Journal of the Turkish Academy of Dermatology
eISSN 1307-394X

Research

The Evaluation of Dermoscopic Findings in Basal Cell Carcinoma

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Published:
J Turk Acad Dermatol 2010; **4 (3)**: 04301a.
This article is available from: http://www.jotad.org/2010/3/jtad04301a.pdf
Key Words: basal cell carcinoma, dermoscopy, dermatopathological subtypes

Abstract

Introduction: Many surface microscopy features of pigmented BCCs have been described. The purpose of this study was to review dermoscopic findings of BCC and to investigate their incidence in different dermatopathological subtypes.

Material and Methods: Dermoscopic examination of 130 skin lesions in 113 patients with the preliminary diagnosis of BCC, without knowledge of the dermatopathological diagnosis was performed. For all lesions, macroscopic clinical photographs and documentation of the dermoscopic findings were performed. Routine biopsy procedures were carried out and haematoxylin and eosin stained sections were examined for dermatopathologic diagnosis and evalulation of dermatopathologic subtypes.

Results: Preoperative diagnostic accuracy rate of dermoscopy in the diagnosis of BCC was found to be 95.3%. A total of 14 morphological dermoscopic criteria were identified. The most common dermoscopic finding was vascular structures (87.7%) with arborising vessels (78%). Vascular structures and ulceration were observed in all dermatopathological subtypes but except fibrosing BCC. Blue globules, mapple leaf like pattern, blue-gray ovoid nests and blue-grey areas were more commonly seen in pigmented BCC. Comedo like openings without a collision of seborrheic keratosis was observed in 3,2% of the BCCs which was not reported in association with BCC, previously.

Conclusions: In our study dermoscopy maintained 95.3% preoperative diagnostic accuracy rate in BCC. In this way dermoscopy hinders unnecessary surgical procedures which might be carried out. Our study indicated that the six morphological findings that had already been reported for pigmented BCC can be seen in other dermatopathologic subtypes as well.

Introduction

Dermoscopy is a non-invasive technique that is known to increase the diagnostic accuracy of basal cell carcinoma (BCC) especially pigmented BCC versus malignant melanoma (MM) [**1, 2**] Many surface microscopy features of pigmented BCCs have been described [**1, 2, 3, 4, 5**]. *Menzies* et al. [**2**] proposed a simple dermoscopic model for the diagnosis of pigmented BCC based on the absence of a pigment network and the presence of at least one of six positive morphologic features. Positive dermoscopic features include ulceration, not associated with a recent history of

trauma, multiple blue-gray globules, leaf like areas, large blue-gray ovoid nests, spoke wheel areas and prominent telangiectases of different diameter and numerous branches (arborising telangiectasia).

Because of their growth patterns and asymmetry of pigmentation, pigmented BCCs are included in the differential diagnosis of melanoma. In addition demoscopic features of MM such as gray dots/globules, irregular depigmentation, border disarray, whitish veil and blue-gray areas may also be detected in BCC. BCC is differed both from MM and melanocytic skin lesions with the absence of pigment network, brown globules and radial streaming [**1, 2, 4, 6**].

BCC has various dermatopathological subtypes such as: nodular, micronodular, cystic, superficial-multifocal, baso-skuamous, pigmented, sclerozan, adenoid, infiltrative, keratotic, infundibulo-cystic, metatypic, fibroepitheliomatous types. Also mixed subtypes are commonly seen.

To date dermoscopic findings of BCC according to dermatopathological subtypes has not been carried out in large series. The purpose of this study was to review dermoscopic findings of BCC and to investigate their incidence in different dermatopathological subtypes.

Materials and Methods

Dermoscopic examination of 130 skin lesions in 113 patients with the preliminary diagnosis of BCC, without knowledge of the dermatopathological diagnosis was performed. All the lesions involved in this study were dermoscopically equivocal, with the suspected diagnosis of BCC.

All BCCs were examined by an experienced "dermoscopist" using the Dermlite Foto at 10 fold magnification; 3 Gen, LLC, Dana Point, CA, USA. All data were collected prospectively in a period of 2 years. Macroscopic clinical photographs and documentation of the dermoscopic findings were performed for every lesion. The evaluation of dermoscopic findings of suspected BCCs were performed by using *Menzies*' surface microscopy method [**2**]. Routine biopsy procedures were carried out for all lesions and haematoxylin-eosin stained sections were examined for dermatopathological diagnosis and evaluation of dermatopathological subtypes.

