

Ruptured Epidermal Cyst Mimicking Cutaneous Melanoma on F-18 FDG PET/CT

Ba D. Nguyen, M.D., and Ann E. McCullough, M.D.

F-18 FDG PET/CT provides an accurate staging and post-therapeutic evaluation of melanoma based on high metabolic characteristics of its primary and secondary lesions. This functional imaging modality may, however, detect coexisting benign lesions of inflammatory or infectious origin mimicking malignancy thus interfering with the staging of cancer. The authors present a case of ruptured epidermal inclusion cyst exhibiting abnormal radiotracer accumulation on PET/CT in a patient with a history of recurrent metastatic melanoma.

Introduction

Epidermal cysts are well-encapsulated benign lesions containing keratin within stratified squamous epithelial walls. They are frequently located in the scalp, face, neck, trunk, back and scrotum. Ruptured cysts with prominent inflammation may exhibit aggressive features on cross-sectional imaging and mimic primary or secondary malignancy. Such instances have been reported with sonographic and MRI examinations. The authors would like to add the

PET/CT findings of ruptured epidermal cyst during a re-staging of head and neck melanoma.

Case Report

A 71-year-old man had a history of resected right cheek melanoma with subsequent metastases successively to the right shoulder and right axilla. He has been treated with surgery, radiation therapy and high-dose interferon. He came to our institution for a newly resected right back metastasis with positive surgical margins, which required additional extended excision. He also complained of three palpable posterior neck nodules. PET/CT imaging showed only a mild to moderate degree of radiotracer uptake in the right back (SUV: 1.6) compatible with post-operative changes. In the posterior aspect of the neck, PET/CT (Figure 1) showed an abnormal focus of F-18 FDG accumulation (SUV: 4.6, arrows) corresponding to a spiculated soft tissue nodular lesion on transmission CT. This lesion was suspicious for recurrent cutaneous melanoma with adjacent dermal inflammation or invasion. PET/CT also demonstrated additional well-margined posterior neck nodules without radiotracer uptake (Figure 2) suggestive

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Abbreviations: 18-F FDG, fluorine-18 fluorodeoxyglucose; CT, computed tomography; EIC, epidermal inclusion cyst; MRI, magnetic resonance imaging; PET, positron emission tomography; SUV, standardized uptake value

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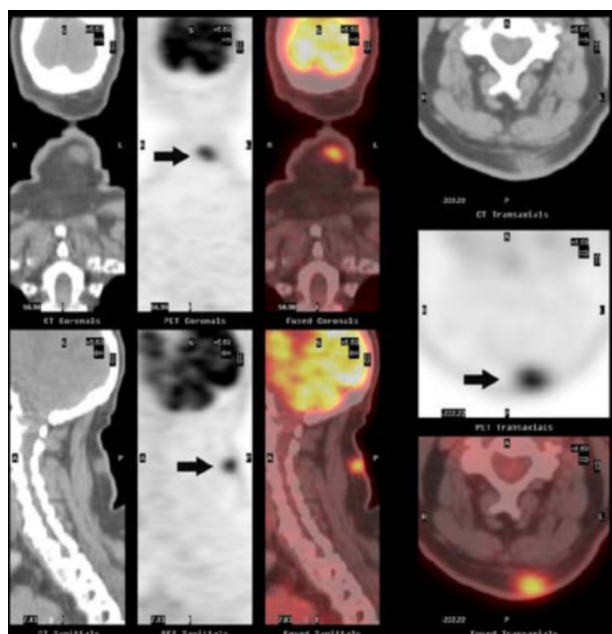


Figure 1. 71-year-old man with ruptured epidermal cyst. Composite PET/CT image (sequence: CT, PET, fused PET/CT in coronal, sagittal and axial projections) shows a focus of increased F-18 FDG uptake at the posterior neck (SUV: 4.6). This positive PET finding corresponds to a slightly spiculated soft tissue lesion on transmission CT (arrows). The PET and CT features of this lesion are suspicious for recurrent malignant melanoma.

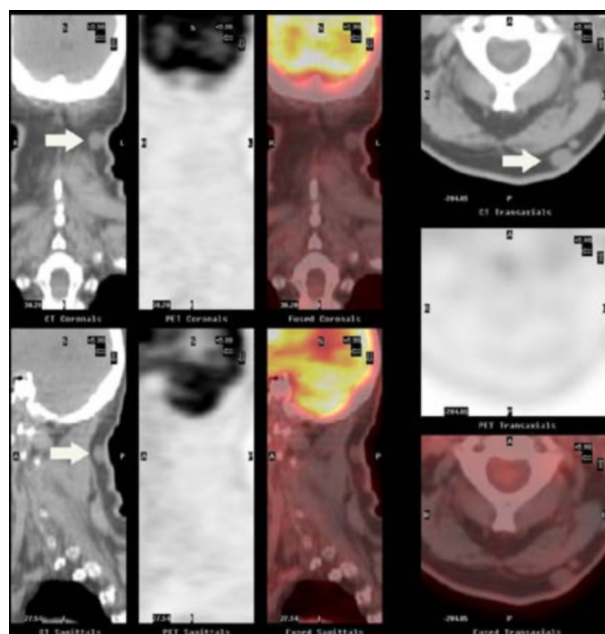


Figure 2. Composite PET/CT image (same sequence as the one of figure 1) at a level inferior to the one depicted by figure 1, shows well-defined soft tissue nodules of the posterior neck exhibiting no radiotracer accumulation (arrows).

