

# Melanocytic Matricoma: An Additional Case with Literature Review over this Rare Entity

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## Abstract

Melanocytic matricoma is a rare cutaneous adnexal tumour first described as a distinct entity in 1999 by Carlson et al. It commonly presents as a well circumscribed pigmented dermal nodule, frequently on sun-damaged skin of elderly men. Melanocytic matricoma is presumed to recapitulate the growth of anagen hairs.

A 36-year old female presented to the clinic with an 18-month history of a non-tender solitary darkly pigmented lobulated nodule on the right parietal scalp. The nodule was surgically excised. Histopathology showed a well-circumscribed nodular dermal lesion, consisting of a mixed population of basaloid, intermediate and shadow cells admixed with dendritic melanocytes. Immunohistochemical studies were negative for Ber - EP4 while positive for S100, Beta Catenin and E - Cadherin. Based on the clinical, microscopic and immunohistochemical findings, a diagnosis of melanocytic matricoma was made.

To date, there have been only 16 cases reported in the literature. We report an additional case of melanocytic matricoma with similar clinical and histopathological findings to previously described cases. To the best of our knowledge, this is the first case reported in a middle aged female in the Middle East. It's important to recognize this neoplasm as it should be considered in the differential diagnosis of tumours that present with a dual cell population of follicular and matrical differentiation. Long-term follow-up is indicated to exclude the aggressive potential of these matrical neoplasms.

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## Introduction

Melanocytic matricoma is an extremely rare adnexal tumour, named owing to the content of both follicular and matrical differentiation<sup>[1-3]</sup>, first described as a distinct entity in 1999, by Carlson et al<sup>[4]</sup>. It presents as a well-circumscribed nodular proliferation typically occurring on sun-damaged skin of elderly men<sup>[4-11]</sup>. Melanocytic matricoma is presumed to recapitulate the growth of anagen hairs<sup>[4]</sup>. The tumour is composed of a mixed population of basaloid, intermediate and shadow cells admixed with dendritic melanocytes. To date, there have been only 16 cases reported in the literature. We report an additional case of melanocytic matricoma with similar clinical and histopathological findings to previously described cases, occurring in a middle aged female from the Middle East.

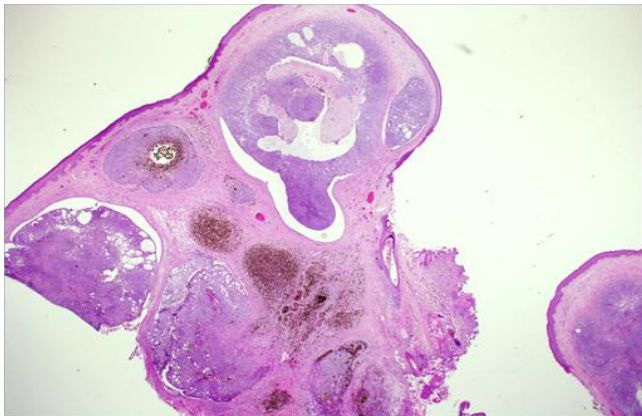
## Case History

A 36-year old female, previously healthy, presented to the clinic with an 18-month history of a lobulated nodule on the right parietal scalp. Initially, the lesion was asymptomatic. However, in the last few months, the nodule started to gradually grow in size and occasionally bleed upon combing.

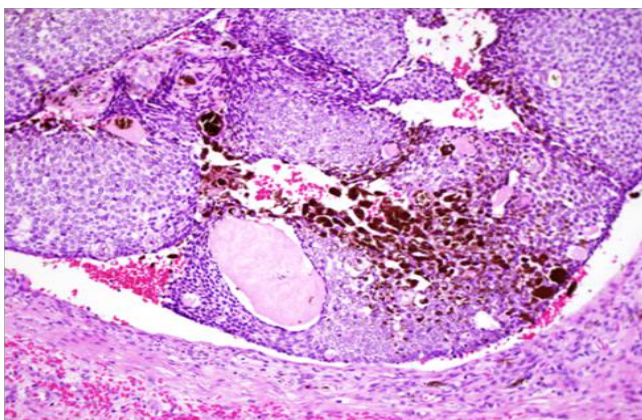
Physical examination revealed a non-tender solitary, well circumscribed, small with a relatively broad base, darkly pigmented nodule, localized on the right parietal scalp. No family history of similar lesions. The nodule was surgically fully excised. Recurrence following excision couldn't be assessed as the patient was unavailable for follow-up review.



