis typically occurs LATE (12 months or later)

References:
QUESTION 5: What is the best diagnosis in this patient using the images below:

a) Right glottic carcinoma
b) Right vocal cord paralysis
c) Left vocal cord paralysis
d) a and b
e) Left glottic cancer

Correct Answer = c - left vocal cord paralysis
Rationale:
The PET image demonstrates increased FDG uptake in the right true vocal cord, and the CT scan illustrates the classic secondary findings of left true vocal cord paralysis including dilatation of the ipsilateral left laryngeal ventricle and mild medial rotation of the left aryepiglottic fold/arytenoid cartilage. Other findings that may be seen in vocal cord parlayisis (not shown here) include ipsilateral dilatation of the piriform sinus, and sometimes the ipsilateral vallecula. Increased FDG uptake in the right true vocal cord shown here is felt to reflect compensatory activation with uptake due to the left true vocal cord paralysis. It is important to be aware of this physiologic variation, which is frequently misinterpreted as a true vocal cord cancer on PET imaging.

References:
1) Isles MG, McConkey C, Mehanna HM. A systematic review and meta-analysis of the role of positron emission tomography in the follow up of head and neck squamous cell carcinoma following radiotherapy or chemoradiotherapy. Clin Otolaryngol 2008; 33:210-222.

QUESTION 6:
What is the best diagnosis in this patient using the images below?
   a) Lymphoma with bilateral uptake in supraclavicular lymph nodes
   b) Bilateral uptake in neck muscles
   c) Uptake in brown fat
   d) Metastatic breast cancer
   e) Radiation plexitis
Correct Answer = c – Uptake in brown fat.

Rationale:
The PET image shows increased uptake that is bilaterally symmetric in the lower neck and supravacuicular fossa. The configuration of the uptake is linear. The corresponding CT scan shows fat in the location of the FDG uptake. This case illustrates the importance that cross-sectional imaging plays not only in localizing regions of FDG uptake, but also in assessing the anatomic constituents within the questioned anatomic region. Using the PET image alone, malignant adenopathy or muscle uptake are possible diagnostic considerations. Uptake in brown fat has been reported in 2 to 4% of patients undergoing FDG PET-CT. It is more common in winter, in women, and in association with rapid weight loss. Brown adipose tissue serves as a thermogenic organ, producing heat to maintain body temperature. Brown fat is known to have increased glucose and hence FDG uptake when the sympathetic nervous system is activated by cold stimulation.

References:

QUESTION 7: Which of the following is not a potential cause of a false negative PET scan in the assessment of cervical lymphadenopathy?

a) Dense cellularity  
b) Central necrosis  
c) Cystic lymph node  
d) Mucoepidermoid carcinoma  
e) Adenoid cystic carcinoma

Correct answer = a - Dense cellularity

Rationale:
Low cellularity, cystic lymph nodes, nodal necrosis, and certain cell histologies including mucoepidermoid carcinoma, adenoid cystic carcinoma, mucinous adenocarcinomas, and iodine avid metastatic papillary thyroid carcinoma are some examples.

References: