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CASE REPORT

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Amelanotic melanoma detected by ^{18}F-FDG PET-CT

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Abstract

Background Amelanotic/hypomelanotic melanoma is an extremely rare cancer and accounts for less than 1/10,000 in the population. For losing and hypomelanotic pigment, amelanotic melanoma can lead to misdiagnosis with benign skin lesions. Therefore, early recognition and diagnosis is important to avoid a delay in treatment.

Case presentation A 73-year-old man presented for a gradually enlarged nodule on the surface skin of the left crus, with no color change, ulceration, or bleeding. Malignant lesion was suspected based on computed tomography (CT) and magnetic resonance imaging (MRI), and biopsy was scheduled. Immunohistochemical (IHC) revealed amelanotic melanoma followed by biopsy.^{18}Florine-fluoro-2-deoxy-2-D-glucose (^{18}F-FDG) positron emission tomography-computed tomography (PET-CT) was employed to explore whether there are metastases or not. ^{18}F-FDG PET-CT showed increased FDG accumulation with standardized uptake value max (SUVmax) of 5.6 of the lesion, and no other lesions were detected. The patient refused to be hospitalized and died 12 months later.

Conclusion This case highlights the need of considering melanoma even if there is no color change. Increased FDG uptake from PET-CT is prone to be consistent with malignant disease as well as whole body scan is crucial in determining the accurate TNM stage. Moreover, prompt treatment according to guidelines is necessary even if the disease is at its early stage.

Keywords Amelanotic melanoma, PET, CT, Case report

Background

Melanoma is a malignant tumor which derives from melanocytes. Amelanotic/hypomelanotic melanoma is an extremely rare cancer and accounts for less than 1/10,000 in the population. They also exhibit a thicker Breslow thickness, higher mitosis rates, more frequent ulcers, higher tumor stage, and lower survival rates than pigmentary melanomas [1]. For absence or hypomelanotic pigment, this extremely rare subtype of melanoma can lead to confusion with benign skin diseases and early recognition and diagnosis is crucial to avoid delaying in treatment.

Case presentation

A 73-year-old man presented with a lesion on the left crus which had been gradually enlarging in the past 4 months. He reported itching and tenderness but no ulceration or bleeding. Physical examination revealed a well-defined, fleshy, reddish skin nodule measuring 2.6 cm in diameter, without black skin changes. CT and MRI revealed malignant image findings, and biopsy was scheduled. After biopsy, immunohistochemical examination showed tumor cells that were positive for S-100, Vim, and HMB-45, while

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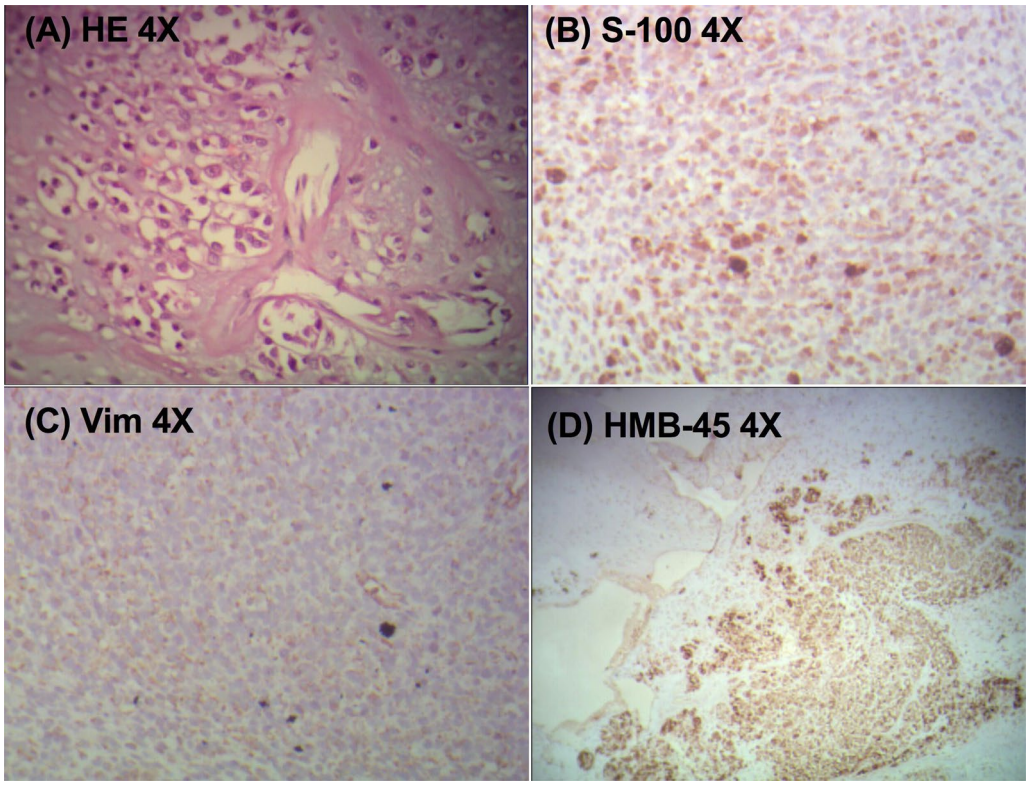

