OBSERVATIONAL STUDY

Dermoscopic features of red tumors among Filipino patients seen at two centers

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Background: Dermoscopy, a non-invasive diagnostic tool, has been proven to improve the diagnostic accuracy of vascular tumors since it can aid in identifying vascular structures as well as morphology of vessels. Tumor depth and precise vascular structures can also be evaluated through dermoscopy.

Objective: The study aimed to describe the dermoscopic features of red tumors in Filipino patients seen at the Outpatient Dermatology Department of two centers from January 2013 to July 2014.

Methods: Patients with red tumors were recruited to the study. Dermoscopic features were described for each tumor, and histopathology was done.

Results: A total of 44 patients were included in the study, and 45 red tumors were evaluated. The tumors were located on the face (31%), trunk (36%), and extremities (33%). The majority of the red tumors were confirmed to be vascular tumors (78%) on histopathology. Dermoscopic features that were found in the majority of vascular tumors seen were lacunae and reddish homogenous areas. For non-vascular tumors, vessels were identifiable in 90% of the tumors seen.

Conclusion: In this study, the use of dermoscopy in the diagnosis of red tumors proved to be a useful preliminary tool that aided in the observation of vascular pattern, albeit red lacunae, red to dark red homogenous areas, and different types of vessels. The identification of these structures may aid in arriving at a more precise diagnosis and help differentiate vascular from non-vascular tumors.

Keywords: dermoscopy, nonmelanocytic tumor, vascular lesions.

INTRODUCTION

Dermoscopy is a non-invasive diagnostic technique that allows visualization of pigmented and vascular structures not visible to the naked eye. Previous studies have demonstrated the use of dermoscopy in differentiating benign and malignant skin lesions[1]. It has also been shown to be helpful in improving the diagnostic accuracy of vascular tumors, allowing the clinician to better differentiate them from other cutaneous tumors, especially melanoma[2,3]. This has resulted in better management of skin tumors, such as reduction in the excision of benign lesions, and early detection of malignant lesions[4]. Several studies have also shown that dermoscopy is useful in evaluating precise vascular structures, making it useful in classifying vascular lesions as well as assessing the depth of the lesions[4,5]. If vascular lesions are identified accurately, treatment can be performed via non-invasive procedures such as laser therapy, as opposed to excision[6].

Vascular lesions are a large and heterogenous group of mesenchymal lesions, ranging from benign to overtly malignant, that may be found in extremes of age[7]. Being vascular in nature, these tumors have the capacity to involute, remain stable, or rapidly proliferate[7]. The definitive treatment for most tumors has been excision, with subsequent histopathologic studies to arrive at a final diagnosis as to the type of lesion. Recent studies, however, have shown that vascular lesions are amenable to certain types of laser treatment, eliminating the need for invasive procedures to provide resolution of the lesion[6]. Vascular lesions such as thrombosed hemangiomas, pyogenic granulomas, and angiokeratomas are sometimes difficult to differentiate from melanoma, based on clinical examination. Features such as hemorrhagic crusts are common for both pyogenic granulomas and melanomas, making clinical diagnosis difficult[8]. Hemangiomas such as arteriovenous hemangioma (cirsoid aneurysm), capillary

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aneurysm (thrombosed capillary aneurysm), cherry angioma (senile angioma), pyogenic granuloma, and venous lake may occasionally simulate a malignant melanoma or other pigmented lesions[2].

Several other lesions aside from vascular lesions also present as red tumors. Because of their color, these lesions can be initially thought of as vascular lesions. A few other studies on pilomatricoma[9] and xanthogranuloma[10] show that these lesions also present with vascular structures when viewed through a dermoscope.

OBJECTIVES

This study aimed to describe the dermoscopic features of red tumors in patients who consulted at the dermatology outpatient departments (OPDs) of two centers from January 2013 to July 2014. The study's specific objectives were: 1) To describe the dermoscopic features of each type of red tumor observed in selected Filipino patients observed from the two centers; 2) To describe and compare the dermoscopic structures and patterns between the different red tumors and compare to international dermoscopic criteria.

