





Review

Dermoscopy for venereologists: an update on patterns of tumors, inflammatory and infectious diseases of the genitalia, and tips for differential diagnosis

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Introduction

Dermoscopy (or dermatoscopy) became an integrative part of clinical dermatologic examination for pigmented and non-pigmented tumors as well as for non-neoplastic skin diseases.¹ For clinicians who mainly deal with genital dermatoses and other venereal diseases, dermoscopy can have a valuable role to enhance the clinical differential diagnosis. The use of dermoscopy on genital areas is facilitated by the development of handheld dermoscopes using polarized light, which are highly portable and do not require skin contact or immersion fluid.

Dermoscopy has been shown to improve the diagnosis of malignant tumors while reducing the number of unneeded excisions of benign ones. In the field of inflammatory diseases, it was also shown to significantly enhance the clinical differential

Abstract

Introduction Dermoscopy is an integrative part of clinical dermatologic examination. For clinicians mainly dealing with genital dermatoses and other venereal diseases, the differential diagnosis includes a broad spectrum of neoplastic, inflammatory, and infectious entities. Dermoscopy might have a valuable role to enhance the clinical differential diagnosis and help avoid some biopsies done for diagnostic purposes. Although the dermoscopic patterns of most tumors and inflammatory diseases of the trunk/face have been described, their manifestations on genital areas are less elucidated. We aimed to provide a succinct summary of existing data on dermoscopy of dermatologic diseases on genital areas.

Methods A literature search was performed on PubMed using the terms dermoscopy OR dermatoscopy OR videodermoscopy OR video dermoscopy AND genital. All studies reporting on dermoscopic findings of at least one case of a dermatologic disease on genital areas were included in the review. Unless otherwise indicated, ×10 was the magnification used in the reported studies. The main outcome was to describe the dermoscopic feature of each disease.

Results A total of 31 articles were identified and analyzed. They included single case reports and case series. The described entities were categorized into anatomical variants, vascular and lymphatic lesions, tumors, inflammatory disorders, and infectious conditions.

Conclusion In diseases of the genital area, dermoscopic findings can be highly diagnostic and might establish a confident diagnosis. Limitation is that most of the criteria are based on case series, and few of them have been validated.

diagnosis. Dermoscopy is a clinical tool and should not be considered as competitive to histopathology by any means. However, by improving the accuracy of clinical diagnosis, dermoscopy indirectly helps to avoid some biopsies done for purely diagnostic purposes. This is particularly relevant in the sensitive genital areas.¹ In this article, we provide a succinct summary of existing data on dermoscopy of dermatologic diseases on genital areas. Practical tips are suggested, which can assist clinicians in profitably utilizing and applying the available knowledge in their everyday practice.

Materials and methods

To identify eligible studies, the main search was conducted in the MEDLINE electronic database using the following medical