In the first step the frequency of the dermoscopic findings of dermatopathologically confirmed BCC were determined. In the second step the dermoscopic findings were classified according to dermatopathological subtypes where they are commonly seen. Statistical analysis were made using SPSS 10 Chi IL. Simple descriptive statistics were tabulated. The chi-square test and the Fisher exact probability test were used to analyze differences between groups; $P<0.05$ was considered statistically significant.

Results

A total of 130 lesions in 113 cases that had dermoscopic preliminary diagnosis of BCC were evaluated. Dermatopathologically 124 lesions were concordant with BCC, 3 with solar keratoses and three with squamous cell carcinoma. Six lesions which were not histopathologically compatible with BCC were not enrolled in the study. Nodular BCC (78.8%) was the most common clinical presentation and of these 26% was ulcerative. The other clinical presentations of BCC were mainly; pigmented (16%), superficial (4%), and morpheaform (8%). Solid type was the most common dermatopathological type. The frequencies of the dermatopathological subtypes of BCC are shown in **Table 1**.

A total of 14 morphological dermoscopic criteria were identified (**Table 2, Figures 1-5**). The most common dermoscopic finding was vascular structures (87.7%) with arborising vessels (78%). Large diameter vessels (50%), kinking (68%), thin pruning vessels (13.7%) and hairpin like vessels (3%) were the other determined vascular structures.

The distribution of dermoscopic criteria defined by *Menzies* et al [**2**] in various dermatopathological subtypes of BCC are shown in **Table 3**. Mapple leaf like areas was encountered in: 50% of pigmented, 37.5% of

Table 1. The Distribution of Dermatopathological Subtypes of BCC

Dermatopathology	Frequency	(%)
Solid	57	45,9
Pigmented	20	16,1
Infiltrative	15	12,1
Superficial	10	8
Metatypic	8	6,4
Adenoid	4	3,2
Nodulo-Ulcerative	4	3,2
Basosquamous	3	2,4
Sclerozing	1	0,8
Micro-Nodular	1	0,8
Keratotic	1	0,8
Total	124	100

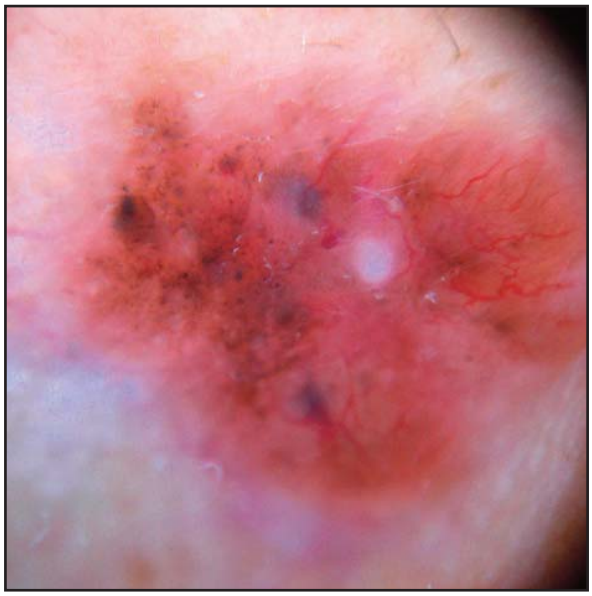

Figure 1. Dermoscopy of solid type BCC; Blue-grey areas, grey dots, thin prunning vessels

Table 2. Dermoscopic Findings of Basal Cell Carcinoma

Dermoscopy	Frequency	(%)
Vascular structures	109	87,7
Ulceration	55	44,4
Mapple leaf like areas	30	24,2
Blue-grey areas	28	22,8
Blue globules	23	18,5
Whitish veil	20	16,1
Brown globules	15	12,1
Blue-grey ovoid nests	12	9,7
Scar like depigmentation	10	8,1
Spoke-wheel areas	7	5,6
Pepper like grey dots	7	5,6
Black-brown dots	4	3,2
Comedo-like openings	4	3,2
Milia like cysts	3	2,4
Pigment network	0	0

metatypic, and 25% of solid BCCs, blue-grey globules; in 35% of pigmented, 21% of solid, and13.3% of infiltrative BCCs, blue-grey ovoid nests; in 45% of pigmented and 33.3% of basosquamous BCCs, spoke wheel areas; in 100% of micronodular, 20% of superficial, and 10% of pigmented BCCs. Vascular structures and ulceration were observed in all but except fibrosing type of BCCs (**Table 3**).