METHODS

This was a descriptive study conducted at the Dermatology Out-Patient Departments (OPDs) of two centers. Collection of data was from January 2013 to July 2014. The study population was recruited from the pool of patients seen at the two Dermatology OPDs. Recruitment begun on initial consultation and followed up until biopsy results became available.

The inclusion criteria were: 1) Healthy individuals presenting with a red skin tumor; 2) Individuals who were able to give informed consent; 3) If the patient was a minor, the consent of the parent or guardian was secured.

The study was approved by the Ethics Review Board (ERB) prior to the start of data collection. Informed consent was also collected from all participating patients. Patient demographic data was collected, as well as the clinical, dermoscopic and histopathological characteristics of each red tumor.

Clinical and dermoscopic imaging and evaluation

For clinical imaging, the lesions were photographed using uniform distances and angles by Canon Powershot G12 camera. For dermoscopic imaging, the red tumors were imaged with a dermoscope (3Gen Dermlite II multispectral) and documented by digital photography (Canon Powershot G12 with attachment for dermlite II multispectral). On dermoscopy, the following characteristics were registered: red, blue, and black lacunae, red-bluish or red-black homogenous areas, whitish veil, white collarette, milia-like cysts, dark hemorrhagic crusts, telangiectatic vessels, hairpin vessels, dotted vessels, white collarette and peri-follicular halo. Others not listed were specified. The dermoscopy pictures of the lesions were evaluated for standard pattern analysis and diagnosis.

Biopsy and Histopathologic evaluation

Following clinical examination and dermoscopy, skin punch biopsies (3mm) or excision biopsies of the lesions were performed on all dermoscopically-imaged sites in all patients. Local intradermal anesthesia (2% lidocaine with epinephrine) was applied prior to biopsy. The skin biopsies were fixed in buffered 10% formalin for 48 hours, processed overnight, embedded in paraffin, sectioned at 5mm thickness, and stained with hematoxylin and eosin. Specimens were observed under light emitting diode (LED) microscope.

RESULTS

A total of 45 patients were included in the study (Table 1) and majority was female (64%). The diameters of the tumors were measured and the median diameter was 5 mm, ranging from 2 to 42 mm. The red tumors were seen in almost equal proportions in either one of the three body parts of a patient (face, trunk, extremities). The red tumors were categorized as vascular (78%) or non-vascular (22%), based on histopathologic diagnosis.

Using dermoscopy as a tool for diagnosing the red tumors, the different features of vascular and non-vascular tumors were identified. Among the vascular tumors, the more common features were red/dark red lacunae, which were found in 66% of the tumors and red bluish/red black homogenous areas, found in 43%. For the non-vascular tumors, the more common features were telangiectatic vessels and yellow white homogenous areas, seen in 50% and 40%, respectively (Table 2).

The most common red tumors on histopathology were hemangioma, pyogenic granuloma, angiokeratoma circumscriptum, and xanthogranuloma (Table 3)

Table 1. Summary of clinical characteristics of the 45 patients with red tumors seen at two OPD centers from January 2013

Age	36.956 ± 23.609
Diameter of red tumors	5 (2-42)
Female Sex	29 (64%)
Location	
Face	14 (31%)
Trunks	16 (36%)
Extremities	15 (33%)
Histopathologic diagnosis	
Vascular	**35 (78%)**
– Angiokeratoma	3 (9%)
– AV hemangioma/Cirsoid aneurysm	1 (3%)
– Hemangioma	13 (37%)
– Cherry angioma/hemangioma in collision with lentigo simplex	3 (9%)
– Pyogenic granuloma	15 (43%)
Non-Vascular	**10 (22%)**
– Fibroepithelial polyp	1 (10%)
– Molluscum contagiosum	1 (10%)
– Pilomatricoma	1 (10%)
– Squamous Cell Carcinoma In-situ	1 (10%)
– Sclerotic fibroma	1 (10%)
– Trichilemmoma	1 (10%)
– Xanthogranuloma	4 (40%)

Table 4 shows the dermoscopic features observed in the four most common red tumors. For hemangiomas, the most common features were lacunae and white structureless areas. In pyogenic granulomas, red-bluish or red-black homogenous areas, white rail lines, and collarette features were predominant. Among xanthogranulomas, telangiectatic vessels, setting sun sign, and paler white clouds were more commonly described. Angiokeratoma circumscriptum tumors showed lacunae and whitish veil.

