ORIGINAL RESEARCH PAPER

Pathology

PIGMENTED BASAL CELL CARCINOMA: A CLINICOPATHOLOGICAL, DERMOSCOPIC, AND IMMUNOHISTOCHEMICAL STUDY

KEY WORDS: Pigmented basal cell carcinoma, dermoscopy, histopathology, immunohistochemistry, melanoma, Ber-EP4.

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ABSTRACT

Background Pigmented basal cell carcinoma (PBCC) is an uncommon histological variant of basal cell carcinoma characterized by increased melanin deposition within tumor nests. Due to its pigmented appearance, PBCC may clinically mimic melanoma and other melanocytic lesions, posing a diagnostic challenge. **Materials and Methods** A descriptive observational study was conducted in the Department of Pathology in collaboration with the Department of Dermatology at Index Medical College Hospital and Research Centre, Indore, Madhya Pradesh, India, over a period of six months following institutional ethical approval. sixteen patients with clinically suspicious pigmented lesions subsequently confirmed as PBCC on histopathology were included. Clinical examination, histopathological, dermoscopic evaluation, analysis using hematoxylin and eosin staining, and immunohistochemistry (Ber-EP4, HMB-45, and S-100) were performed. **Results** The mean age of patients was 58.4 ± 12.6 years, with a male predominance (male : female ratio = 10:6). Most lesions occurred on sun-exposed areas, particularly the face (62.5%). Nodular morphology was the most common clinical presentation (62.5%). Histopathological examination demonstrated basaloid tumor nests in all cases, with peripheral palisading in 87.5% and stromal retraction in 81.2% of lesions. Melanin deposition within tumor cells was observed in 93.7% of cases. Dermoscopy revealed blue-gray ovoid nests in 81.2% and arborizing vessels in 75% of lesions. Immunohistochemistry showed universal Ber-EP4 positivity with negative HMB-45 and S-100 staining. Diagnostic concordance between dermoscopy and histopathology was 93.7%. **Conclusion** Histopathology remains the gold standard for the diagnosis of PBCC. Dermoscopy serves as a valuable adjunctive tool, while immunohistochemistry significantly aids in differentiating PBCC from melanoma in diagnostically challenging cases.

INTRODUCTION

Basal cell carcinoma (BCC) is the most common cutaneous malignancy worldwide and accounts for nearly 80% of non-melanoma skin cancers. Pigmented basal cell carcinoma (PBCC) represents an uncommon histological variant of BCC characterized by increased melanin deposition within basaloid tumor islands and stromal melanophages. PBCC constitutes approximately 6–10% of all BCCs and is reported more frequently among individuals with darker skin phenotypes.

Clinically, PBCC often presents as dark brown to black nodules, plaques, or ulcerated lesions, frequently leading to diagnostic confusion with melanoma and other pigmented cutaneous neoplasms. The irregular distribution of pigment may obscure the classical clinical appearance of BCC, thereby complicating diagnosis.

Histopathological examination remains the definitive diagnostic modality for PBCC. Classical microscopic features include nests of basaloid cells, peripheral palisading, stromal clefting or retraction artifacts, and melanin pigmentation within tumor cells and melanophages. Immunohistochemistry (IHC) further assists in difficult cases, particularly in distinguishing PBCC from melanoma. Strong Ber-EP4 positivity with negative HMB-45 and S-100 staining strongly supports the diagnosis of BCC.

Dermoscopy has emerged as a useful non-invasive diagnostic adjunct. Characteristic dermoscopic features such as arborizing vessels, blue-gray ovoid nests, maple-leaf–like structures, and spoke-wheel areas enhance diagnostic confidence. However, dermoscopic findings should always be interpreted in conjunction with histopathological examination.

The present study was undertaken to evaluate the clinical, dermoscopic, histopathological, and immunohistochemical characteristics of PBCC cases diagnosed at our institution and to assess the diagnostic concordance between dermoscopy and histopathologically.

MATERIALS AND METHODS

This descriptive observational study included sixteen histopathologically confirmed cases of pigmented basal cell carcinoma received in the Department of Pathology in collaboration with Department of Dermatology, Index Medical College Hospital and Research Centre, Indore, over a period of six months.

Clinical details, dermoscopic features, gross morphology, and microscopic features were reviewed from departmental records. All specimens were routinely processed and stained with haematoxylin and eosin (H&E stain). Histopathological findings were analyzed with Basaloid tumor nests, peripheral palisading, stromal retraction, melanin deposition, presence of melanophages and mitotic activity.

RESULTS:

Demographic Characteristics

A total of 16 histologically confirmed cases of PBCC were included in the study.

Parameter	Value
Mean age	58.4 ± 12.6 years
Male : Female ratio	10:6
Lesions on sun-exposed sites	12 (75%)
Most common location	Face (62.5%)
Median duration before presentation	14 months (IQR 8–22)

The mean age of the patients ranged from 34 to 82 years. Most lesions occurred on sun-exposed regions, particularly the face. No statistically significant association was observed between age group and lesion location.