Fig. 1 Histological sections of amelanotic melanoma specimen **A** hematoxylin and eosin sections at ×4 magnification identifying primary neoplasm within the left upper inner crus. **B** Positive staining for S-100 (×4), **C** positive staining for Vim (×4) and **D** positive staining for HMB-45 (×4) indicate a malignant melanocytic neoplasm

negative for melanin-A. Based on these findings, a diagnosis of amelanotic melanoma was made, with a Breslow depth of 2.1 mm (Fig. 1). ^{18}F-FDG PET-CT was suggested to explore whether there are metastases or not. ^{18}F-FDG PET-CT revealed that there was increased uptake in the upper inner crus with SUVmax of 5.6 and no other lesions were detected (Fig. 2). The patient refused to be hospitalized and died 12 months later (Fig. 3).

Discussion

Amelanotic melanomas may conspicuously miss melanin, the dark pigment that gives most moles and melanomas their color. These unpigmented melanomas may be pinkish-looking, reddish, purple, normal skin color or essentially clear and colorless. Patients and even physicians have difficult in recognizing these masquerader as possible melanomas. Losing of pigment in amelanotic melanoma can lead to confusion with more benign skin conditions (e.g., pyogenic granulomas, warts, angiomas, and dermal nevi), which may prove dangerous, since early detection of melanoma is critical; early melanomas are almost always curable, while those that advance beyond stage I become more difficult to treat. Amelanotic melanomas tend to recur or spread more often than melanomas with more typical features. In developed countries, the incidence of melanoma is between 9.3 and 10.3/10,000 [2], while amelanotic melanoma accounts for only 1.8–8.1% of melanoma [3–5], implying an extremely low incidence of this rare disease, approximately 0.18–0.8/10,000. Malignant melanoma can metastasize via the lymphatic drainage to distant sites from an early stage, leading to a poor prognosis. Moreover, amelanotic melanoma has shown a higher proliferation capacity compared to pigmented malignant melanoma for lacking melanin-producing capability [6]. The five-year survival rate in pigmented melanoma is 42%, whereas that in amelanotic melanoma patients is 15%. Traditional radiology cannot exactly diagnose this rare malignant cancer. PET-CT holds a better capability in detecting regional, nodal, and distant metastasis [1]. Although there is a disagreement on the cost-effective of PET-CT as a part of the diagnostic workup for the limited utility of PET-CT in early-stage melanoma [7, 8], PET-CT undoubtedly takes advantage in

detecting amelanotic melanoma [9]. Malignant melanoma (including amelanotic melanoma) will stain for S-100, HMB-45, and vimentin [10]. S-100 proteins can be found in cells derived from the neural crest, including melanocytes, and have been used as markers for melanoma with the sensitivity of 97–100% [10]. HMB-45 is a marker of the cytoplasmic premelanosomal glycoprotein 100 and the reported sensitivity is 69–93% [11].

Rashmi Nalamwar and colleagues (3) reported a case of amelanotic melanoma on the posterior aspect of the right thigh [12], presenting as multiple erythematous papules. The absence of melanin in this lesion posed diagnostic challenges. MRI scans revealed a soft tissue mass on the posterior–lateral aspect of the right thigh and enlargement of the right inguinal lymph nodes. Ultrasound did not detect any abnormalities. Cell biopsy and immunohistochemistry showed positive S100 and HMB45 staining at the lesion site, with malignant cells found in the right inguinal region, suggesting metastasis of melanoma. In our case, the skin nodules appeared only slightly erythematous with no other distinctive features. The biopsy diagnosis was amelanotic melanoma, and what set this case apart was the use of ^{18}F-FDG-PET-CT to explore the possibility of metastasis. The results revealed increased uptake at the primary lesion site, with no lesions detected in other areas. The enhanced uptake of ^{18}F-FDG suggests that PET-CT has a certain advantage in diagnosing amelanotic melanoma and determining TNM staging. Unfortunately, the patient declined surgical treatment and eventually succumbed to the illness 12 months later. Therefore, timely intervention is crucial post-diagnosis, whether metastasis has occurred or not.