DISCUSSION

The three most common cases found in the 45 Filipino patients who consulted at the two centers with red tumors were pyogenic granulomas (33%), hemangiomas (29%), and xanthogranulomas (9%).

Vascular tumors

The most common dermoscopic features of vascular red tumors were red or dark red lacunae (66%) and reddish homogenous areas (43%).

In a study by Senel, dermoscopy was useful for the assessment of vascular lesions such as hemangioma, solitary angiokeratoma, and pyogenic granuloma. Typical features of said vascular lesions were red, blue, or black lacunae, and red-bluish or red-black homogenous areas [3]. In a study on dermoscopic findings in pyogenic granuloma by Zaballos et al., the most common dermoscopic feature seen in pyogenic granulomas was reddish homogenous areas, found in 92%[11]. Dermoscopy of thrombosed hemangiomas[12] showed sharply demarcated, uniform, jet-black areas that corresponded to the thrombus, and red to blue lagoons, corresponding to dilated blood vessels in the superficial and deep dermis. Wolf et al. also found that lacunar patterns were the dermoscopic criteria for hemangiomas and angiokeratomas[13].

The dermoscopic criterion for hemangiomas is red lacunae[13], described by Toledo-Alberola as multiple, oval, erythematous areas. The erythema of these oval areas histopathologically corresponds to superficially located dilated blood vessels. Bluish colored oval areas correspond to dilated blood vessels located deeper in the dermis[14]. All the hemangiomas seen in our study consistently showed red lacunae (Figure 1A). The erythema of these oval areas histopathologically corresponds to superficially located dilated blood vessels while the whitish zones relate to areas of fibrosis[14] (Figure 1B).

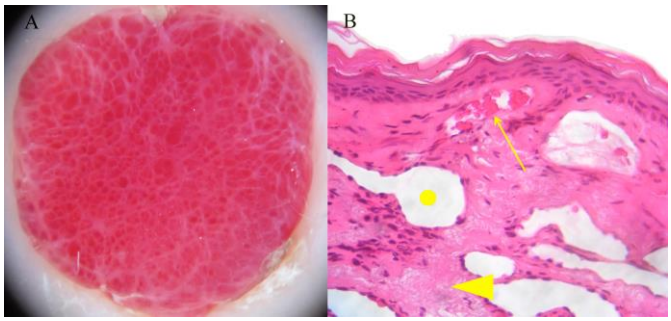

Figure 1. Multiple red oval areas, called lacunae or lagoons, in a hemangioma captured using a dermoscope, (1A). A section of a hemangioma on histopathology (1B). Dilated vessel (yellow circle), red blood cells in a vessel (yellow arrow), and areas of fibrosis (yellow triangle, pointed area). (H&E, 400x)

In a study by Zaballos et al., reddish homogenous areas were the most frequent dermoscopic feature seen in pyogenic granulomas. Other features include a white collarette, 'white rail' lines that intersect the lesion, and ulceration. A reddish homogenous area surrounded by a white collarette was found to be the most frequent finding[11]. In the pyogenic granulomas seen in our study, 80% were found to have reddish homogenous areas, while white collarette was seen in 60%. These were also the most consistent dermoscopic findings in pyogenic granulomas that were seen in this study (Figure 2).

The reddish homogenous areas may correspond to the presence of numerous small capillaries in a myxoid stroma, while the white collarette corresponds to the hyperplastic adnexal epithelium that partially or totally embraces the lesion[11]. This is also called histopathologically as epidermal collarette.

Hemangiomas and pyogenic granulomas may resemble each other clinically. However, dermoscopic findings of red or red-blue lacunae in hemangiomas as opposed to reddish homogenous areas in pyogenic granulomas aid in differentiating one from the other.