Table 1 Summary of main dermoscopic clues of each disease

Disorder	No. of reported lesions	Dermoscopic features
Anatomical variants		
Vestibular papillomatosis	1	Transparent papillae arising from a common base with prominent fibrovascular core containing a linear vessel
Pearly penile papules	1	White, slightly transparent cobblestone-like projections, with the central comma or dotted vessel
Tyson's glands hyperplasia	2	Well-defined, yellowish structures with white ovoid slightly transparent material. Commonly surrounded by wreath-like non-arborizing vessels
Vascular/lymphatic lesions		
Angiokeratomas	3	Red to dark blue lacunae and whitish-bluish veil
Acquired lymphedema and lymphangiectasia	1	Well-defined, round-to-oval reddish lacunae surrounded by whitish septa and numerous tiny punctiform lacunae
Tumors		
Benign melanotic macules or melanosis	176	Parallel brown lines, ring-like pattern, structureless pattern, reticular-like pattern
Seborrheic keratosis	84	Polypoidal structures, cerebriform pattern, fat finger-like structures, milia-like cysts
Genital nevi	122	Globular/cobblestone and mixed patterns
Queyrat's erythroplasia	14	Clustered and diffusely distributed glomerular vessels
Pigmented Bowen's disease	1	Brown or gray dots and coiled or dotted vessels
Vulval intraepithelial neoplasia	4	Dotted/glomerular vessels, papillomatous structures, brown dots
Basal cell carcinoma	2	Blue-gray ovoid globules, linear vessels, and whitish homogenous structures
Melanoma	12	Structureless pattern with blue, gray, or white color. In amelanotic variants: structureless white area with polymorphous vessels
Inflammatory diseases		
Zoon's balanitis	34	Reddish orange areas with curved or serpiginous vessels
Psoriasis balanitis	33	Uniformly distributed dotted vessels
Lichen planus	10	Wickham's striae (white crossing lines)
Lichen sclerosus et atrophicus	35	White structureless background
Infectious diseases		
Candidal balanitis/vulvitis	13	Cottage cheese-like structures (white amorphous masses)
Genital warts	61	Polylobular appearance with each lobule containing a dotted, coiled, or hairpin vessel
Molluscum contagiosum	211	White polylobular roundish structures and peripheral vessels

subject headings (MeSHs) as key words: dermoscopy OR dermatoscopy OR videodermoscopy OR video dermatoscopy AND genital. In addition, pertinent references not identified by search engines and retrieved from articles or books were also considered. The manual search was concluded by the perusal of the reference sections of all relevant studies or reviews. All studies reporting on dermoscopic findings of at least one case of a dermatologic disease on genital areas were included in the review. Unless otherwise indicated, x10 was the magnification used in the reported studies. The main outcome was to describe the dermoscopic feature of each disease.

Results

A total of 31 articles were identified and analyzed; they included single case reports and case series. The described entities were categorized into anatomical variants, vascular and lymphatic lesions, tumors, inflammatory disorders, and infectious conditions (Table 1). Tips for differential diagnosis were proposed based on published data and the authors' personal experience.

Anatomical variants

Vestibular papillomatosis and pearly penile papules

Vestibular papillomatosis and pearly penile papules are anatomical variants of the vestibular mucosa in women and glans in men. The main differential is genital warts. Dermoscopy of vestibular papillomatosis reveals transparent papillae arising from a common base with prominent fibrovascular core containing a linear vessel.^{2,3} Pearly penile papules dermoscopically project as white, slightly transparent, cobblestone-like projections, each one containing a vascular structure which might be comma shaped or appearing as a central dot (Fig. 1a).⁴ Both are different from condylomas which usually demonstrate multiple irregular projections with tapering ends.²

Sebaceous gland (Tyson's glands) hyperplasia

The modified Tyson's glands (sebaceous) might frequently be hyperplastic or ectopic in men and women. Dermoscopically, they are well-defined, yellowish structures with milky white ovoid material, which is slightly transparent. Commonly, they are surrounded by wreath-like non-arborizing vessels.⁵