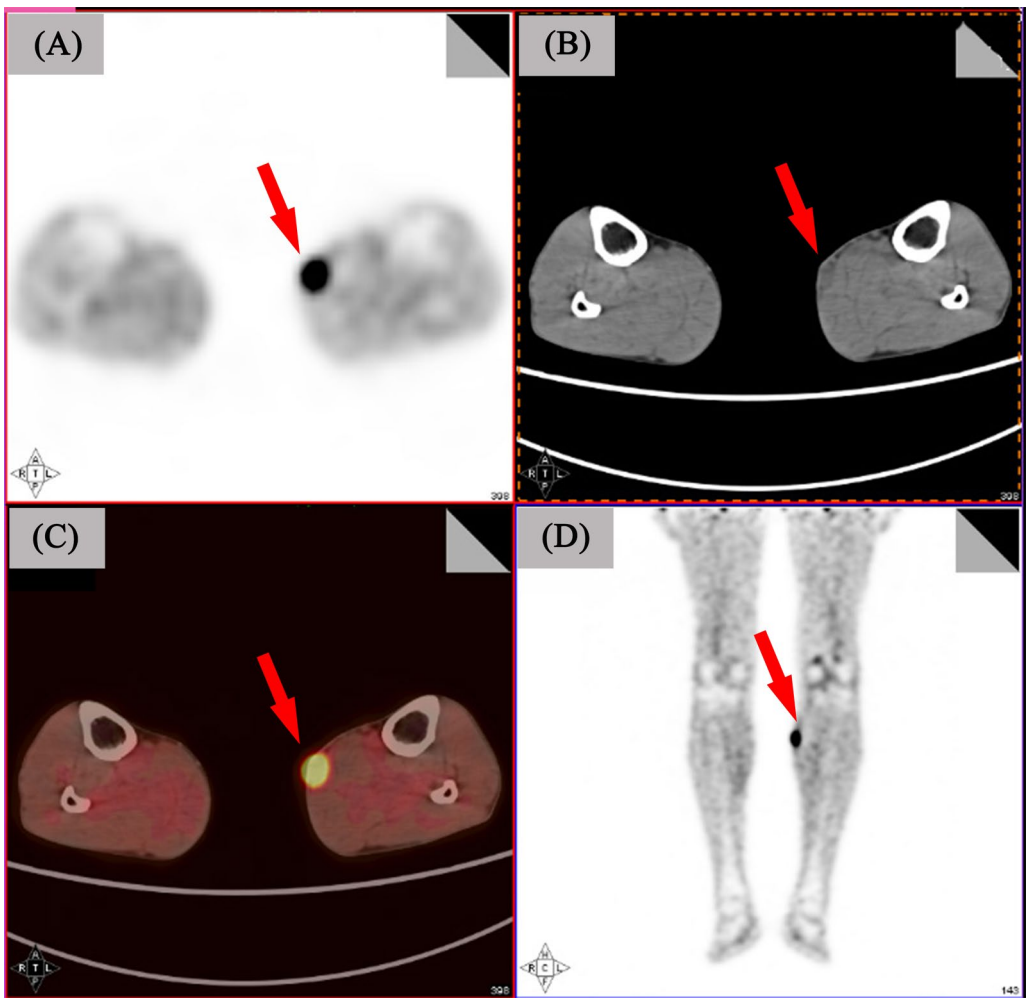

Fig. 2 A 73-year-old man presented for treatment of a lesion on the left crus. Whole body positron emission tomography (^{18}F-FDG PET-CT) scan identified the location of the malignancy and demonstrated no pathological uptake in any other organs. **A** Axial PET scan identifying pathologic uptake of ^{18}F-FDG in primary amelanotic melanoma. **B** Axial CT identifying location of primary amelanotic melanoma. **C** Axial PET-CT of primary amelanotic melanoma. **D** The maximum intensity projection (MIP)

