Acta Derm Venereol 2000; 80: 117–121

Morphological Features of Spitz Naevus as Observed by Digital Videomicroscopy

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A characteristic epiluminescence pattern of pigmented epithelioid and/or spindle cell naevus, or Spitz naevus, has been described previously. The aim of this study was (i) to evaluate the characteristic morphological features both of pigmented and non-pigmented epithelioid and/or spindle cell naevi observed employing a videomicroscope, (ii) to identify their histopathological correlates and (iii) to assess the improvement in diagnostic accuracy for epithelioid and/or spindle cell naevi obtained by means of this new instrumental device. Clinical, videomicroscopic and histopathological diagnoses were performed on 26 epithelioid and/or spindle cell naevi. Moreover, the videomicroscopic pattern of each lesion was described using appropriate morphological parameters. Based on their morphological aspect detected by digital videomicroscopy, epithelioid and/or spindle cell naevi can be subdivided into three main groups: (i) darkly pigmented lesions, (ii) red or light brown ESC naevi, and (iii) lesions with dark or brown areas on a light-brown background. Whereas most epithelioid and/or spindle cell naevi of the spindle cell type belonged to the morphological group 1 and group 3, most epithelioid cell lesions appeared as red or light-brown coloured naevi. Finally, instrumental observation by means of a videomicroscope enabled an improvement in diagnostic accuracy with respect to the naked eye observation, with an increase in sensitivity from 15% to 58%. *Key words: epithelioid andlor spindle cell naevus; Spitz naevus; digital videomicroscopy; epiluminescence microscopy; histopathological correlates; diagnostic accuracy.*

(Accepted October 11, 1999.)

Acta Derm Venereol 2000; 80: 117–121.

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Epithelioid and/or spindle cell melanocytic naevus (ESC naevus), including Spitz and Reed naevus, is an acquired, usually benign melanocytic tumour, sometimes leading to diagnostic confusion with melanoma, because of its alarming clinical presentation. In fact, correct clinical diagnosis of ESC naevus is generally achieved in a minority of cases (1). Usually, ESC naevi appear clinically as firm, dome-shaped, round to oval nodules, less than 1 cm in diameter, in a wide spectrum of colours, red, tan or darkly pigmented (2–5). Histologically, these naevi are defined by a set of characteristic features (4, 6, 7). In spite of a bizarre histology and the frequent occurrence of dermal inflammation and mitoses, ESC naevi can usually be differentiated from melanomas by distinct lateral margins, the presence of a distinctive pattern of growth (characterized by the maturation of cells with increasing depth) and uniform nuclei, and by the absence of atypical mitoses and deep dermal invasion (4, 6, 7).

The introduction of instrumental devices designed for observation and magnification of pigmented skin lesions, such as epiluminescence microscopy (ELM), has enabled the identification of morphological features characterizing different pigmented skin lesions (8–10). The advantages of these techniques as an aid in the differential diagnosis between naevi and melanomas have been stressed repeatedly (11–18).

To the best of our knowledge, a detailed description of the characteristic ELM features of the ESC naevi has so far been introduced only by the Vienna group on two series comprising 28 (9) and 54 (19) pigmented Spitz naevi, and by Stolz et al., who provided exemplary illustrations referring to different development phases and types of Spitz naevi (20).

Videomicroscopes, consisting of a hand-held probe with a small camera and a polarizing system, produce highly magnified pigmented skin lesion images, comparable with the one obtained by a surface microscope after the application of a drop of oil and a glass slide (ELM) (21). However, videomicroscopic features of pigmented skin lesions are similar to those observed by ELM, but not exactly alike. To date, the videomicroscopic aspects of ESC naevi have not been reported.

The aim of this study was the description of the characteristic features of ESC naevi observed by a videomicroscope and the identification of the histological correlates. Furthermore, the improvement in diagnostic accuracy achieved by videomicroscopy was assessed by comparing clinical and instrumental diagnoses.

MATERIAL AND METHODS

Lesions and images

A total of 26 ESC naevi, excised from different patients, were studied. A clinical diagnosis by simple inspection of the lesions was performed before recording the images.

Prior to biopsy, each lesion was recorded by means of an NTSC VMS-110A videomicroscope (Scalar Mitsubishi, Tama-shi, Tokyo, Japan) with 50- and 20-fold magnifications. The instrument has been described elsewhere (21). For aquisition of the images, we used an image processing program, DBDermo-MIPS® (Biomedical Engineering Dell'Eva-Burroni, Siena, Italy), which runs under Microsoft Windows (22).