Angiokeratomas are benign vascular tumors that histopathologically show dilated blood vessels in the dermis and epidermal acanthosis and/or hyperkeratosis. In a study by Kim et al.[15], three distinct dermoscopic patterns were seen in angiokeratomas and all these patterns included dark lacunae and whitish veil. Pattern 1 consisted of dark lacunae and whitish veil with no other features. Pattern 2 had an additional peripheral erythema, and pattern 3 had hemorrhagic crusts. Dark lacunae and whitish veil (pattern 1) was the most common dermoscopic pattern seen. Zaballos et al. also found that dark lacunae were the most valuable criterion for correctly describing angiokeratomas[1]. The finding of dark lacunae histologically represented dilated blood vessels with thrombosis. Red lacunae histologically corresponded to dilated blood vessels without thrombosis. Whitish veil corresponds to hyperkeratosis and acanthosis.

In our study, pattern 1 (dark lacunae and whitish veil) was the most common dermoscopic pattern seen in angiokeratomas (Figure 3). The finding of whitish veil (Figure 3B & 4A) corresponds to hyperkeratosis and acanthosis (Figure 4B). Red lacunae correspond

Table 2. Dermoscopic features of the red tumors excised from the 45 patients

	Vascular (N=35)		Non-Vascular (N=10)		Total (N=45)	
	F	%	F	%	F	%
Red or dark red lacunae	23	66%	1	10%	24	53%
Red-bluish or red-black homogenous areas	15	43%	2	20%	17	38%
Collarette	9	26%	1	10%	10	22%
Whitish veil	8	23%	0	0%	8	18%
Dotted vessels	0	0%	2	20%	2	4%
Red crust	1	3%	0	0%	1	2%
Hairpin vessels	0	0%	1	10%	1	2%
Radial vessels	0	0%	1	10%	1	2%
Others						
– White-structure less areas	11	31%	1	10%	12	27%
– White rail lines	10	29%	0	0%	10	22%
– Telangiectatic vessels	0	0%	5	50%	5	11%
– Dark hemorrhagic crusts	3	9%	1	10%	4	9%
– Yellow-white homogenous areas	0	0%	4	40%	4	9%
– Normal rectangular pigment network	3	9%	0	0%	3	7%
– Setting sun sign	0	0%	3	30%	3	7%
– Paler white clouds	0	0%	3	30%	3	7%
– white streaks	0	0%	1	10%	1	2%
– Central-cyst formation	0	0%	1	10%	1	2%
– Faint peripheral network	0	0%	1	10%	1	2%
– Orifices	0	0%	1	10%	1	2%

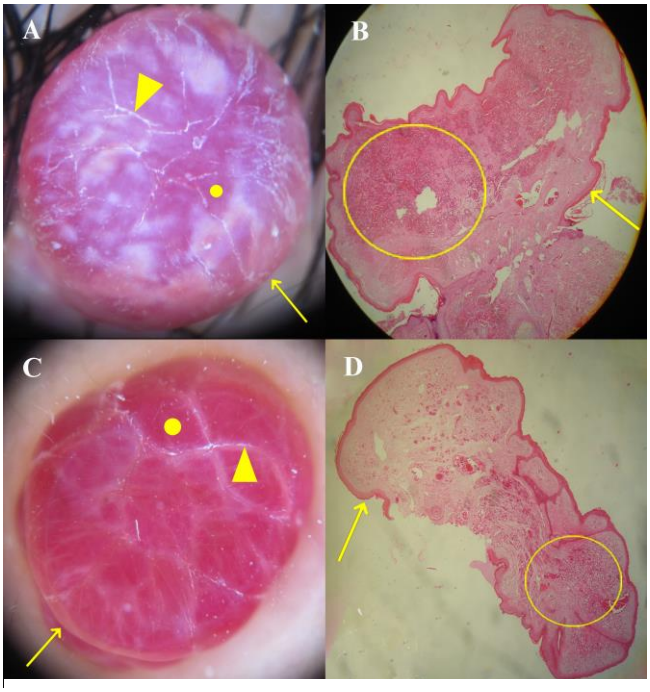

Figure 2. Dermoscopic images of pyogenic granulomas (2A & 2C). Dermoscopic features include red homogenous areas (yellow circle), a white collarette (yellow arrow), and white rail lines that intersect the lesion (yellow triangle, pointed structure). Scanning views of pyogenic granuloma (2B & 2D). Small capillaries in a myxoid stroma (yellow circle) and epidermal collarette (yellow arrow) (H&E, 40x, B&D).