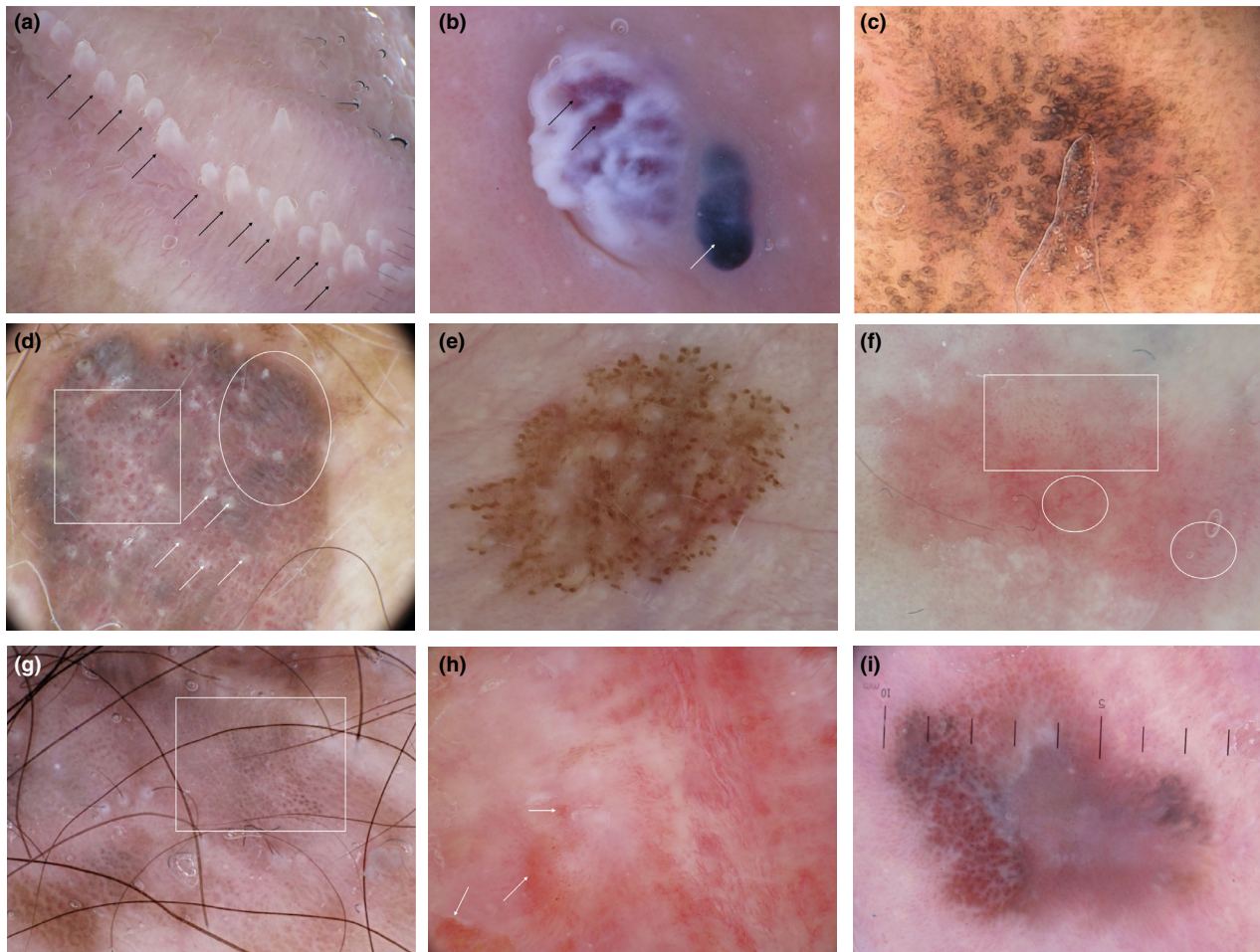


Figure 1 (a) Pearly penile papules, projecting as papillae arising from a common base. (b) Angiokeratoma characterized by red and black lacunae and white color. (c) Melanosis with the ring-like pattern. (d) Seborrheic keratosis with multiple hairpin vessels and milium-like cysts. (e) Genital nevus displaying a globular pattern. (f) Erythroplasia of Queyrat, characterized by clustered dotted vessels and a few short linear vessels. (g) Pigmented Bowen's disease showing brown dots in a linear arrangement. (h) Squamous cell carcinoma typified by microulceration and polymorphous vessels. (i) Melanoma displaying gray and white color

Vascular and lymphatic lesions

Angiokeratoma

Fordyce angiokeratomas are usually easy to be clinically diagnosed. However, a study reported that a proportion of angiokeratomas might be misdiagnosed as melanoma.⁶ The characteristic dermoscopic features include well-demarcated, round lacunae (dilated upper dermal vessels) and a whitish veil (epidermal hyperkeratosis).⁶ Dark-blue or black lacunae (vessel thrombosis) might also be present (Fig. 1b). The sharp demarcation of the lacunae is the most useful dermoscopic sign, indicating the vascular nature of the tumor.⁷