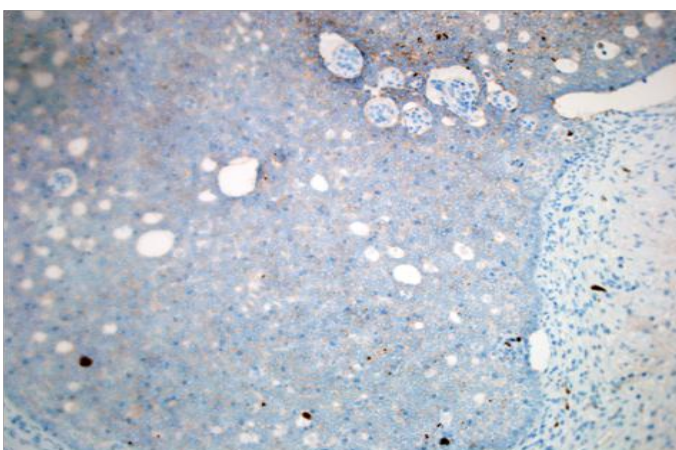
Histopathology showed a well-circumscribed nodular, solid and cystic dermal lesion with no connection to the epidermis (Figure 1). It consisted mainly of peripheral palisaded basaloïd cell proliferation surrounding a few solitary and clustered ghost cells. Admixed with these cells, were heavily pigmented-dendritic melanocytes. Mild nuclear atypia and few mitotic figures were noted (Figure 2). Immunohistochemical studies was negative for Ber - EP4 (Figure 3), S100 showed positive staining for the dendritic cells (Figure 4), while Beta Catenin (Figure 5) and E - Cadherin were both strongly and diffusely positive in the tumour cells.



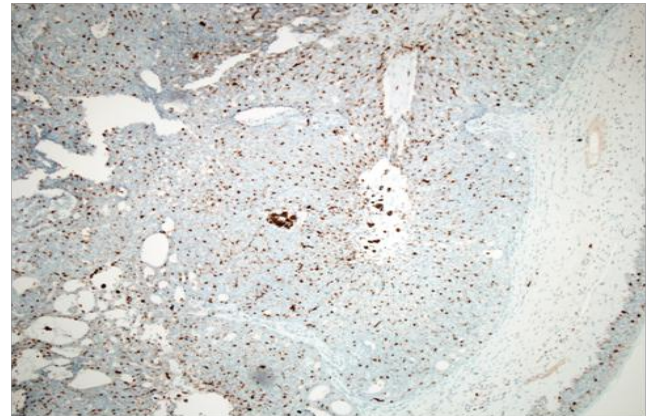
**Figure 1:** Well-circumscribed nodular, solid and cystic dermal lesion with no connection to the epidermis.



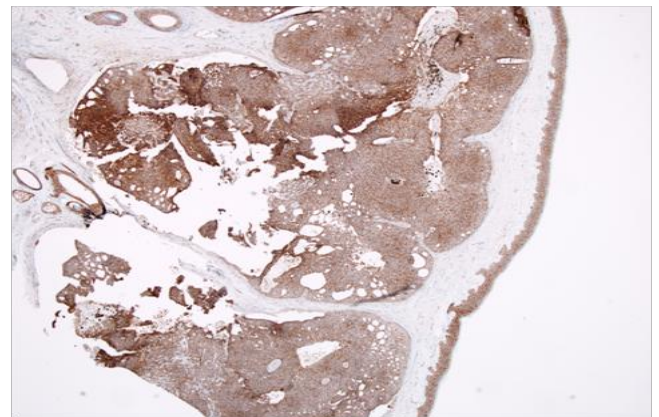
**Figure 2:** Consisting mainly of peripheral palisaded basaloid cell proliferation surrounding a few solitary and clustered ghost cell. Admixed with these cells, are heavily pigmented dendritic melanocytes. Mild nuclear atypia and few mitotic figures were noted.



**Figure 3:** Immunohistochemical studies was negative for Ber - EP4.



**Figure 4:** S100 showed positive staining for the dendritic cells.



**Figure 5:** Beta Catenin strongly and diffusely positive in the tumour cells.

Based on the clinical, microscopic and immunohistochemical findings, a diagnosis of melanocytic matricoma was made. Our case is unique, as to the best of our knowledge; this is the first case to be reported in a middle aged female in the Middle East.

### Discussion

Melanocytic matricoma is a cutaneous adnexal tumour with distinctive clinical and pathological features<sup>[4]</sup>. In 1999, Carlson et al., was the first to describe 2 cases of melanocytic matricoma as a distinct entity from pilomatricomas<sup>[8-14]</sup>, matricomas<sup>[2,12]</sup> and pigmented matricoma variants<sup>[13]</sup>. Melanocytic matricoma presents as a well-circumscribed dermal nodule composed of matrical and supra matrical cells surrounding clustered ghosts cells and admixed pigmented dendritic melanocytes<sup>[4,9]</sup> with no connection to the epidermis or pre-existing hair follicles and no cyst formation.