In order to establish the videomicroscopic aspects of the ESC naevi, the features referring to the shape of the lesion, the borders, the pigmentation and the presence of characteristic patterns were described by a trained dermatologist. All lesions underwent histological examination. The histological features of the lesions were described by a trained pathologist, filling in an appropriate form.

In order to evaluate the efficacy of videomicroscopy in improving diagnostic accuracy, 1–2 months after the patient's examination, the videomicroscopic images were retrieved and projected on the computer screen together with 124 other images referring to naevi ($n=89$) and melanomas ($n=35$). Diagnosis was performed by inspection of the videomicroscopic images by a trained observer.

 ISSN 0001-5555

RESULTS

Videomicroscopic features

Our ESC naevus population could be classified into 3 groups, depending on the dominant aspect of the lesion: darkly pigmented lesions (group 1: 12 cases), red or light coloured ones (group 2: 9 cases) and lesions with dark or brown areas on a light-brown background (group 3: 5 cases). Table I shows the distribution of videomicroscopic morphological features of the ESC naevi according to the different groups. Examples of each morphological group are illustrated in Fig. 1.

Histopathological correlations

Spitz naevus was diagnosed in 19 cases, Reed naevus in 6 and desmoplastic type Spitz naevus in 1. Table II shows the histological aspects of our ESC naevi population. From a histopathological point of view a spindle cell component was observed in most of pigmented lesions (group 1 and 3), whereas epithelioid cells were usually detected in red or light brown coloured ESC naevi, in accordance with previous literature data (3).

At the histological examination of the lesions belonging to group 1, a great amount of pigmentation inside the melanocytes, abundant trans-epidermal melanin loss and numerous melanophages were present, especially in the cases where a central dark structureless zone was observed by videomicroscopy. All lesions showed confluent junctional pigmented nests at the periphery. From a morphological point of view, this corresponded to peripheral globules or peripheral streaks, in accordance with previous literature data (23, 24).

On the other hand, the histological examination of the lesions belonging to group 2 evidenced low or absent pigmentation inside the melanocytes, the absence of melanin loss and the presence of few melanophages. The absence of pigmentation was correlated with the absence of a typical pattern. In these cases the dominant colour was due to increased vascularization, always present in ESC naevi.

The melanocytes of the 5 lesions with dark or brown coloured areas on a light-brown background (group 3) showed an intermediate amount of pigment, compared with that of the other groups. Peripheral structures were observed in the lesions which presented confluent junctional nests at the periphery. All lesions showed dark globules as well as large melanocytic nests, whereas the 2 lesions, which also showed black dots, revealed trans-epidermal melanin loss, confirming previous observations about the coincidence of

Table I. *Morphological features referring to the videomicroscopic observation of 26 epithelioid and/or spindle cell naevi*

Videomicroscopic aspects	Frequency	Group 1	Group 2	Group 3
No. of lesions	26	12	9	5
Pigmentation				
Dark (black or dark brown) lesions (group 1)	12	12	–	–
Red or light brown coloured lesions (group 2)	9	–	9	–
Dark or brown areas on a light-brown background (group 3)	5	–	–	5
Shape				
Symmetrical	23	11	8	4
Asymmetric	3	1	1	1
Border				
Well defined	13	9	1	3
Shading off margins	9	0	8	1
Both characteristics	4	3	0	1
Structures at the margins				
Peripheral globules	12	9	0	3
Peripheral streaks	4	3	0	1
Pigment distribution				
Symmetrical and homogeneous	15	9	6	0
Symmetrical and non homogeneous	6	3	0	3
Asymmetric	5	0	3	2
Typical patterns				
Targetoid pattern (20)	0	0	0	0
Central darker structureless zone (20)	9	9	0	0
Central lighter zone (19, 20)	0	0	0	0
Retiform depigmentation (inverse network) (9, 19, 20)	1	0	1	0
Structureless pattern with scantly darker linear structures representing pseudostreaks (20)	0	0	0	0
Globules				
Homogeneous in size and black or brown coloured globules	11	6	0	5
Black dots	6	2	1	3
Pigment network				
Absent	21	12	6	3
Present	5	0	3	2
Prominent broadened regular pigmented network	2	–	2	0
Prominent broadened irregular pigmented network	3	–	1	2
Internal branched streaks	1	0	0	1
Slate blue areas	3	0	2	1

black dots with accumulation of melanin inside the epidermis (23, 25).

Diagnostic accuracy

A correct clinical diagnosis was performed only in 4 out of 26 cases. On the videomicroscopic images, 15 out of 26 ESC naevi were correctly diagnosed (Table III).

In 4 out of 11 misclassified cases the lesions were interpreted as melanomas.