Acquired lymphedema and lymphangiectasia

This phenomenon is typically a result of damage of the lymphatics of the genital area, usually because of trauma, and less

frequently after infections, surgical procedures, or radiation. Although clinical examination is diagnostic, dermoscopy might facilitate the diagnosis by revealing well-defined, round-to-oval reddish lacunae (vascular pattern) surrounded by whitish septa and numerous tiny punctiform lacunae.⁸

Tumors

Benign melanotic macules or melanosis

They are the most frequent pigmented lesions of the genital area. Multiple dermoscopic patterns have been described. Manzone *et al.* described three main patterns in a series of 21 women.⁹ The most frequent pattern was structureless with color ranging between light brown and dark blue, the latter corresponding to the presence of macrophages in the upper dermis. A pattern of parallel brown lines and a reticular pattern were

also seen in the latter study. An additional pattern suggestive of genital melanosis was introduced by Ferrari *et al.* based on a study that included 87 lesions. It consisted of multiple ovoid structures with hyperpigmented borders and was named “ring-like pattern” (Fig. 1c).¹⁰ Cengiz *et al.* suggested that the most frequent dermoscopic pattern of genital melanosis is the parallel, but the most specific one is the ring-like.¹¹

Seborrheic keratosis

Dermoscopy of seborrheic keratosis on genital areas usually reveals a cerebriform pattern, polypoidal structures, fat finger-like structures, and multiple hairpin vessels (Fig. 1d). Milia-like cysts might also be seen as they are embedded within the epidermis. In contrast, comedo-like openings (keratin-filled invaginations) are usually absent because of constant friction.¹²

Genital nevi

Genital nevi are more commonly seen in females and usually develop early in life. A proportion of genital nevi might display clinical and histopathologic atypia (atypical melanocytic nevi of the genital type).¹³ Dermoscopically, genital nevi usually display a globular or a homogeneous pattern (Fig. 1e). Ferrari *et al.* reported that a mixed pattern combining structureless areas and brown-to-black globules was seen in 21% of genital nevi in their study.¹⁴ Atypical nevi might display a multicomponent pattern and several structures that are generally considered as suggestive of melanoma, such as blue-white veil and irregular dots.¹¹

Extramammary Paget's disease

Extramammary Paget's disease shows pinkish to light-red background with numerous dotted and glomerular vessels with a regular distribution throughout the entire lesion. Pigmented variants might display irregular pigmented globules and need to be differentiated from melanoma.¹²

Queyrat's erythroplasia and vulval intraepithelial neoplasia

These terms are used to describe in situ squamous cell carcinoma developing on the male and female genitalia, respectively. Erythroplasia of Queyrat shows overlapping dermoscopic features with Bowen's disease of the trunk. Clustered and diffusely distributed glomerular vessels are suggested by Errichetti *et al.* as the most diagnostically useful feature.¹⁵ Linear vessels might also coexist (Fig. 1f). Pigmented Bowen's disease (or Bowenoid papulosis) is dermoscopically characterized by brown dots or globules in a linear or uniform arrangement and coiled or dotted vessels (Fig. 1g).¹⁶ Similarly, non-pigmented vulval intraepithelial neoplasia is dermoscopically typified by pink to red areas associated with dotted and glomerular vessels and papillomatous structures.¹⁷ In the pigmented variant, which accounts for approximately 10–15% of lesions, brownish dots with well-defined borders are usually seen.¹⁷

Invasive squamous cell carcinoma

Data on the dermoscopic pattern of invasive squamous cell carcinoma on genital areas are lacking.¹⁸ In our experience, the most worrisome dermoscopic sign for invasion is the appearance of dermoscopic ulceration (even micro-ulceration). In addition, invasive SCC is much more likely to display a combination of dotted/glomerular and linear vessels, as compared to in situ forms that, as mentioned above, usually exhibit dotted/glomerular vessels only (Fig. 1h).