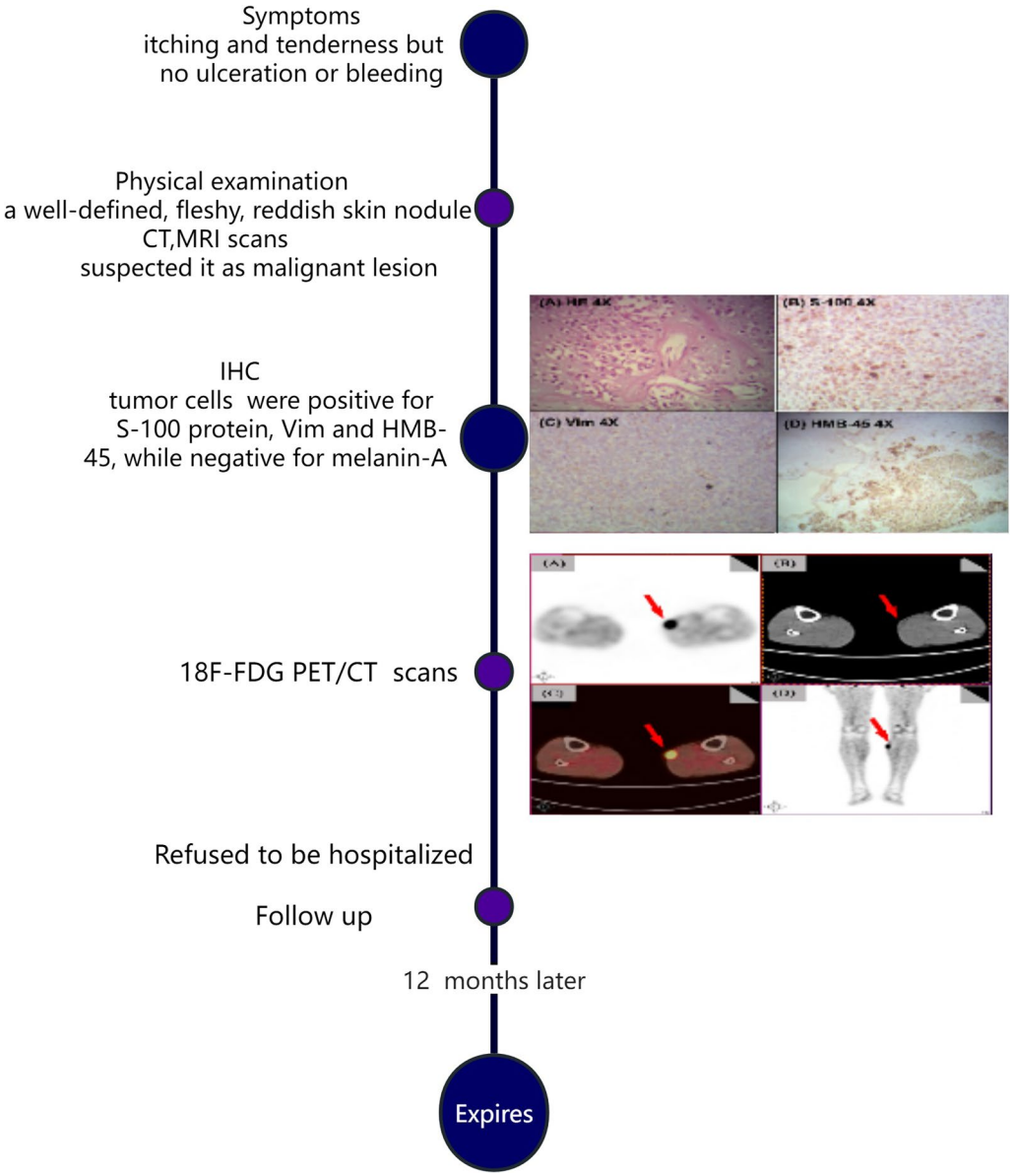

Fig. 3 Case report timeline. Presented according to CARE guidelines

Conclusions

This case highlights the need for considering melanoma even if there is no color on the skin surface. Increased FDG uptake from PET-CT is prone to be consistent with malignant disease as well as whole body scan is helpful in determining the accurate TNM stage. Moreover, instant treatment to melanoma according to guidelines is crucial even if the disease is at its early stage.

Abbreviations

^{18}F-FDG	^{18}Florine-fluoro-2-deoxy-2-D-glucose
PET-CT	Positron emission tomography-computed tomography
SUVmax	Standardized uptake value max
IHC	Immunohistochemistry
CT	Computed tomography
MRI	Magnetic resonance imaging

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Not applicable.

Author contributions

NNC wrote the manuscript drafts; LC helped in study design, critical revision, approving final content of manuscript; CHY was involved in critical revision and approving final content of manuscript; XL and CTF helped in data analysis and approving final content of manuscript; YZP and FKY were involved in revising and approving final content of manuscript. All authors read and approved the final manuscript.

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Availability of data and materials
Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

Declarations

Ethics approval and consent to participate
The study involving human participant was in accordance with the ethical standards of Yunnan Cancer Hospital.

Informed consent
Informed written consent was obtained from individual participant included in the study.

Consent for publication
The study has obtained consent for publication.

Competing interests
The authors declare that they have no competing interests.

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