To our knowledge, only 16 cases of melanocytic matricoma have been reported to date<sup>[14,15]</sup>. Most cases described have been reported in elderly men with a history of sun-damaged skin<sup>[4-11]</sup>. Interestingly, there has been one report of a tumour with similar features to melanocytic matricoma on the tail of a dog<sup>[16]</sup>.

Normally during the anagen phase, the bulb of the hair follicle contains matrical, and supra matrical cells as well as markedly dendritic and pigmented melanocytes. And since active melanocytes are more prominent in the early anagen phase<sup>[17]</sup>, this led to the speculation that melanocytic matricoma represents an early stage of anagen follicular differentiation, in contrast to pilomatricoma, which may represent a late-stage of

differentiation<sup>[5-7,18]</sup>. Additionally, given the intimate interactions between epithelial cells and melanocytes during hair cycling, it has been proposed by Carlson *et al*<sup>[4]</sup>, and others, that secondary melanization is expected to occur in lesions with concomitant matrical cells. This may explain why there are frequent reports of pigmentation in other forms of neoplasms with follicular differentiation; highlighting the close interrelationship between follicular epithelium and melanocytes<sup>[4]</sup>. Moreover, since most reported cases occurred on the sun-damaged skin of elderly patients, it has been theorized that Ultraviolet Radiation (UVR) influences the migratory behavior of melanocytes, further contributing to the melanocytic colonization of melanocytic matricoma<sup>[11,19]</sup>.

Clinically, melanocytic matricoma presents as an intensely pigmented purple to black, papule or nodule. Due to its pigmented appearance, clinical differential diagnoses that need to be considered include malignant melanoma, pigmented basal cell carcinoma, thrombosed hemangioma and porocarcinoma.

Histopathologically, melanocytic matricoma has unique pathological features. Microscopically, it presents as a well-circumscribed solid, uni-nodular, intradermal tumour characterized by a dual cell population including epithelial and melanocytic cells. The epithelial component consists of matrical and supra matrical cells surrounding 'ghost' or 'shadow' cells. The epithelial cells may display varying cytological atypia and mitotic activity. Admixed with the epithelial cells are heavily pigmented dendritic melanocytes, present in both the epithelial and the melanocytic component. Typically, this matrical neoplasm doesn't display connection to the epidermis or pre-existing hair follicles, nor cyst formation or granulomatous reaction<sup>[4,9]</sup>. Though recently, there have been a few case reports of melanocytic matricoma, described with features of epidermal connection, calcification and granulomatous response<sup>[7,10]</sup>.

Immunohistochemically, matrical and supra matrical cells show diffuse pattern of nuclear and cytoplasmic activity to Beta-catenin, membrane positivity to Cadherins, patchy pattern of CD10<sup>[11]</sup>, weak expression of epithelial membrane antigen EMA<sup>[11]</sup> and are positive towards Pan cytokeratin<sup>[4,9]</sup>, CAM 5.2<sup>[4,6]</sup>, CK 5/6<sup>[11]</sup> and p63. The shadow cells show immunoreactivity to Pan cytokeratin<sup>[5,9,20]</sup>, CK13<sup>[4]</sup>, and AE1/AE3<sup>[7,8,20]</sup> but show negative staining to both Beta-catenin and Cadherins<sup>[14]</sup>. In addition, the melanocytic component show characteristic immunohistochemical expression with S100 protein<sup>[4,5,9,11,20]</sup>, Melan A<sup>[6,7,9,20]</sup>, HMB-45<sup>[4-11,18,20]</sup>, Vimentin<sup>[4,5,20]</sup> and E cadherin<sup>[9,18]</sup>. However, staining for Cytokeratin 7<sup>[11]</sup>, Cytokeratin 20<sup>[11]</sup> and Ber-EP4<sup>[4,7,11]</sup> is negative. The pattern of expression of Cadherins and Beta-catenin antigen in melanocytic matricoma further supports that this rare tumour recapitulates cellular components of anagen hair bulb<sup>[21,22]</sup>.

Despite the presence of variable cytological atypia and frequent mitoses<sup>[5,8]</sup>, features that favour benign behavior of this matrical neoplasm include circumscription, small size, lack of infiltrative growth in the subcutaneous tissue and lack of lymphatic, blood vessel, perineurial and visceral invasion<sup>[23-31]</sup>. Nevertheless, in the literature there has been 5 cases<sup>[32]</sup> of malignant melanocytic matricoma reported, and 1 case of local recurrence<sup>[32]</sup>. Therefore, long-term follow-up is indicated to exclude aggressive behavior.