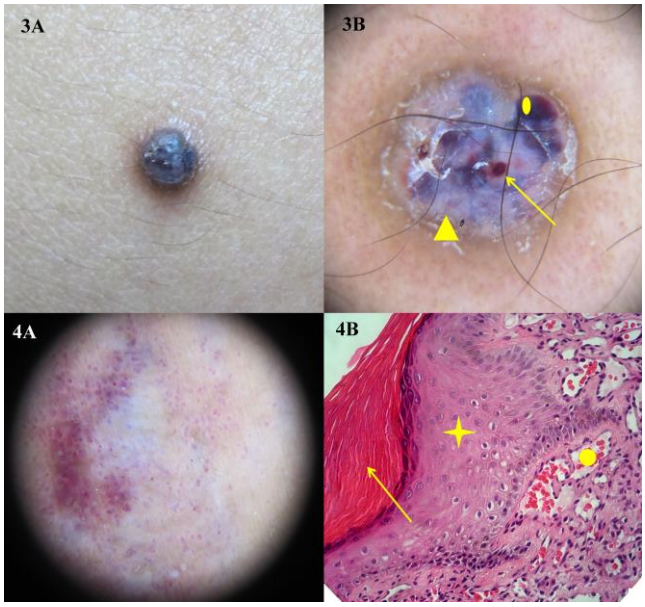

Figure 3. Angiokeratoma clinically presenting as a red-black tumor (3A). Dermoscopic features of the same tumor (3B), showing red lacunae (arrow), red-black lacunae (oval), whitish veil (triangle, pointed area).

Figure 4. Dermoscopy of an angiokeratoma showing red lacunae and whitish veil (4A). Histopathologic features of angiokeratoma (4B): hyperkeratosis (yellow arrow), acanthosis (yellow cross), dilated blood vessels (yellow circle) (H&E, 400x).

Table 3. Histopathologic diagnosis of the red tumors excised from the 45 patients

	F	(%)
Vascular (N=35)		
– Pyogenic granuloma	15	(43%)
– Cherry angioma/Hemangioma	13	(37%)
– Angiokeratoma	3	(9%)
– Cherry angioma/hemangioma in collision with lentigo simplex	3	(9%)
– AV hemangioma/Cirsoid aneurysm	1	(3%)
Non-Vascular (N=10)		
- Xanthogranuloma	4	(40%)
- Fibroepithelial polyp	1	(10%)
– Molluscum contagiosum	1	(10%)
– Pilomatricoma	1	(10%)
– Squamous cell carcinoma in-situ	1	(10%)
– Sclerotic fibroma	1	(10%)
– Trichilemmoma	1	(10%)

histopathologically to dilated blood vessels without thrombosis (Figure 4B) while dark lacunae histologically represented dilated blood vessels with thrombosis (Figure 5).

The dermoscopic feature of dark lacunae corresponds to the histopathologic finding of thrombi (Figure 5). While dark lacunae may be found in any vascular tumor as it may also be seen in hemangiomas[12], dark lacunae have been found to be a more consistent finding in angiokeratomas.

Cirsoid aneurysm or arteriovenous hemangioma is a benign acquired cutaneous vascular tumor. To our knowledge there have been no published findings on the dermoscopic features of arteriovenous hemangiomas. The arteriovenous hemangioma (Figure 6) seen in this study

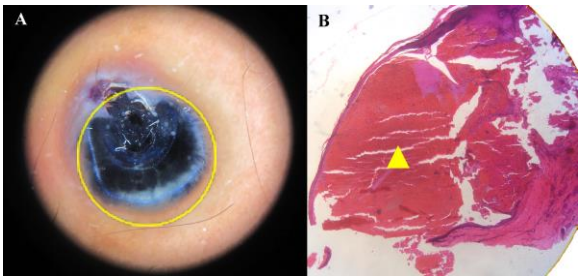

Figure 5. Dark lacunae in an angiokeratoma (yellow circle) (5A). Thrombus seen histopathologically in angiokeratoma (5B) (yellow triangle) (H&E, 40x).