Basal cell carcinoma

Genital basal cell carcinoma is extremely rare. In the very few described cases, it has been suggested to display blue-gray ovoid globules, linear vessels, and whitish homogenous structures.¹⁹

Melanoma

In contrast to the classic cutaneous melanoma that typically displays a multicomponent pattern, mucosal melanoma is usually structureless. In terms of colors, brown and/or black are almost always present, but blue, gray, and white color frequently coexist (Fig. 1i).²⁰ A reticular depigmentation and network of fine whitish lines have also been described in vulvar melanoma.¹¹ In amelanotic melanoma, white color and polymorphous vessels are the only visible structures.²¹

Inflammatory disorders

Zoon's balanitis

Zoon's balanitis is dermoscopically typified by homogenous reddish-orange areas, as a result of the dense plasmacytic infiltrate and hemosiderin deposition, combined with linear curved vessels (Fig. 2a).¹⁵ Other morphologic types of vessels might also be seen, including serpiginous, convoluted, chalice-shaped, and dotted vessels.^{22,23}

Psoriatic balanitis and vulvitis

As on any other anatomic site, psoriasis developing on the glans penis or the vulva is dermoscopically typified by uniformly distributed dotted vessels (Fig. 2b). The only difference is that, unlike other body sites, scales are absent in psoriatic plaques of the genitalia.^{15,23}

Lichen planus

Lichen planus on genital areas is dermoscopically characterized by white crossing lines (Wickham striae), corresponding to the underlying hypergranulosis (Fig. 2c). Short linear and dotted vessels might also be seen, usually distributed at the periphery of the white network.^{23,24}

Lichen sclerosis

The dermoscopic hallmark of lichen sclerosis is the white structureless background, corresponding to the underlying fibrosis.

