Dermatology Practical & Conceptual

A Systematic Review of Diagnoses with Rosettes Under Dermoscopy

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ABSTRACT

Introduction: Rosettes are a cluster of shiny white dots in the shape of a four-leaf clover seen under polarized dermoscopic light. Historically, rosettes were primarily reported in actinic keratoses and squamous cell carcinoma. However, rosettes have also been reported in other conditions.

Objectives: The objective of this systematic review to elucidate the breadth of diagnoses exhibiting this unique dermoscopic phenomenon.

Methods: A review was conducted following Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. Literature searches were performed in MEDLINE, EMBASE, Cochrane Central Register of Controlled Trials and Web of Science, as well as a manual search of the reference lists of screened articles.

Results: A total of 73 articles met the inclusion criteria. Out of these, 47 distinct diagnoses with rosette were identified. Among neoplastic conditions, keratinizing neoplasms had the highest number of articles reported (N = 19). Discoid lupus was the most commonly reported diagnosis within the inflammatory category (N = 6). Molluscum contagiosum was the predominant diagnosis among infectious entities (N = 3), while acroangiodermatitis was the sole diagnosis reported in the vascular category (N = 1).

Conclusions: These findings confirm rosettes are not specific to keratinocytic growths and are observed in a wide range of conditions. Knowledge of the breadth of conditions with rosettes may aid clinicians when developing a differential diagnosis of a growth or an eruption with rosettes under dermoscopy.

Introduction

Under dermoscopy, rosettes are a distinct type of white shiny structures characterized by a cluster of shiny white dots in the shape of a four-leaf clover. They are created by the presence of scale in the follicular ostia and can only be observed under dermoscopy when using polarized light [1]. Historically, rosettes were primarily reported as a finding in actinic keratoses (AKs) and squamous cell carcinoma (SCC) [2]. However, several reports demonstrated that rosettes are not specific to keratinocytic neoplasms and are rather encountered in many other conditions [3].

Objectives

The goal of this systematic review was to conduct a thorough examination of all reported entities with rosettes to elucidate the breadth of diagnoses exhibiting this unique dermoscopic phenomenon. Through our analysis, we aim to equip clinicians with the knowledge necessary to harness the diagnostic potential of rosettes in the evaluation of skin lesions and cutaneous eruptions.

Methods

A review was conducted following Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [4]. Literature searches were performed in MEDLINE, EMBASE, Cochrane Central Register of Controlled Trials and Web of Science, through April 24, 2023, as well as a manual search of the reference lists of full-text-screened articles. Keywords and subject heading terms used were: dermoscopy, dermatoscopy, trichoscopy, epiluminescence/skin surface microscopy, rosettes, four dot and four clod. Conference abstracts, studies based on reflectance confocal microscopy alone were excluded. No studies were excluded based on language, publication date, or patient age. Two reviewers independently performed data screening and extraction (MA and KB). Conflicts were resolved by discussion with a third reviewer (ES). The full MEDLINE search was conducted as detailed below:

Ovid MEDLINE(R) ALL <1946 to April 24, 2023>
1 exp Dermoscopy/
2 dermoscop*.mp.
3 dermatoscop*.mp.
4 trichoscop*.mp.
5 (microscope or microscopes or microscopy or microscopies).mp.
6 exp Microscopy/
7 5 or 6
8 skin surface.mp.
9 epiluminescen*.mp.
10 8 or 9
11 7 and 10
12 1 or 2 or 3 or 4 or 11
13 rosett*.mp.
14 Four Dot.mp.
15 4 dot.mp.
16 four clod.mp.
17 4 clod.mp.
18 13 or 14 or 15 or 16 or 17
19 12 and 18

Results

A total of 73 articles met the inclusion criteria (Figure 1). The majority were case reports (N = 33), followed by observational cohort studies (N = 29), case series (N = 7), review articles (N = 3) and a single randomized controlled trial (N = 1). Out of these 73 articles, 47 distinct diagnoses were reported (Table 1). The diagnoses were categorized into four main groups: neoplastic processes accounted for 51.9% of the diagnoses, inflammatory conditions comprised 39.0%, infectious conditions made up 7.8%, and vascular conditions represented 1.30%. Among neoplastic cases, keratinizing neoplasms had the highest frequency of number of articles reported, these predominantly included AKs and SCC (N = 12) followed by basal cell carcinoma (BCC) (N = 6) and one report of basosquamous carcinoma (n=1). Within the inflammatory category, discoid lupus erythematosus (DLE) was the most commonly reported entity (N = 6). Molluscum contagiosum was the predominant diagnosis among infectious entities (N = 3), while acroangiodermatitis was the sole diagnosis reported in the vascular category (N = 1).