showed reddish homogenous areas, similar to pyogenic granulomas, which may be why the tumor was initially clinically assessed as a pyogenic granuloma. However, white patches were a predominant dermoscopic feature of this tumor, which may be a differentiating feature from a pyogenic granuloma or plain hemangioma. Pyogenic granulomas have white rail lines that intersect the lesion (Figure 2) while hemangiomas had thin whitish area around lacunae (Figure 1). The lack of dark lacunae may also differentiate this from angiokeratomas or simply rule out the presence of thrombosis.

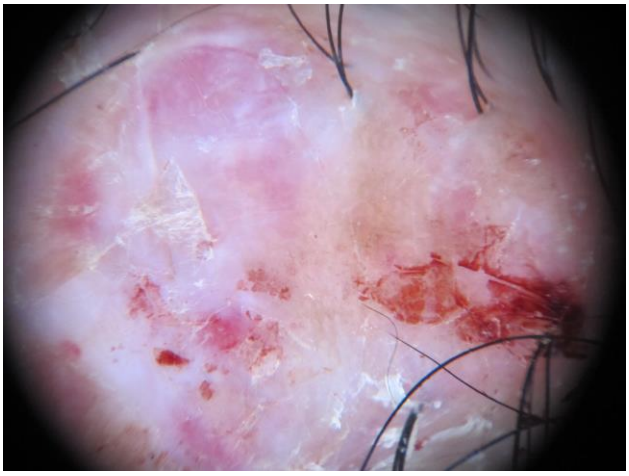

Figure 6. Arteriovenous hemangioma. Reddish homogenous areas with predominant white patches

Non-Vascular tumors

Vessels were identifiable in 90% of red tumors seen. The most common dermoscopic features of non-vascular red tumors were telangiectatic vessels (50%). Some tumors had an identifiable pattern of vessels, namely dotted (20%), hairpin (10%), and radial (10%) vessels. Compared to vascular tumors, there were no lacunae or reddish homogenous areas in 80% of the non-vascular tumors seen. In the majority of the non-vascular tumors that were seen in the study, the only vascular structures

Table 4. Dermoscopic features in the four most common red tumors observed

	Hemangioma (N=30)		Pyogenic granuloma (N=40)		Xanthogranuloma (N=10)		Angiokeratoma circumscriptum (N=10)	
	F	%	F	%	F	%	F	%
Lacunae	15	50%	3	8%	0	0%	3	30%
Red-bluish or red-black Homogenous areas	2	7%	12	30%	0	0%	1	10%
White rail lines	1	3%	9	23%	0	0%	0	0%
Collarette	1	3%	7	18%	0	0%	1	10%
White-structure less areas	6	20%	3	8%	0	0%	1	10%
Hemorrhagic crusts	1	3%	2	5%	0	0%	1	10%
Telangiectatic vessels	0	0%	0	0%	3	30%	0	0%
Others								
– Setting sun sign	0	0%	0	0%	3	30%	0	0%
– Paler white clouds	0	0%	0	0%	3	30%	0	0%
– Whitish veil	1	3%	4	10%	0	0%	3	30%
– Yellow-white homogenous areas	0	0%	0	0%	1	10%	0	0%

