Radiologic Manifestations of Melanoma

Lydia Carpenter, Harvard Medical School, Year IV
Gillian Lieberman, MD
Our Patient

• A 60-year-old woman was being seen for evaluation of anemia when a mass was found in her right groin.

• Biopsy of the area revealed lymph nodes invaded by melanoma.

• A skin exam led to the discovery of the primary lesion on the dorsum of her foot.

• A CT was ordered to stage the extent of disease.
Pelvic CT: Inguinal Adenopathy

CT showing metastatic melanoma involvement of right inguinal lymph nodes.

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Chest CT: Lung Metastases

Chest CT showing innumerable melanoma metastases to both lungs.
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Abdominal CT showing innumerable hypodense and hyperdense melanoma metastases to liver and spleen. 

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Abdominal CT showing melanoma metastasis to left adrenal gland. 

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Melanoma

- Incidence: about 44,000 people per year and rising.

- Melanocytes are derived from our neuroectoderm, so primaries can occur not only within skin but also within mucous membranes (e.g., oral and nasal), GI mucosa, eyes, prostate, teratomas, etc.
Histologic Staging & Prognosis

- Stage I and II are localized melanomas without clinical evidence of metastasis.
  - Stage IA corresponds to lesions ≤ 0.75 mm in depth and has the best 5-year survival at 96%.
  - Stage IIB corresponds to lesions ≥ 4 mm deep and has a 5-year survival of 47%.
Histologic Staging & Prognosis

• Stage III and IV melanomas show clinical evidence of metastasis.

  – Prognosis for Stage III depends on how many lymph nodes are involved:
    1 node → 5-year survival is 45%
    2 or more nodes → survival is <20%.

  – Stage IV (distant mets) have <5% survival.
Metastasis

• Tends to spread in a typical fashion from the skin to regional lymph nodes to visceral organs (with the lungs being the most common site).
Radiologic Staging

- Standard of care is to obtain a chest x-ray if the lesion is $> 0.75$ mm (in addition to lab tests, such as LFTs).
- If the history and/or physical exam suggest metastasis, use CT to evaluate the chest, abdomen, and pelvis; for the brain, use CT and/or MRI; for suspected bone mets, use a bone scan.
- PET scan can be used, but isn’t widespread.
Lets Review some patients with Metastatic Melanoma on different melanoma on different modalities at different sites
Patient 2: Frontal CXR

Multiple metastatic melanoma masses within the thorax on this PA view.

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Patient 2: Lateral Chest X-ray

- Multiple masses due to metastatic melanoma
- Patient has evidence of a prior median sternotomy a surgical chip

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DDx of Multiple Pulmonary Nodules

- Metastases
- Bronchiolo-alveolar cancer
- Fungal disease (*e.g.*, histo, coccidio)
- TB
- Infarcts
- Abscesses
- Fake outs: Chest wall lesions; foreign bodies; artifacts
Patient 3: Abdominal CT
Liver/Spleen Lesions

Abdominal CT image showing multiple hypodense lesions in the liver and spleen.

Courtesy of Dr. Jonathan Kruskal.
DDx: Lesions in Liver & Spleen

• Liver
  – Metastases
  – Lymphoma
  – Cysts
  – Hemangiomas
  – Abscesses (e.g., echinococcus)
  – Adenoma
  – HCC

• Spleen
  – Metastases
  – Lymphoma
  – Cysts
  – Hemangiomas
  – Infarcts
Mets to Hollow Viscera

• The cancers that most frequently metastasize to the gut are melanoma, breast, and lung.

• Within the gut, the small intestine is the most common site, followed by stomach, colon, rectum, and esophagus.
Patient 4: Barium Upper GI Mets to the Small Intestine

Innumerable filling defects on an upper GI barium study (with small bowel follow through) representing melanoma metastases to the small intestine.

Courtesy of Dr. Jonathan Kruskal.
Patient 4: Barium Upper GI Mets to the Stomach

- Early lesions start submucosally and are difficult to visualize, but they can eventually be seen with double contrast barium studies.