DISCUSSION

Most ELM features of pigmented skin lesions established by different research groups and the European Consensus Conference (9–12, 14, 17, 26) have been identified employing dermatoscopes or surface microscopes and no description of ESC naevi by videomicroscopy has been reported so far.

Contrary to the ELM technique, in videomicroscopy, in order to gain access to the structures underlying the epidermis, a polarizing filter is used to reduce reflected light. It is therefore evident that videomicroscopic features present some differences with respect to those observed employing a surface microscope with immersion oil and a glass slide. In spite of this, videomicroscopy enables a remarkable improvement in diagnostic accuracy with respect to clinical diagnosis (27, 28). Owing to their low cost, small size and handiness, videomicroscopes are increasingly employed in clinical practice and the description of pigmented skin lesion features appears to be going to gain more and more practical value.

Our description of ESC naevus features belonging to the 3 different groups emphasizes the most frequently observable structures and evidences some differences between videomicroscopic and ELM observations, due to a lower resolution and the lack of contact medium in the videomicroscopic technique. In fact, we have never observed a targetoid pattern, described as a characteristic feature of pigmented ESC naevi (20) nor the so-called "structureless pattern, with scantily darker linear structures representing pseudostreaks" (20), in view of the sulci on the surface filled with the immersion oil. Owing to the short duration of the lesions before their excision (less than 12 months), we also never observed a central lighter zone, a structureless slate-blue or whitish area that takes the place of the central dark structureless zone after the end of the growing phase (20). Literature data referring to ELM on ESC naevi described the morphological aspect of darkly pigmented naevi alone (11, 19). Stolz et al. stated that ESC naevi can be recognized under a dermatoscope only if they are pigmented (20).

In fact, in darkly pigmented ESC naevi, characteristic features were observable in most cases and, particularly at the periphery of the lesion because the centre of the lesion frequently appeared dark and homogeneous, owing to abundant trans-epidermal melanin loss. The presence of typical aspects and characteristic features, not invisible to the naked-eye but only observable with a videomicroscope, such as peripheral globules and peripheral streaks all around the lesion, improved diagnostic accuracy: in fact, clinically, only 4 out of 12 darkly pigmented lesions were correctly classified, whereas a correct diagnosis was performed using the videomicroscope in 11 out of 12 pigmented ESC naevi, with a sensitivity of 91.6%. This is in line with other authors' data. On a series of 28 pigmented Spitz naevi Steiner et al. obtained an improvement in sensitivity from 46%, by clinical observation, to 96%, by ELM (11). The same authors successively confirmed these findings on a series of 54