of benign lesions such as epidermal or sebaceous cysts. Surgical revision of the right back was negative for residual melanoma as expected from the pattern of F-18 FDG uptake on PET/CT. All the three posterior neck nodules were excised and diagnosed as epidermal inclusion cysts by histology (Figure 3). The one, which exhibited positive radiotracer accumulation, appeared to be a ruptured epidermal cyst with prominent surrounding granulomatous inflammation (Figures 4 and 5).

Discussion

Epidermal inclusion cyst (EIC) is a benign skin lesion also known as sebaceous cyst, epidermoid cyst, retention cyst or infundibular cyst. It may originate from remnant ectodermal tissues, pilosebaceous gland occlusion, or spontaneous, traumatic or iatrogenic implantation of

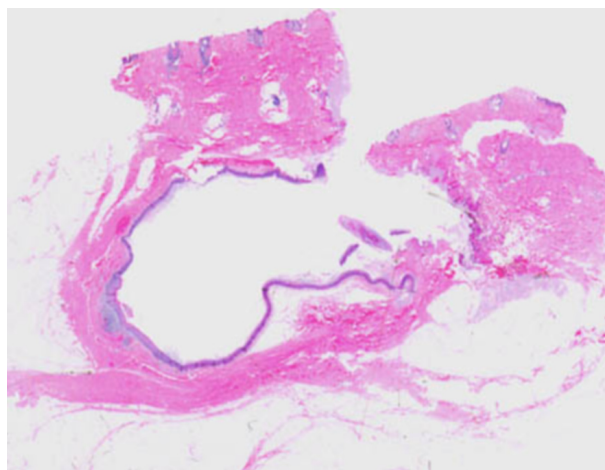


Figure 3. Photomicrograph shows the intact cyst (H and E, x10) with epidermal lining and surrounded dermis and subcutaneous tissue.

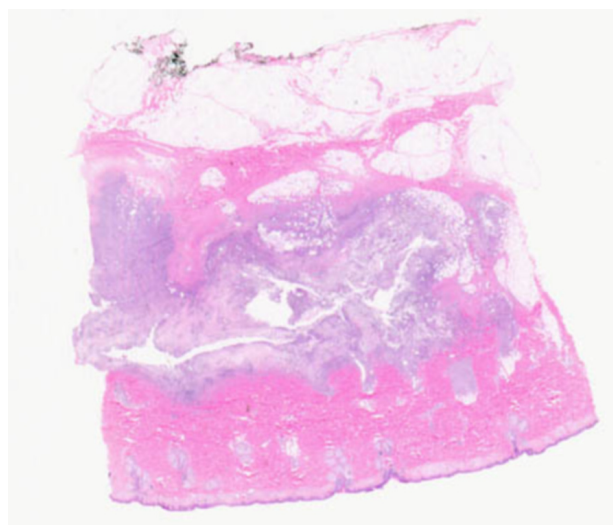


Figure 4. Photomicrograph (H and E, x10) shows the ruptured epidermal cyst at the junction of reticular dermis and subcutaneous fat. There is dense inflammation surrounding the ruptured cyst secondary to release of keratin cyst contents into adjacent soft tissue.

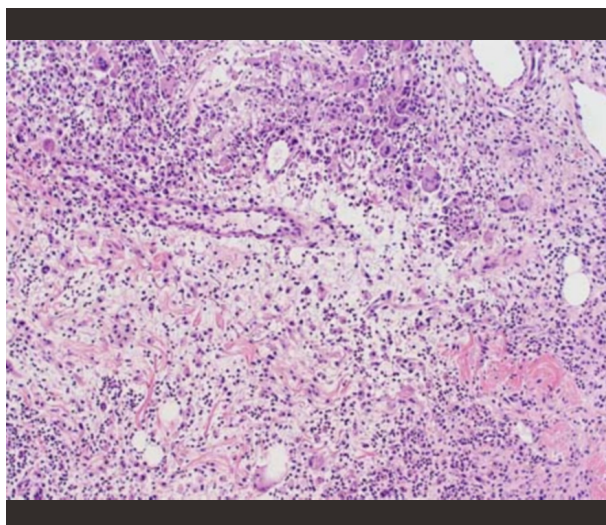


Figure 5. Photomicrograph (H and E, x200) shows chronic active inflammation with foreign body type giant cells characteristic of granulomatous reaction to ruptured epidermal cyst.