Histopathologically, the major differential diagnosis include both the pigmented and malignant variant of pilomatri-

coma, matricoma, matrical carcinoma, trichoblastoma and basal cell carcinoma with matrical differentiation.

Melanocytic matricoma is both clinically and pathologically distinct from pilomatricoma. Pilomatricoma typically presents as a large, firm, cystic or solid nodule, frequently seen in young female individuals<sup>[1,2,33,34]</sup> whereas melanocytic matricoma is frequently reported in elderly men<sup>[4,11]</sup>. Histopathological features that aids differentiation of pigmented variants of pilomatricoma from melanocytic matricoma includes the presence of multi-nodular lesions with islands of tumour cells<sup>[14]</sup>, lack of a prominent melanocytic hyperplasia<sup>[6]</sup> and presence of calcification in more than two thirds of the cases<sup>[1,2,33]</sup> of the former as opposed to the latter which is characterized as being uni-nodular with a marked prominence of pigmented dendritic melanocytes and with the absence of calcification and granulomatous reactions<sup>[4,6,9]</sup>.

Malignant pilomatricoma commonly presents in male adults<sup>[1-3,33,34]</sup>, as a large<sup>[1-3,33,34]</sup> asymmetric infiltrative tumour with occasional necrosis<sup>[1,2,33,34]</sup>. The main histopathological feature that characterizes malignant pilomatricoma is the lack of prominent melanocytic proliferation with heavy melanin pigmentation and the presence of a variable number of atypical mitoses<sup>[2]</sup>, while the latter is absent in the non malignant melanocytic matricoma<sup>[14]</sup>.

Around 75 – 100% of pilomatricomas<sup>[35,36]</sup>, have activating mutations in exon 3 of CTNNB1, which encodes for beta-catenin<sup>[37]</sup>. Based on the nuclear localization of b-catenin in basaloid cells in melanocytic matricoma, may imply that mutations of melanocytic matricoma are similar to pilomatricoma<sup>[38]</sup>. Subsequently, further studies of CTNNB1 mutations in various matricomas will be of high importance, to determine whether these rare tumours are genetically related to other tumours of the hair matrix.

Historically, there has been some debate on whether melanocytic matricoma represents a distinct entity or is simply a variant of matricoma<sup>[39]</sup>. However, these two entities are considered to be different. Matricomas, are defined as benign neoplasms containing all the cellular elements of a pilomatricoma but with a different silhouette<sup>[2]</sup>, where they are composed of many small, discrete, solid, solid cystic or cystic aggregations positioned throughout the dermis and occasionally may extend into the subcutaneous fat, in contrast to melanocytic matricoma which is uni-nodular<sup>[12,40]</sup>. Microscopic features that discriminates melanocytic matricoma from matricoma include the presence of melanocytic proliferation<sup>[6]</sup>, absence of a connection with the epidermis or adnexal epithelium and absence of a granulomatous component or calcifications in the former<sup>[4,9]</sup>. While matricomas are benign, matrical carcinoma on the other hand, tend to follow a locally aggressive behavior, where they demonstrate deep infiltration with areas of necrosis.

Furthermore, features that distinguish melanocytic matricoma from trichoblastomas with matrical differentiation is the absence of the abundant stromal component with primitive follicular bulb formation in melanocytic matricoma<sup>[4]</sup>, compared to the large size, exuberant stoma with predominance of germinative cells in trichoblastomas with matrical differentiation<sup>[12]</sup>.

Finally, one of the most important differential diagnoses to be ruled out is basal cell carcinomas with matrical differentiation, which presents as a slowly growing ulcerated nodule, commonly in elderly men. Histopathological features of basal

cell carcinoma with matrical differentiation include infiltrative tumour aggregates, peripheral nuclear palisading, and retraction clefts<sup>[12,41-47]</sup>. Moreover, basal cell carcinomas with matrical differentiation shows positivity towards Ber-EP4<sup>[1,2,34]</sup> and a focal and membranous pattern<sup>[44,46]</sup> of staining with beta-catenin, in contrast to melanocytic matricomas, which is negative to Ber-EP4<sup>[4,7,11]</sup> and show an intense, pattern of nuclear and cytoplasmic positivity to beta-catenin<sup>[9,11,18]</sup>.

## Conclusion

In conclusion, melanocytic matricoma is a rare cutaneous adnexal tumour commonly presenting as a well circumscribed pigmented dermal nodule, frequently on sun-damaged skin of elderly men. To the best of our knowledge, this is the first case reported in a middle aged female in the Middle East. It's important to recognize this neoplasm as it should be considered in the differential diagnosis of tumours that presents with a dual cell population of follicular and matrical differentiation. With case reports of malignant changes and local recurrence, long-term follow-up is indicated to exclude the aggressive potential of these matrical neoplasms.

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