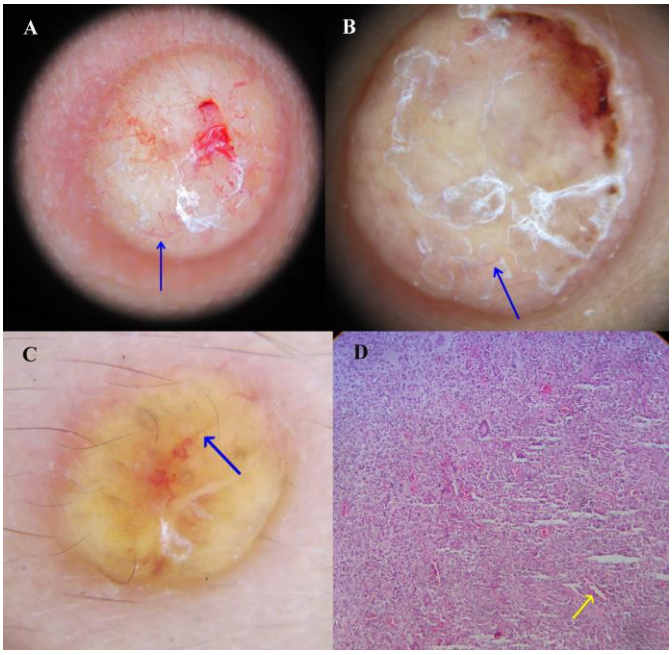

Figure 7. Dermoscopic images of xanthogranulomas, which show the characteristic 'setting sun' sign and paler white clouds. Curved (7A), straight (7B), and branching vessels (7C), are seen (blue arrows). Dense dermal infiltrate of histiocytes seen in xanthogranulomas (7D). Dermal vessels (yellow arrow) are also seen. (H&E, 100x)

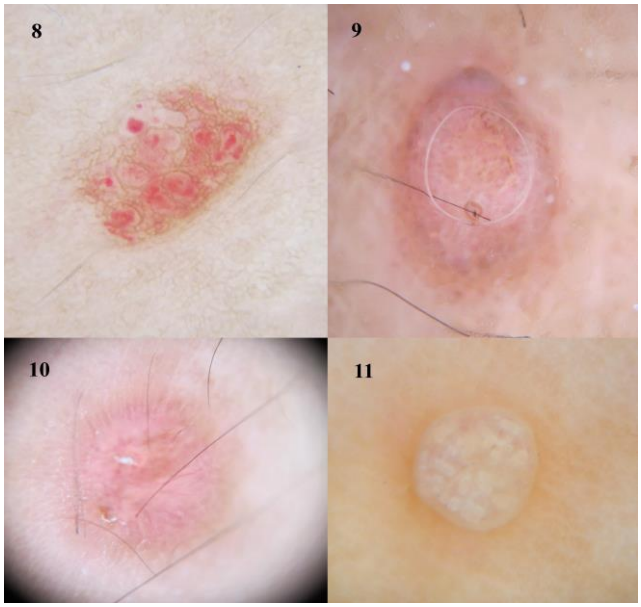

Figure 8. Cherry angioma in collision with Lentigo simplex. Red lacunae interspersed with a faint pigment network.
Figure 9. Fibroepithelial polyp. Yellow-white homogenous areas with dotted vessels.
Figure 10. Sclerotic fibroma. Yellow-white homogenous areas with linear telangiectatic vessels and a faint peripheral pigment network.
Figure 11. Xanthogranuloma. Multiple orifices with minimal punctiform vessels

seen were vessels. These vessels made non-vascular seen were vessels. These vessels made non-vascular tumors appear red clinically.

The most common non-vascular tumor seen in this study is xanthogranuloma. Juvenile xanthogranuloma is the most common form of non-Langherhans cell histiocytosis and manifests as asymptomatic yellow-red papulo-nodules, which may include quite a number of possible diagnoses. In a case report by Palmer and Bowling, a characteristic orange-yellow background coloration (also called setting sun sign) and clouds of paler deposits were seen[10]. Central linear blood vessels were also appreciated. The dermoscopic feature of 'setting sun sign' (Figure 7A, 7B & 7C) was consistent with the xanthogranulomatous dermal histiocytic infiltrate seen histopathologically (Figure 7D). Setting sun sign and paler white clouds were consistently seen in the four xanthogranulomas seen in this study. Additionally, central linear blood vessels were also seen[10]. Song et al. found however that telangiectatic vessels were seen in 81.8% of xanthogranulomas in their study[16]. Although vessels were not identified as a main feature, telangiectatic vessels were a consistent feature in the xanthogranulomas that were seen in this study.

Three out of ten non-vascular tumors were found to have red lacunae and reddish homogenous areas. Only single lesions of each of the three tumors were found hence it could not be assessed whether these were consistent or significant findings for these tumors. Telangiectatic vessels however were found in all three tumors.