keratinizing squamous epithelium in the dermis [1, 2]. Human papillomavirus may contribute to the pathogenesis EIC mostly at palmo-plantar locations [3, 4]. This benign lesion undergoes variable degrees of growth and becomes cystic with keratin content. It is usually a well-encapsulated subepidermal nodule, which is mobile and non-tender to palpation. It is commonly encountered at follicular skin regions such as the scalp, face, neck and trunk but could also be found at extremities, palm, sole and breast [1, 2, 5]. EIC may be symptomatic with rupture, infection, abscess formation or exuberant growth with mass effect and esthetic challenge [1, 2, 5]. Malignant transformation of EIC is rare with an occurrence rate of 2.2% for squamous cell carcinomas [6]. Cross-sectional imaging shows EIC as a well-margined skin nodule with variable degree of signal intensity or echotexture on MR and ultrasound depending on the complexity of keratin content [1, 7]. Imaging may be difficult to differentiate complicated EIC from other malignant cutaneous lesions due to its aggressive appearance and associated peripheral inflammatory reaction [1]. With a ruptured EIC, there is spillage of keratin in the dermis triggering “foreign body” granulomatous reaction and hypervascularity. These changes may exhibit complex cystic/septated features and heterogeneous or rim contrast enhancement on CT and MR simulating soft tissue

neoplasm with necrotic component [8, 9]. Sonography may show multilobulated lesions with increased ultrasound Doppler flow signal [1, 5, 7]. F-18 FDG PET has been reported with abnormal tracer accumulation in an inflamed EIC [10].

In our case presentation, PET/CT showed both features of negative and positive radiotracer uptake from coexisting uncomplicated and ruptured EIC of the posterior neck. Even though, F-18 FDG PET/CT provides a comprehensive assessment and staging of cancer and melanoma, in certain high-risk patient populations, it may detect concomitant benign or malignant pathologic processes [11]. It may show abnormal radiotracer uptake at sites of benign tumors, inflammation or infection potentially interfering with the correct staging of malignancy [10-13]. In the clinical context of recurrent metastases of melanoma of our patient, there was a very high suspicion index for neck recurrent malignancy justifying excision, which led to the correct histological identification of ruptured EIC.

References

1. Lee HS, Joo KB, Song HT, et al. Relationship between sonographic and pathologic findings in epidermal inclu-

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- sion cysts. *J Clin Ultrasound*. 2001;29:374-83. [PubMed]
2. Ohtsuka H. Sprouting epidermoid cysts. *Br J Plast Surg*. 2000;53:534-8. [PubMed]
 3. Kashima M, Takahama H, Baba T, et al. Detection of human papillomavirus type 57 in the tissue of a plantar epidermoid cyst. *Dermatology*. 2003;207(2):185-7. [PubMed]
 4. Lee S, Lee W, Chung S, et al. Detection of human papillomavirus 60 in epidermal cysts of nonpalmoplantar location. *Am J Dermatopathol*. 2003 Jun;25(3):243-7. [PubMed]
 5. Fisher AR, Mason PH, Wagenhals KS. Ruptured plantar epidermal inclusion cyst. *AJR Am J Roentgenol*. 1998;171:1709-10. [PubMed]
 6. Bauer BS, Lewis VL Jr. Carcinoma arising in sebaceous and epidermoid cysts. *Ann Plast Surg*. 1980 Sep;5(3):222-6. [PubMed]
 7. Ma LD, McCarthy EF, Bluemke DA, Frassica FJ. Differentiation of benign from malignant musculoskeletal lesions using MR imaging: pitfalls in MR evaluation of lesions with a cystic appearance. *AJR Am J Roentgenol*. 1998;170:1251-8. [PubMed]
 8. Harish S, Jan E, Ghert M, Alowami S, Finlay K. Pseudotumoral appearance of a ruptured epidermal cyst in the foot. *Skeletal Radiol*. 2006 Nov;35(11):867-71. [PubMed]
 9. Hong SH, Chung HW, Choi JY, Koh YH, Choi JA, Kang HS. MRI findings of subcutaneous epidermal cysts: emphasis on the presence of rupture. *AJR Am J Roentgenol*. 2006 Apr;186(4):961-6. [PubMed]
 10. Holder WD Jr, White RL Jr, Zuger JH, Easton EJ Jr, Greene FL. Effectiveness of positron emission tomography for the detection of melanoma metastases. *Ann Surg*. 1998;227:764-9. [PubMed]
 11. Ishimori T, Patel PV, Wahl RL. Detection of Unexpected Additional Primary Malignancies with PET/CT. *J Nucl Med*. 2005;46:752-7. [PubMed]
 12. Friedman KP, Wahl RL. Clinical use of positron emission tomography in the management of cutaneous melanoma. *Semin Nucl Med*. 2004;34:242-53. [PubMed]
 13. Kumar R, Alavi A. Clinical applications of fluorodeoxyglucose-positron emission tomography in the management of malignant melanoma. *Curr Opin Oncol*. 2005;17:154-9. [PubMed]