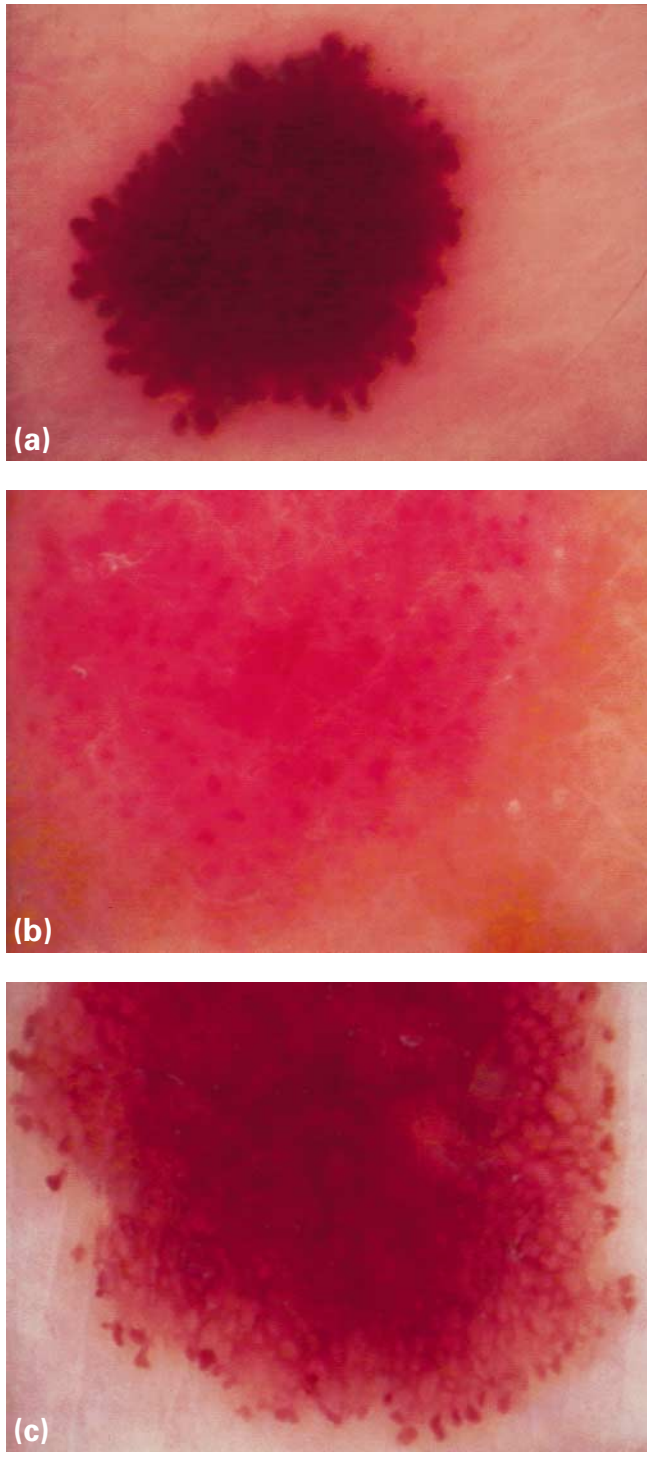

Fig. 1. Fifty-fold magnified images of epithelioid and/or spindle cell naevi: (a) darkly pigmented ESC naevus characterized by peripheral globules and structureless central dark pigmentation; (b) red ESC naevus with reticular depigmentation; (c) ESC naevus with dark and brown areas on a light-brown background presenting peripheral globules and non-homogeneous pigmentation.

Table II. *Histopathological features referring to 26 epithelioid and/or spindle cell naevi*

Histopathological aspects		Frequency	Group 1	Group 2	Group 3
No. of lesions		26	12	9	5
Epidermis					
Abundant hyperkeratosis		12	7	2	3
Acanthosis		22	9	8	5
Melanocytic component					
Junctional		14	10	2	2
Compound		11	2	6	3
Dermal		1	0	1	0
Cell type					
Spindle		14	10	0	4
Epithelioid		7	1	6	0
Mixed		5	1	3	1
Nests					
Large nests		23	12	6	5
Confluent junctional nests at the periphery		16	12	0	4
Pigmentation					
Melanocyte pigmentation	Abundant	12	12	0	0
	Intermediate	5	0	0	5
	Low or absent	9	0	9	0
Abundant trans-epidermal elimination of melanin		9	9	0	0
Amount of melanophages	None	3	0	3	0
	Few	10	1	5	4
	Abundant	13	11	1	1
Pagetoid infiltration		6	3	3	0
Particular structures					
Kamino's bodies		5	1	2	2
Clefts		13	8	2	3
Stroma					
Fibrotic appearance		26	12	9	5
Desmoplastic aspect	Focal	1	0	1	0
	Diffused	1	0	1	0
Increased vascularization		26	12	9	5
	Numerous teleangectases	3	0	3	0
Inflammatory infiltrate	Absent	4	1	2	1
	Focal	20	9	7	4
	Abundant	2	2	0	0
Regression		0	0	0	0

pigmented Spitz naevi, where a correct ELM diagnosis was obtained in 50 cases (92.6%), compared with 30 cases (55.5%) correctly diagnosed by the naked-eye (19).

No reports are so far available about improvement in diagnostic accuracy when non-pigmented Spitz naevi are observed by means of ELM techniques. In our series, when melanocytes were not pigmented, typical structures were seldom observable and diagnosis was difficult in spite of the use of the videomicroscope. In fact, all lesions belonging to the "red or light coloured" group were erroneously diagnosed by clinical observation, and only 1 ESC naevus was correctly classified by means of the videomicroscope, owing to the presence of a characteristic retiform depigmentation. The ESC naevi with dark or brown areas on a light-brown background, never correctly classified by the naked-eye, were identified as such only in 3 out of 5 cases when observed by a videomicroscope. In fact, the presence of brown globules, black dots and peripheral streaks suggested the melanocytic nature of the lesion, but the bizarre aspect and the irregular shape and distribution of pigmentation oriented towards a diagnosis of melanoma.

Going on the above, we can conclude that the videomicro-

Table III. *Comparison between naked-eye and videomicroscopic diagnosis of epithelioid and/or spindle cell naevi*

		Naked-eye		Videomicroscope	
ESC naevi	No. of lesions	Correct	Incorrect	Correct	Incorrect
Darkly pigmented	12	4	8	11	1
Red or light coloured	9	0	9	1	8
Dark or brown areas on a light-brown background	5	0	5	3	2
Total	26	4	22	15	11

scopic technique greatly improves diagnostic accuracy of ESC naevi only when lesions belong to the darkly pigmented type (i.e. in less than 50% of the cases of our series), whereas it is usually inadequate for distinguishing slightly pigmented ESC naevi from other types of pigmented skin lesions.

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