Conclusions

This systematic review identified a wide range of skin conditions which manifest rosettes under dermoscopy. As

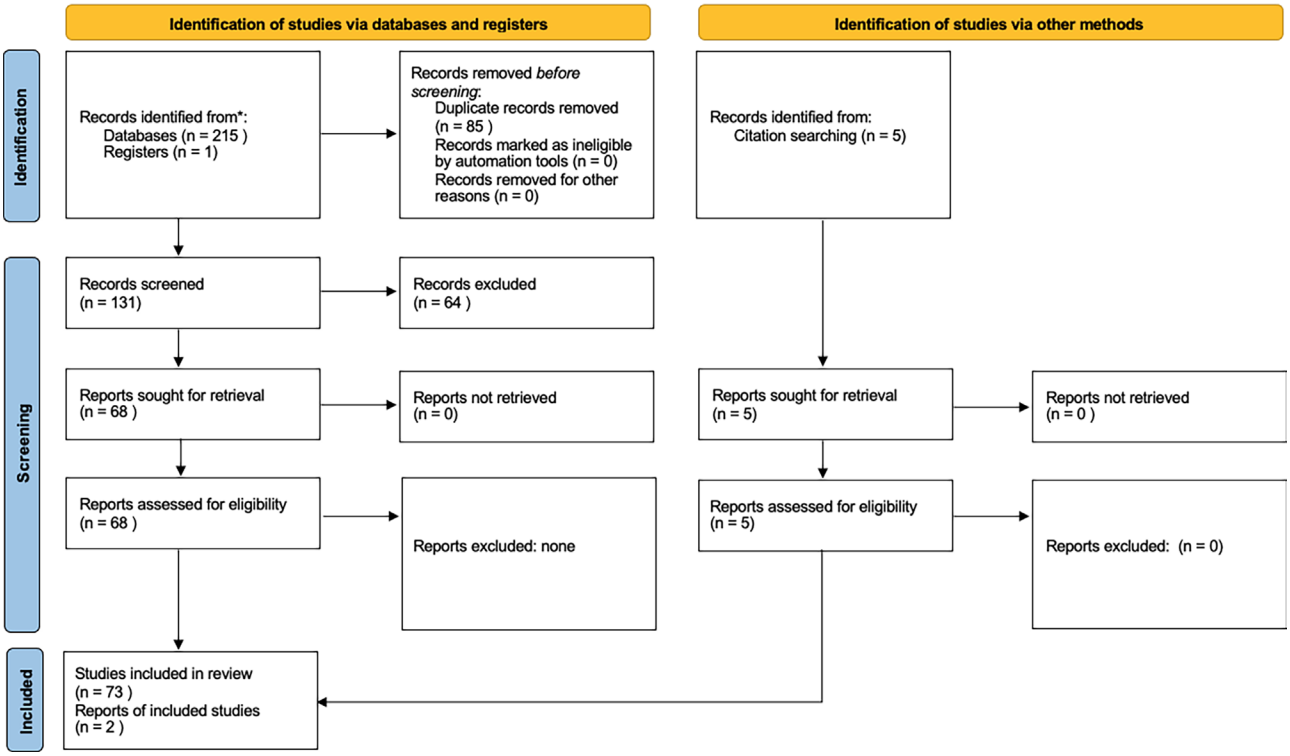

Figure 1. Flow diagram of literature screening using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

previously reported, rosettes are commonly found in keratinocytic neoplasms with most of the articles devoted to actinic keratosis and squamous cell carcinoma. Rosettes are also frequently present in BCC [5] and accounted for approximately 30% of articles on keratinizing neoplasms. Therefore, BCC should be considered when encountering rosettes in neoplastic processes.

In addition to AK, SCC and BCC, this review identified articles on rosettes in autoimmune diseases, sarcomas, skin infections, rosacea, scars and cysts. Of the autoimmune conditions with rosettes, DLE was the most common. Notably, SCC may develop within DLE lesions, therefore it is imperative to seek additional dermoscopic indicators of SCC beyond the presence of scale and rosettes [6]. The breadth of diagnoses with rosettes supports the lack of specificity of this dermoscopic finding. Furthermore, this review identified three reports on rosettes in molluscum contagiosum. A subsequent report on a child who had two fleshy papules with rosettes raised concerns about SCC, which led to the decision to perform skin biopsies. The biopsies ultimately confirmed the presence of molluscum contangiosum instead [7]. Increased awareness of the presence of rosettes in infectious conditions, such as molluscum, has the potential to improve diagnostic accuracy and reduce the number of biopsies performed in pediatric patients.