The distribution of additional 8 dermoscopic criteria to the ones defined by *Menzies* et al [**2**] in various dermatopathological subtypes of BCC are shown in **Table 4**. Whitish veil was confronted; 75% of adenoid, 25% of pigmented, and 14% of solid BCCs, brown globules; 30% of superficial, 20% of infltrative and 14% of solid BCCs, scar like depigmentation; 26.6% of infiltrative and 10% of superficial BCCs and pepper like grey dots; 25% of adenoid and 20% of pigmented BCCs.

Milia like cysts and comedo like openings were seen in 3 (2.4%) and (3.2%) of the lesions respectively. Comedo like openings

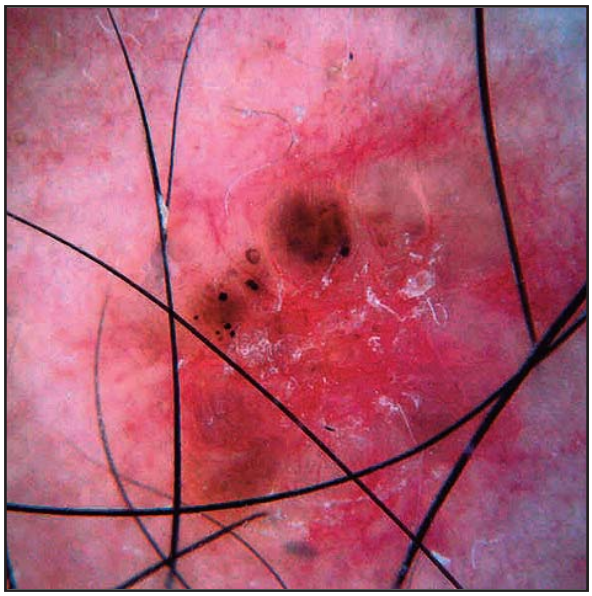

Figure 2. Dermoscopy of solid type BCC; Brown dots and globules, grey area, thin prunning vessel

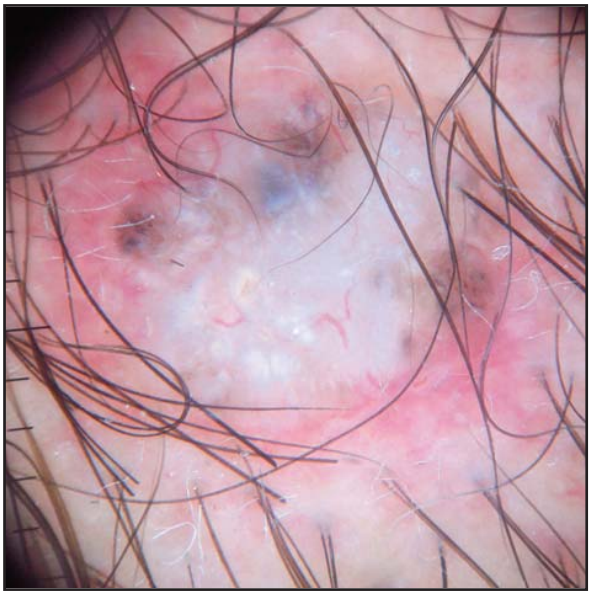

Figure 2. Dermoscopy of adenoid type BC; Whitish veil, blue-grey area, black dots and globules, thin vessels

Table 3. The Distribution of Dermoscopic Criteria Defined by *Menzies* et al [**2**] According to Various Dermatopathological Subtypes of BCC

BCC	Blue Globules	Mapple Leaf	Spoke Wheel	Blue-Grey Ovoid Nests	Vascular Structures	Ulceration
Solid (57)	12 (21,0%)	14 (24,5%)	1 (1,7%)	1 (1,7%)	51 (89,4%)	20 (35,0%)
Pigmented (20)	7 (35%)	10 (50%)	2 (10%)	9 (45%)	17 (85%)	7 (35%)
Superficial 10	1 (10%)	2 (20%)	2 (20%)	0 (0)	5 (50%)	1 (10%)
İnfiltrative (15)	2 (13,3%)	1 (6,6%)	1 (6,6%)	0 (0)	14 (93,3%)	9 (60%)
Adenoid (4)	0 (0)	0 (0)	0 (0)	0 (0)	4 (100%)	3 (75%)
Metatypic (8)	0 (0)	3 (37,5%)	0 (0)	1 (12,5%)	8 (100%)	6 (75%)
Noduloulcerative (4)	1 (25%)	0 (0)	0 (0)	0 (0)	4 (100%)	4 (100%)
Micronodular (1)	0 (0)	0 (0)	1 (100%)	0 (0)	1 (100%)	1 (100%)
Keratotic (1)	0 (0)	0 (0)	0 (0)	0 (0)	1 (100%)	1 (100%)
Fibrosing (1)	0 (0)	0 (0)	0 (0)	0 (0)	1 (100%)	0 (0%)
Baso-squamous (3)	0 (0)	0 (0)	0 (0)	1 (33,3%)	3 (100%)	3 (100%)
TOTAL	**23**	**30**	**7**	**12**	**109**	**55**

without a collision of seborrheic keratosis in BCC was not reported before.