Clinical Characteristics

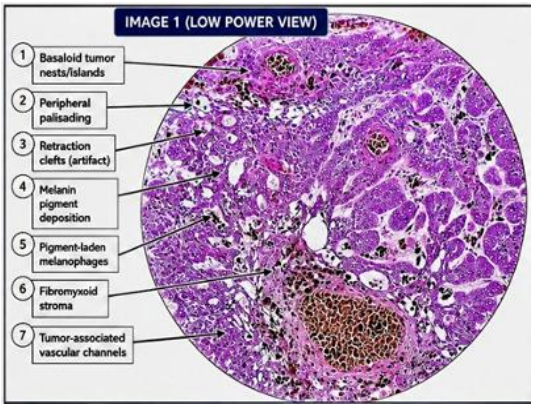
Clinical Feature	Number (%)
Nodular morphology	10 (62.5%)
Plaque-like morphology	4 (25%)
Ulceration	2 (12.5%)
Brown-black pigmentation	15 (93.7%)
Irregular pigment distribution	9 (56.2%)

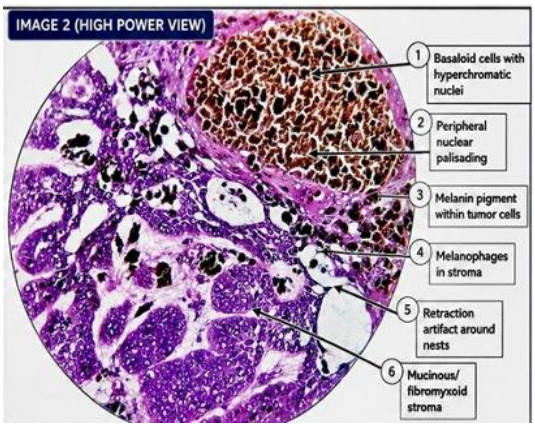
Nodular lesions constituted the most common presentation. Irregular pigment distribution was observed in more than half of the cases. No significant difference was observed in lesion morphology between facial and non-facial lesions.

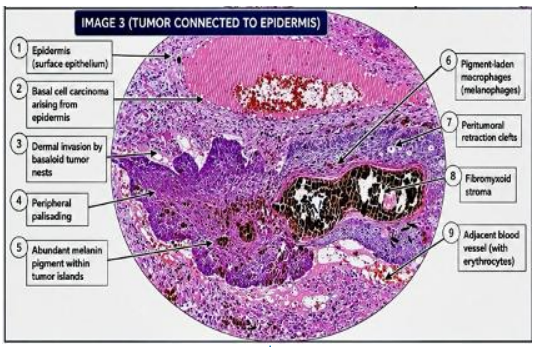
Histopathological Findings

Histopathological Feature	Number (%)
Basaloid tumor nests	16 (100%)
Peripheral palisading	14 (87.5%)
Stromal retraction	13 (81.2%)
Melanin in tumor cells	15 (93.7%)
Melanophages	14 (87.5%)
Low-to-moderate mitotic index	9 (56.2%)

Histopathological examination confirmed PBCC in all cases. Basaloid tumor islands with peripheral palisading and stromal clefting were the predominant microscopic features. Melanin deposition within tumor cells and melanophages was frequently observed.







Immunohistochemical Findings

Marker	Result
Ber-EP4	Positive in all cases
HMB-45	Negative
S-100	Negative

Immunohistochemistry was particularly useful in differentiating PBCC from melanoma in heavily pigmented lesions.

Dermoscopic Findings

Dermoscopic Feature	Number (%)
Arborizing vessels	12 (75%)
Blue-gray ovoid nests	13 (81.2%)
Maple-leaf areas	9 (56.2%)
Blue-gray globules	10 (62.5%)
Spoke-wheel structures	6 (37.5%)

Blue-gray ovoid nests and arborizing vessels were the most common dermoscopic findings. Arborizing vessels were significantly more common in facial lesions compared to non-facial lesions.

Dermoscopy–Histopathology Concordance

Parameter	Value
Dermoscopy positive	15
Histopathology positive	16
Concordance	93.7%
Cohen's kappa	0.86

Dermoscopy demonstrated high concordance with histopathological findings, indicating strong agreement between the two modalities.

DISCUSSION

Pigmented basal cell carcinoma is a clinically important variant of BCC because its pigmented appearance frequently leads to confusion with melanoma and other melanocytic lesions. The present study highlights the combined utility of histopathology, dermoscopy, and immunohistochemistry in the accurate diagnosis of PBCC.

The majority of lesions in our study occurred in older individuals and predominantly involved sun-exposed facial regions. These findings are consistent with the established role of chronic ultraviolet radiation exposure in the pathogenesis of BCC.

Histopathological examination remains the cornerstone of diagnosis. All cases in the present study demonstrated characteristic basaloid tumor nests with peripheral palisading and stromal retraction. Melanin deposition within tumor cells and the presence of melanophages accounted for the pigmented appearance of the lesions.

Immunohistochemistry significantly enhanced diagnostic confidence, particularly in heavily pigmented lesions with overlapping features of melanoma. Uniform positivity for Ber-EP4 and negativity for HMB-45 and S-100 reliably differentiated PBCC from melanocytic neoplasms.

Dermoscopy demonstrated high diagnostic concordance with histopathology. Blue-gray ovoid nests and arborizing vessels were the most common dermoscopic features identified. Although dermoscopy serves as an important non-invasive adjunct, it cannot replace histopathological confirmation, especially in clinically ambiguous lesions.

The findings of the present study are comparable with previously published literature describing PBCC as a diagnostically challenging yet histopathologically distinctive variant of BCC.

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