Double contrast UGI study showing a met in the wall of the stomach. 
*Courtesy of Dr. Jonathan Kruskal.*
Patient 5: Barium Upper GI Mets to the Stomach

- Deeper invasion and ulceration can produce “target” or “bull’s eye” lesions, but these aren’t specific to melanoma.

Upper GI barium study showing metastatic melanoma target lesions within the stomach. 
*Courtesy of Dr. Jonathan Kruskal.*
Patient 6: Barium Upper GI

Melanoma mets can cause obstruction (either by the mass itself or by a polypoid met inducing intussusception); they can also cause bleeding, and/or perforation.

Large filling defect on an upper GI barium study showing metastatic melanoma in the duodenal bulb.

Courtesy of Dr. Jonathan Kruskal.
Patient 6: Pelvic CT Colonic Metastasis

CT image through the pelvis showing melanoma involvement of the colon.

*Courtesy of Dr. Jonathan Kruskal.*
Patient 6: Abdominal CT Bone Metastases

- Bone mets are lytic.

CT image at the level of the kidneys showing two well-circumscribed lytic melanoma metastases within a lumbar vertebral body. Smaller third arrow points to involved paraortic lymph node.

*Courtesy of Dr. Jonathan Kruskal.*
Patient 7: Abdominal CT Mets to Subcutaneous Tissues

CT image at the level of liver/spleen showing innumerable melanoma metastases to adipose tissue and muscle.

Courtesy of Dr. Kruskal.
Patient 7: Head CT Brain Metastases

- Mets to the brain tend to enhance partially with contrast.

- Melanoma lesions have a tendency to necrose and bleed.

Head CT at the level of the circle of Willis showing a single, partially enhancing melanoma met in the left frontal lobe with a hypodense area of necrosis. There’s displacement of the anterior cerebral arteries.

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Patient 8: Sagittal Brain MRI Metastases

- Melanin has a high binding capacity for metal ions (e.g., iron, copper, manganese, zinc), so it can appear bright on T1 MRI without contrast.
Patient 9: Coronal Brain MRI
Sinonasal Melanoma

- Accounts for <1% of Western melanomas but about 10% of Japanese melanomas.

- Usual presenting complaints are nasal obstruction and epistaxis.

Head MRI showing expansile melanoma in superior nasal cavity and ethmoid sinuses.

Uveal Melanoma

- The most common primary intraocular tumor in adults.

- However, they are still rare, with an incidence of about 6 per million per year.

- Most are diagnosed in middle-aged/elderly patients and in Caucasians much more than other races.
Eye Anatomy

- Melanoma can arise from any of the uveal structures, which include the iris, ciliary body, and choroid.

Diagram of structures composing the eye. 
*Online: web: http://www.nei.nih.gov/eyediag.htm*
Melanoma of the Iris

• Melanomas arising from the iris tend to have the best prognosis, probably because they’re noticed earlier.

Kincaid, M, “Uveal melanoma” [Online: web]
URL: http://www.hlmcc.org/cancjrnl/v5n4/article1.html
Melanoma of the Choroid

- 75% of uveal melanomas arise from the choroid.
- They can be visualized by ophthalmoscopy, angiography, and/or ultrasound.

Mushroom-shaped melanoma extending from choroid.
Line of retinal detachment.

URL: http://www.djo.harvard.edu/meei/OA/PBI.html
Patient 10: CT of the Eye

- CT is useful for lesions >3mm and for distinguishing melanomas from choroidal hemangiomas and hematomas.

CT through orbits showing hyperintense lesion of posterior right choroid.

Online: web URL: http://amor.rz.hu-berlin.de/~h1482b3k/fusion3D-pat1_e.html
Patient 10: MRI of the Eye

- MRI is superior to CT in distinguishing melanoma from simulating lesions and for evaluating extraocular invasion.

T1-weighted axial MRI through orbits showing hyperintense lesion of posterior right choroid.

Online: web: URL: http://amor.rz.hu-berlin.de/~h1482b3k/fusion3D-pat1_e.html
References


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