Preoperative diagnostic accuracy rate of dermoscopy in the diagnosis of BCC was found to be 95.3%.

Discussion

Surface microscopy features of pigmented BCC are analyzed statistically in 2 studies. *Menzies* et al [**2**] compared the dermoscopic findings of 71 pigmented BCC, 71 invaziv melanoma and 71 benign pigmented skin lesions. *Puspok* et al [**1**] compared the dermoscopic findings of 25 pigmented BCC versus 25 melanoma [**1, 2**]. To our knowledge, our study is the first that analyzed the dermatopathological types of the determined dermoscopic findings where they are commonly seen.

Menzies et al [**2**] found that dermoscopy gave a sensitivity of 97% in the diagnosis of pigmented BCC and a specifity of 93% in the invasive melanoma set and 92% in the benign

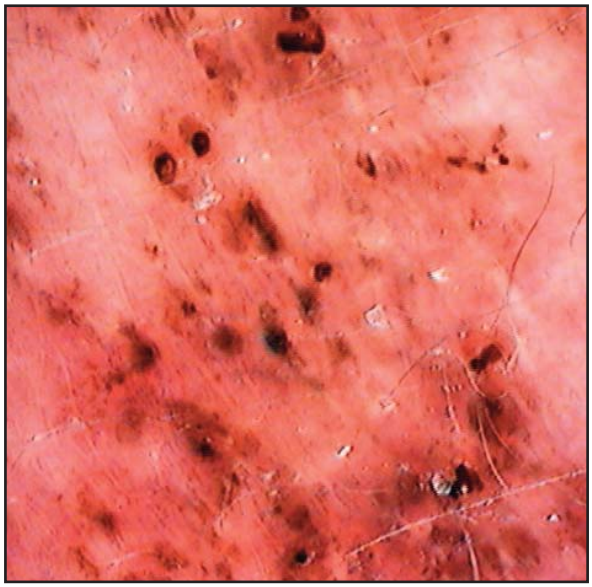

Figure 4. Dermoscopy of superficial type BCC; Comedo like openings, brown globules

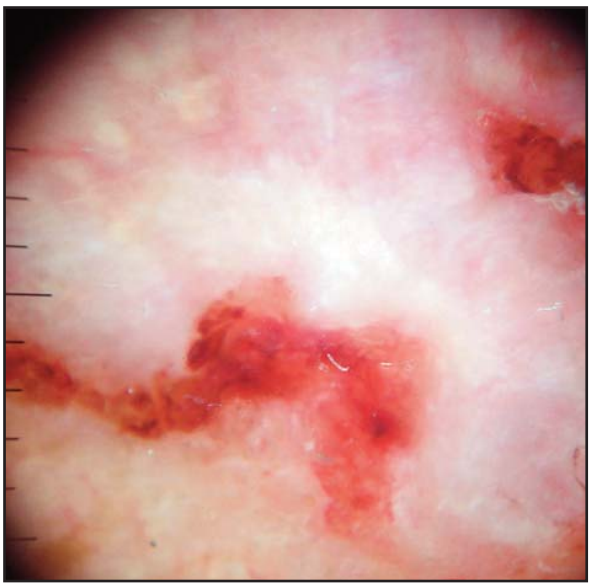

Figure 5. Dermoscopy of infiltrative type BCC; Whitish veil, ulceration

Table 4. The Distribution of Additional 8 Dermoscopic Criteria to the Ones Defined by *Menzies* et al [**2**] in Various Dermatopathological Subtypes of BCC