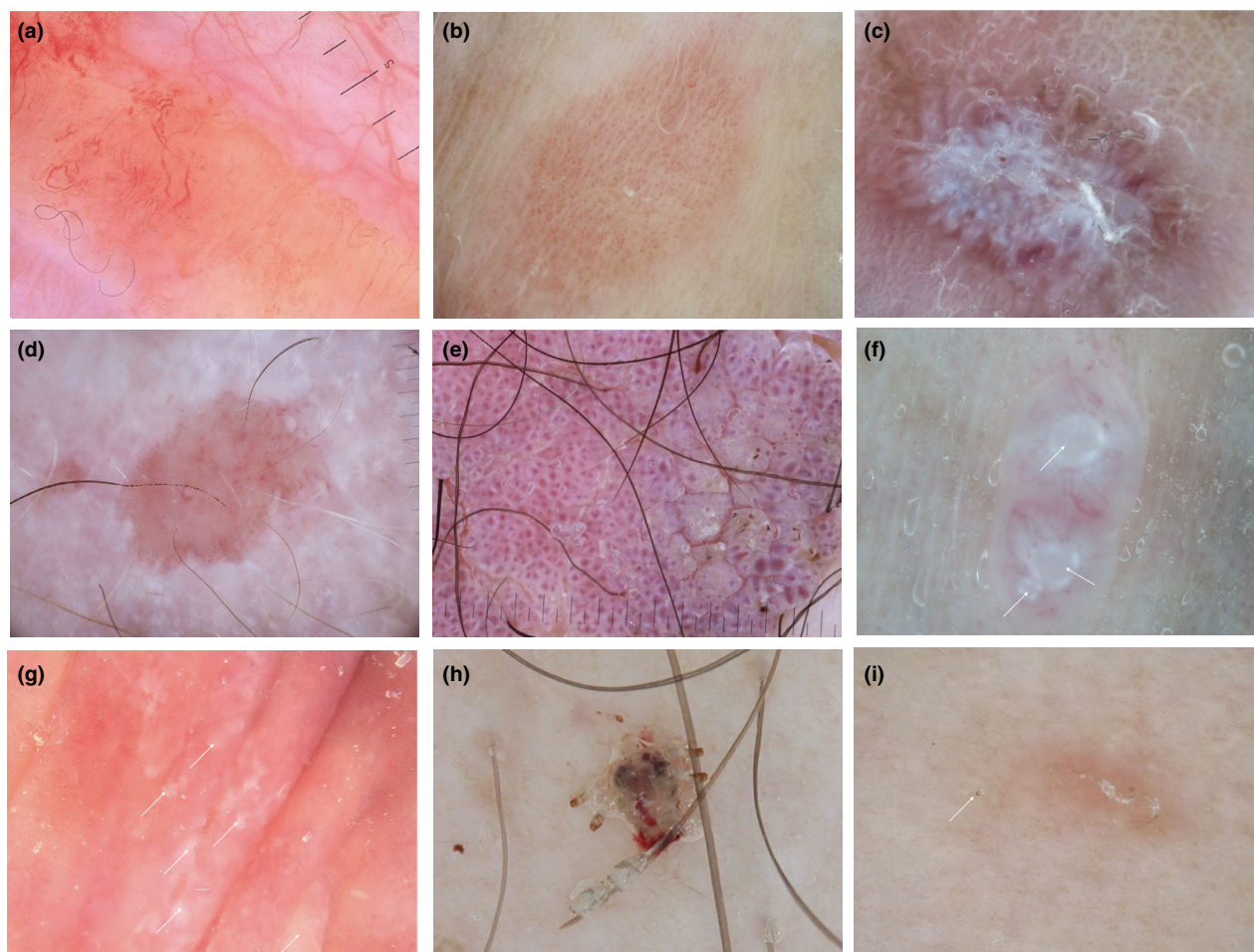


Figure 2 (a) Zoon balanitis exhibiting an orange color and linear vessels. (b) Psoriatic balanitis with numerous uniformly distributed dotted vessels. (c) Lichen planus on the glans penis showing white crossing lines. (d) Lichen sclerosus on the glans penis characterized by a white structureless background and an eroded area with a few dotted vessels and purpuric dots. (e) Genital wart with numerous papillae containing dotted/glomerular vessels. (f) Molluscum contagiosum typified by white clods surrounded by vessels, while rosettes are also present. (g) Candida balanitis with white amorphous masses. (h) The lice and the nits. (i) Scabies, typified by the whitish linear trail ending with a small brown triangle

Dotted vessels might also be seen at the early stage of the disease. Purpuric-to-red globules and blotches might also be found, especially in females, representing a result of intense pruritus and excessive scratching (Fig. 2d). With time, there is a marked decrease in the quantity of dotted vessels, and linear vessels might appear because of the underlying atrophy. Gray-blue dots in the form of peppering, corresponding to dermal melanophages, are frequently present at an intermediate stage.²⁵

Lichen simplex chronicus

Dermoscopy of lichen simplex chronicus might also reveal a whitish background but combined with rich vascularization, composed mainly of linear serpentine vessels arranged diffusely within the affected areas. Whitish gray

structures, corresponding to lichenification, are also quite frequent.²⁶

Infectious conditions

Genital warts

Similarly to common warts, genital warts are dermoscopically characterized by polylobular appearance with each lobule containing a dotted, coiled, or hairpin vessel (Fig. 2e). The lobules are densely attached to each other resulting in an overall symmetric pattern. Dong *et al* described four additional dermoscopic patterns of genital warts: unspecific pattern, finger-like pattern associated with hairpin vessels, mosaic pattern, and knob-like pattern, both of the latter associated with glomerular/dotted vessels.²⁷

Molluscum contagiosum

Dermoscopy of molluscum contagiosum typically reveals a central umbilication surrounded by multiple white clods or globules. Vessels are also frequently present, usually in a peripheral or radial arrangement.²⁸ With polarized light, rosettes inside the white clods are very frequently seen (Fig. 2f).