Collision tumors are defined as side-by-side occurrence of two tumors, whether benign or malignant. Dermoscopy also aids in identifying collision tumors. In this study, 3 tumors were diagnosed clinically as cherry angiomas. However upon dermoscopic examination, each of the 3 tumors showed red lacunae as well as a surrounding normal reticular pigment network, which histologically corresponded with dilated blood vessels in the upper dermis and an increased number of melanocytes in the basal layer. This histopathologically confirmed the dermoscopic diagnosis of a collision tumor of a hemangioma and lentigo simplex (Figure 8).

Pilomatricoma is a benign adnexal tumor derived from immature matrix hair cells. In a study by Zaballos, et al[9] irregular white structures, white streaks, and various vascular structures were found to be the most common dermoscopic findings. In the pilomatricoma seen in this study, dermoscopic features included red homogenous areas, white streaks, and telangiectatic vessels that were consistent with findings in the previous study. These dermoscopic features however are not characteristic of pilomatricomas and may be found in other non-pigmented tumors.

Two fibrous tumors, namely fibroepithelial polyp and

sclerotic fibroma were identified in this study. To our knowledge, there have been no studies on dermoscopic findings of either fibroepithelial polyps or sclerotic fibromas. There have been however several studies on dermatofibromas[17,18] and the most common features noted were a central white scarlike patch and peripheral pigment network. Other dermoscopic features seen were dots/globules, reddish coloration, and scale crusts. In the 2 fibrous tumors included in this study, yellow-white homogenous areas were seen. Telangiectatic vessels were noted in the sclerotic fibroma while few dotted vessels were seen in the fibroepithelial polyp (Figure 9). In addition to the yellow-white homogenous areas present in the sclerotic fibroma (Figure 10), a faint peripheral pigment network was also seen. Similar to dermatofibromas, the 2 fibrous tumors also did not show any red lacunae or red homogenous areas but demonstrated the presence of vessels.

Lesions of molluscum contagiosum are generally skin-colored papules, with a translucent, glossy appearance[19]. However, some lesions of molluscum contagiosum may also present atypically – such as present as a solitary lesions or lack the characteristic central umbilication. In studies done by Vasquez-Lopez, et al[20], 3 vascular patterns were seen in lesions of molluscum contagiosum: Crown vascular, radial, and punctiform patterns. Studies by Zaballos,et al[21] and Morales, et al[22] also referred to vascular patterns that described molluscum contagiosum lesions. In a study done by Ianhez , et al[19], the presence of an orifice is an important characteristic in identifying molluscum contagiosum lesions and dermoscopy is fundamental when the orifice is not perceptible at clinical examination. In the single molluscum contagiosum (Figure 11) included in this study, we were able to find orifices and with minimal punctiform vessels corresponding to a single vascular pattern.

CONCLUSION

What is consistent about the red tumors seen in this study is the presence of a vascular pattern, including red lacunae, red to dark red homogenous areas, and different types of vessels. The identification of such vascular structures may aid in arriving at a more precise diagnosis and will help differentiate vascular from non-vascular tumors.

Since specific criteria are absent for most if not all red lesions, having an idea of characteristic dermoscopic structures seen in uncommon skin tumors may prevent unnecessary anxiety on the part of the patient and guide to the right diagnosis and appropriate treatment, and avoid unwarranted interventions such as unnecessary biopsy or excisions.

Limitations of the study

Although the study was able to identify and histopathologically confirm 45 red tumors, there were several lesions where only one type of each tumor was seen. More tumors of the same kind are needed to establish a more accurate dermoscopic criterion. As with some dermoscopic studies done in the past, a limitation is the lack of a control group for most red tumors, hence there is no accuracy of criteria. As mentioned in the study of uncommon tumors by Lallas et al.[23], there is a variation in terminology used for dermoscopic features hence different terms may be used for the same features leading to inconsistent criteria.

Recommendation

A longer study duration and involvement of more centers is recommended to include more tumors for dermoscopic observation and evaluation. This may be instrumental for the establishment of more accurate criteria.

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