BCC	Blue Grey Areas	Whitish Veil	Brown Globule	Scar Like Depigm.	Pepper Like Grey Dots	Black-Brown Dots	Milia Like Cysts	Comedo like opening
Solid (57)	9 (15,7%)	8 (14,0%)	8 (14,0%)	4 (7,0%)	1 (1,7%)	2 (3,5%)	1 (1,7%)	2 (3,5%)
Pigmented (20)	11 (55%)	5 (25%)	1 (5%)	0 (0)	4 (20%)	2 (10%)	1 (5%)	1 (5%)
Superficial (10)	1 (10%)	0 (0)	3 (30%)	1 (10%)	1 (10%)	0 (0)	0 (0)	1 (10%)
Infiltrative (15)	1 (6,6%)	3 (20%)	3 (20%)	4 (26,6%)	0 (0)	0 (0)	1 (6,6%)	0 (0)
Adenoid (4)	2 (50%)	3 (75%)	0 (0)	0 (0)	1 (25%)	0 (0)	0 (0)	0 (0)
Metatypic (8)	1 (12,5%)	1 (12,5%)	0 (0)	1 (12,5%)	0 (0)	0 (0)	0 (0)	0 (0)
Noduloulcerative (4)	2 (50%)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Micronodular (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Keratotic (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Fibrosing (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Baso-squamous (3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
TOTAL	**27**	**20**	**15**	**10**	**7**	**4**	**3**	**4**

pigmented skin lesions set. In our study, dermoscopy maintained 95.3% preoperative diagnostic accuracy rate in BCC. Since we did not test our diagnostic criteria in a set of randomly choosen pigmented skin lesions, we are not able to determine the specifity of our criteria.

We identified a total of 14 morphological dermatoscopic criteria. These are vascular structures, ulceration, mapple leaf like areas, blue-grey areas, blue globules, whitish veil, brown globules, blue-grey ovoid nests, scar like depigmentation, spoke wheel areas, pepper like grey dots, black-brown dots, milia like cysts and comedo like openings, respectively. In addition to the *Menzies*' 6 classic criteria, gray blue areas, whitish veil, brown globules and scar like depigmentation may be be helpful in the diagnosis. We believe that when these 4 additional criteria will be added to *Menzies* criteria, the difficulties in the diagnosis can be minimized.

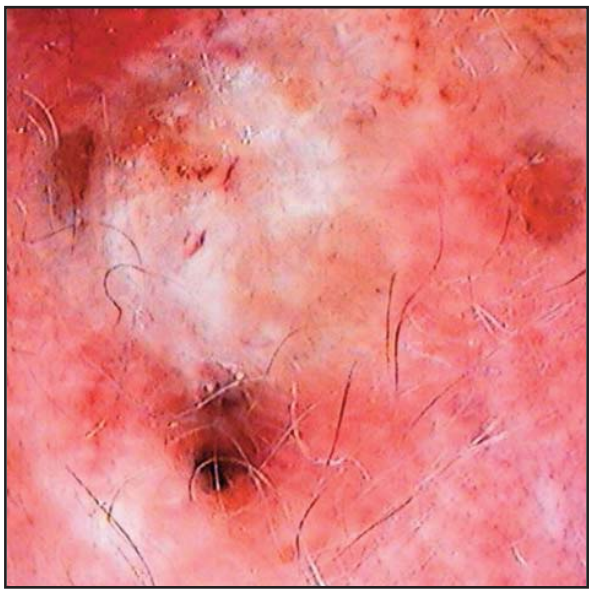

Figure 6. Dermoscopy of metatypic BCC; White scar like depigmentation, Grey ovoid nests, thin prunning vessel

The dermoscopic features of our study and the studies of *Menzies* et al [**2**] and *Puspok* et al [**1**] are compared in **Table 5**. Different from these studies which had evaluated only the dermoscpic findings of pigmented BCC, we analyzed our variables in two different groups. The first group; involves the dermoscopic features of pigmented BCC and the second group; involves all dermatopathological types of BCC. Presence of blue-grey areas (p: 0.000), large blue ovoid nests (p: 0.000), multipl blue-grey dots (p: 0.000), brown globules (p: 0.000) and milia like cysts (p: 0.029) were more common in the study of *Menzies* et al when compared with our study evaluating all dermatopathological subtypes and the study of *Puspok* et al. These findings were statistically significant. Presence of mapple leaf areas (p: 0.008) and black-brown dots (p: 0.000) were more common in the study of *Puspok* et al whereas ulceration was more common (p: 0.01) in our sudy which were statistically signifiant dermoscopic findings. However, when comparing our results for pigmented BCC, most of the results of *Menzies* et al and our studies were concordant, except for mapple leaf like areas and scar like depigmentation. Similar to the results of *Puspok* et al, the incidence of mapple leaf like areas in pigmented BCC (p: 0.00) was statistically significant finding, in our set. In our study, scar like depigmentation was not present in pig-