Candidal balanitis and vulvitis

Blurry linear vessels and whitish amorphous masses (cottage cheese-like structures), corresponding to fungal colonies, are characteristic dermoscopic findings of candidal infections on genital surfaces (Fig. 2g).¹⁵

Pediculosis pubis

Phthiasis pubis is almost always easy to be diagnosed clinically. The dermoscope can reveal the lice itself, as well as the nits fixed to the hair shaft (Fig. 2h). Nits containing vital nymphs dermoscopically display ovoid brown structures, while the empty nits are translucent and typically show a plane and fissured free ending. This information is particularly useful for treatment monitoring.²⁹

Scabies

The dermoscopic hallmark of scabies is the so-called “jet with contrail”, which consists of a small dark brown triangular structure (anterior part of the mite) located at the end of a whitish linear trail that is typically curved or wavy (Fig. 2i). The brown triangle corresponds to the pigmented anterior part of the mite and linear white structure to the burrow. The value of dermoscopy in diagnosis of scabies has been extensively investigated, and the technique was assessed as at least equal to the traditional ex vivo microscopic examination.³⁰

Different lesions of ‘syphilis’

The dermoscopic characteristics of the primary syphilitic ulcer have not been described in the literature. However, dermoscopy might enhance the diagnosis of syphilis by facilitating the recognition of secondary manifestations of the disease. A useful clue is the so-called “dermoscopic Biett’s sign”, which consists of a diffuse yellow-red background, monomorphous dotted or glomerular vessels, and a circular edge of scales with an outward direction.³¹ Moreover, palmar syphiloderma (frequently confused with psoriasis) is dermoscopically typified by an orange background, likely corresponding to hemosiderin deposits in the dermis as a consequence of extravasation of erythrocytes, which commonly occurs in secondary syphilitic lesions.³² Finally, scalp dermoscopy can help in diagnosing syphilitic alopecia. The typical findings include black dots, focal atrichia, hypopigmentation of hair shaft, and yellow dots in the center along with few black dots at the periphery of the patches. A reduction in the number of terminal hairs and the presence of empty hair follicles, vellus hairs, red-brown background, and

irregularly dilated capillaries with small blood extravasation have also been described.³³

It is mandatory to note that contact dermoscopy may be associated with cross infection. To avoid such events, some dermoscopes come with a disposable snap-on system that helps to prevent cross infection.³⁴ However, this system is expensive and needs to be replaced regularly. Another method described is the use of polyvinyl chloride food wrap placed on the lens surface with mineral oil on both sides.³⁴ However, the double layer of mineral oil may interfere with the quality of the image. A third method relies on applying the contact fluid (usually alcohol gel) and then covering it with a single layer of wide, transparent adhesive tape that prevents direct contact with the dermoscope.³⁴ This technique is handy, simple, and cost-effective; it reduces the risk of cross infection and ensures that the contact fluid is locked in over the lesion of interest. Other methods include usage of polarized non-contact dermoscopy and also usage of videodermoscopy with a translucent membrane, especially during the coronavirus 19 pandemic.

Tips for differential diagnosis

Papillomatous papules on genitalia

The differential diagnosis includes vestibular papillomatosis, pearly penile papules, hyperplastic sebaceous glands, genital warts, and molluscum contagiosum. The dermoscopic discrimination among these entities is based on the polylobular morphology of genital warts in contrast to vestibular papillae or pearly penile papule that project as elongated projections arising from a common base. Molluscum contagiosum is usually easily diagnosed with the dermoscope by the characteristic central umbilication and multiple white globules, occasionally with rosettes under polarized light. Peripheral vessels are also frequent.