The study main limitation is that most of the reports included were single case reports restricting the generalizability of rosettes as a universal finding for all cases of each diagnosis.

Lastly, in this review we did not attempt to characterize rosettes based on quantity, distribution, or location. Most articles were case reports featuring single entities, with limited dermoscopic images and lacked descriptive details necessary for further characterization of rosettes. In our own observations, rosettes are commonly diffuse in actinic keratoses, but are few and randomly arranged in entities such as scars and molluscum contagiosum [7]. Additionally, knowledge of hair follicle size and distribution in different body sites could provide further insight into the distribution and appearance of rosettes in different entities. For example, Otberg et al reported the forehead has the highest follicular density compared to the trunk and extremities, and the calf showed the largest hair follicle diameter [8]. Expanding this insight may help explain the differences in the distribution, quantity, and size of rosettes on dermoscopy.

In sum, this study identified the breadth of conditions with rosettes and may aid clinicians when developing a differential diagnosis of a growth or an eruption with rosettes. Given the wide range of conditions which can exhibit rosettes, it is important to look for additional clinical and dermoscopic clues before rendering a diagnosis or deciding to pursue a skin biopsy.

Table 1. All Diagnostic Entities Reported to Exhibit Rosettes[a].

Diagnostic Entity	Total Number of Reports	Study Type				
		CR	CS	O/C	R	RCT
AKs/SCCIS/SCC [9,10,19,20,11–18]	12	2		8	1	1
BCC [5,21–25]	6	1		4	1	
Basosquamous carcinoma [26]	1			1		
Melanoma [27]	1					
LPLK/Lentigo [28]	1	1				
Macular seborrheic keratosis [29]	1	1				
Blue nevus [30]	1	1				
Warty dyskeratoma [31]	1	1				
Syringocystadenoma papilliferum [32]	1	1				
Trichilemmal cyst [33,34]	2	2				
Milium-like cysts [35]	1	1				
Trichoepithelioma [36]	1	1				
Juvenile xanthogranuloma [37]	1	1				
Lymphomatoid papulosis [38]	1	1				
Mycosis fungoides [39]	1			1		
T-cell pseudolymphoma [40]	1	1				
Kaposi sarcoma [41]				1		
Acroangiodermatitis [42]	1	1				
Molluscum contangiosum [43–45]	3	2			1	
Leprosy [46,47]	2	2				
Lupus vulgaris [48]	1			1		
Scars (including cicatricial alopecia) [49–51]	3	3				
Keloid [52]	1					
COVID-19 associated chilblain lesions [53,54]	2		2			
Lichen planus [55,56]	2	2				
Lichen sclerosis [57,58]	2	1	1			
Rosacea [59,60]	2	2				
DLE [61–66]	6	1	1	4		
Acute CLE [67]	1	1				
Chronic CLE [68]	1			1		
CLE (all types) [69]	1			1		
Comedonal lupus [70]	1	1				
Chilblain lupus [71]	1	1				
Granuloma annulare [72]	1			1		
Lichen amyloidosis [73]	1			1		
Pigmented purpura [74]	1			1		
Epidermolysis bullosa [75]	1			1		
Progressive vitiligo [76]	1	1				
Photo-contact dermatitis [77]	1	1				
Apocrine hidrocystoma [77]	1	1				
Urticarial dermatitis [1]	1		1			
Dermatofibroma [1]	1		1			
Melanocytic nevus [1]	1		1			
Dilated pore [1]	1		1			
Cyst [1]	1		1			

[a]The total number of articles differs from the total number of diagnoses as some articles reported on multiple entities with rosettes.

AKs = actinic keratoses; BCC = basal cell carcinoma; CLE = cutaneous lupus erythematosus; COVID-19 = coronavirus disease-2019; CR = case report; CS = case series; DLE = discoid lupus erythematosus; LPLK = lichen planus-like keratosis; O/C = observational/cohort; R = review article; RCT = randomized controlled trial; SCC = squamous cell carcinoma; SCCIS = squamous cell carcinoma in situ.

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