Table 5. The Comparison of the Dermoscopic Features of our Study with the Reported Studies

	Menzies [1] PBCC (n:71) n/%	Puspok [2] PBCC (n:25) n/%	Our Study PBCC (n:20) n/%	BCC (n:124) n/%
Mapple leaf like areas	12/17	12/48	10/50	30/24.2
Spoke wheel areas	7/10	ND	2/10	7/5.7
Large blue ovoid nests	39/55	ND	9/45	12/9.7
Multipl blue grey globules	19/27	ND	7/35	23/18.5
Ulceration	19/27	ND	7/35	55/44.4
Blue-grey areas	43/61	10/42	11/55	28/22.8
Whitish veil	11/15	ND	5/25	20/16.1
Brown globules	35/50	37/12	1/5	15/12.1
Black-brown dots	3/4.2	10/40	2/10	4/3.2
Multipl blue grey dots	17/24	ND	4/20	7/5.6
Pseudopods	1/1.4	2/4	0	0
Radial streaming	2/2.8	2/4	0	0
Milia like cysts	7/10	ND	1/5	3/2.4
Scar like depigmentation	4/5.6	ND	0	10/8.1
Pigment network	2/2.8	2/4	0	0

Abbreviations: PBCC;Pigmented basal cell carcinoma, BCC; Basal cell carcinoma, ND: Not defined

mented BCC but was detected in the other types.

Our study indicated that the six morphological findings that had already been reported for pigmented BCC can also be seen in the other dermatopathological subtypes. Blue globules, mapple leaf like pattern, blue-gray ovoid nests and blue-grey areas were more commonly seen in pigmented BCC whereas vascular structures were found in all dermatopathological subtypes. In the solid type, vascular structures were encountered on the surface or at the periphery of the tumor body while in pigmented BCC, they were found between the areas of mapple leaf islands or at the periphery of the lesion. Spoke wheel areas were more common in pigmented and superficial BCC when compared with the other types. Ulceration was less common in pigmented, superficial and solid BCC than the other types. Whitish veil, a common dermoscopic feature of melanoma was seen more commonly in solid, pigmented, infiltrative and adenoid BCC. Scar like depigmentation was found more commonly in the metatypic and infiltrative types. Comedo-like openings, not reported before as a dermoscopic finding of BCC, encountered in 4 lesions. These 4 lesions were not collision tumors with seborrheic keratosis. Dermatopathologially two of them were solid, one was pigmented and one was superficial BCC.

The dermoscopic features of the vascular structures of our study are compared schematically with the reported studies in **Table 6**. In our study the most common vascular structures were arborising and kinking vessels. We did not encounter hairpin and pinpoint vessels like *Menzies* et al [**2**] and *Kreusch* et al [**7**].

In conclusion, dermatoscopy maintained 95.3% preoperative diagnostic accuracy rate in BCC. In this way, dermoscopy hinders unnecessary surgical procedures which might be carried out. Our study indicated that the six morphological findings that had already been reported for pigmented BCC can be seen

Table 6. The Comparison of the Dermoscopic Features of the Vascular Structures of our Study with the Reported Studies

Dermoscopy	Puspok [2]		Menzies [1]		Kreusch [7]		Our Study	
	PBCC 25 (%)	MM 25 (%)	PBCC 71 (%)	MM 71 (%)	BCC 86 (%)	MM 241 (%)	PBCC 20 (%)	BCC 124 (%)
Vascular structures	96	56	73	8,7	97.7	21	85	87,7
Large diameter	76	16	21	21	ND	ND	40	50
Arborising	84	8	52	4,2	91,7	7,3	65	78
Kinking	88	4	66	16,2			64	68
Thin pruning	ND	ND	ND	ND	ND	ND	20	13,7
Hairpin like	ND	ND	8,5	22,2	10,7	59	0	3
Pinpoint	ND	ND	30	12,2	1,2	38	0	0

Abbreviations: PBCC;Pigmented basal cell carcinoma, BCC; Basal cell carcinoma, ND: Not defined

in other dermatopathological subtypes, as well. In our research, evaluation of findings which has not been reported before, such as comedo-like openings, indicated the need for more advanced studies in determining the missing dermoscopic criteria findings in non-melanocytic lesions. Besides, we believe that our study has shown that there are 8 more dermoscopic morphological findings which may be helpful in the differential diagnosis of BCC.

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