Erythematous macules on genitalia

The differential diagnosis is broad, including in situ squamous cell carcinoma (erythroplasia of Queyrat) and numerous inflammatory diseases (ex. irritative balanitis/vulvitis, Zoon balanitis, psoriasis, lichen planus) and infections (ex. candida). Obviously, if the eruption consists of multiple lesions, the diagnosis of carcinoma becomes unlikely. If the macule is solitary, then all the aforementioned entities might be possible. Some of them are dermoscopically typified by highly specific clues which, if present, are usually diagnostic. For instance, in the presence of white crossing lines (Wickham striae), any diagnosis other than lichen planus is very unlikely. If amorphous white masses are seen (cottage cheese-like structures), then the diagnosis of candida infection is almost straightforward. If no specific clue can be detected, then the evaluation of the morphologic type of vessels becomes crucial. The predominance of linear vessels is highly suggestive of Zoon balanitis, especially when combined with an orange background. If dotted/glomerular vessels predominate, then the main differential diagnosis lays between psoriasis and

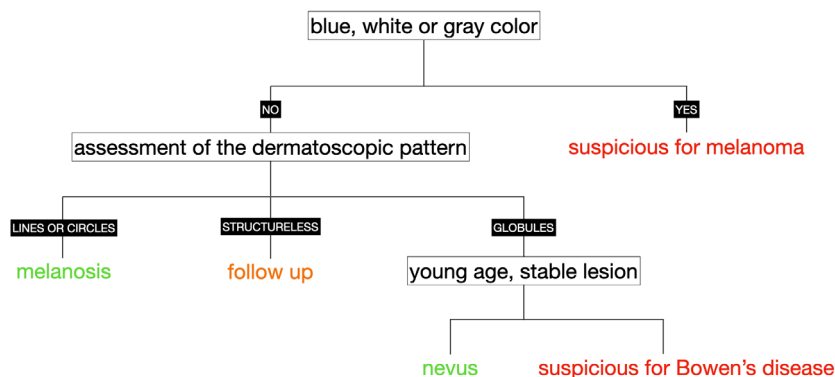


Figure 3 An algorithmic proposal for management of pigmented macules on genitalia

erythroplasia of Queyrat. Theoretically, the distribution of dotted vessels in psoriasis is uniform, whereas in erythroplasia of Queyrat the vessels tend to aggregate in clusters. However, if no other manifestation of psoriasis is evident and the lesion does not respond to a short course of topical steroids, a biopsy is strongly recommended. In addition, the appearance of ulceration should raise the suspicion of invasive squamous cell carcinoma.

Pigmented macules on genitalia

The differential diagnosis consists of melanosis, nevus, pigmented Bowen's disease, and melanoma. Clinicians should take into account that melanosis is much more frequent than the other entities. Again, if the lesions are multiple, then the diagnosis of melanosis is much more likely than any other. If the lesion is solitary, the next step is the evaluation of the global dermoscopic pattern. A pattern of parallel brown lines or circles (ring-like) are highly suggestive of melanosis. A pattern of globules is suggestive of a nevus, but pigmented brown globules can also be seen in pigmented Bowen's disease. The differential diagnosis between nevus and pigmented Bowen's disease is usually feasible based on the age of the patient and the history of the lesion. This is because most genital nevi develop in children and are stable or involute in adulthood, whereas Bowen's disease should have a history of recent appearance and evolution. Finally, if the dermoscopic pattern is structureless, the final step is the assessment of colors. The presence of only brown and/or black color minimizes the possibility of melanoma, whereas the coexistence of blue, white, or gray is highly suspicious. As a general rule, any pigmented genital macule that dermoscopically displays blue, white, or gray color should be considered as suspicious for melanoma and biopsied, unless another clinical diagnosis can be established with confidence. An algorithmic approach for management of pigmented macules on genital is shown in Figure 3.

Conclusion

This review summarizes existing evidence on the usefulness of dermoscopy for the clinical diagnosis of genital conditions. As

an inexpensive and easy-to-use tool, the dermoscope can be used by dermatologists who practice venereology and face these differentials on a daily basis. In several diseases, dermoscopic findings are highly diagnostic, and, therefore, ablative or costly diagnostic procedures may be avoided. However, a major limitation is that most of the described criteria are based on case series or case control studies, and few of them have been validated on external datasets. Therefore, in addition to providing potentially useful clues for clinicians, this review also underlines the need for further studies on larger series of patients.

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