



Three-Point Checklist Dermoscopy for Melanoma Screening: Experience in Medical Students New to Dermatology

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ABSTRACT **Introduction:** Early detection of melanoma and optimal referral to the specialist starts in primary care. Medical education is usually deficient in training general physicians in early detection and risk management for most skin malignancies. A three-point dermoscopy checklist is used as a screening tool for differentiating malignant and benign pigmented lesions in non-expert clinicians using dermoscopy.

Objectives: To evaluate the impact of brief medical training on the three-point dermoscopy algorithm in third-year medical students new to dermatology and to determine the levels of sensitivity and specificity to differentiate malignant and benign pigmented lesions.

Methods: Optional dermoscopy lecture for third-year medical students new to dermatology in the context of general medical semiology courses, with case discussion and evaluation of 50 dermoscopy cases (25 benign and 25 malignant). Students were asked to classify malignant versus benign pathology based on the three-point dermoscopy algorithm discussed. Sensitivity, specificity, and predictive values were calculated according to the students' responses.

Results: Sixty-five students provided 3250 responses. Malignant pathology was misclassified as benign in 154 responses, while benign pathology was misclassified as malignant in 668 responses. Sensitivity and specificity for differentiating malignant lesions were 89.70% and 61.99%, respectively.

Moderate interobserver agreement was found (Kappa value = 0.50; [CI: 0.47–0.54]).

Conclusion: When evaluating melanocytic lesions, the focus of primary healthcare and general medical education should emphasize the correct determination of malignant or benign pathology. Teaching the three-point dermoscopy rule to medical students new to dermatology yields satisfactory levels of sensitivity and specificity, comparable to general physicians.

Introduction

Melanoma is a life-threatening skin malignant pathology that requires timely and efficient diagnosis and management. When detected at early stages, mortality decreases significantly, while prognosis notably improves [1]. Although melanoma is less frequent than other skin malignancies, it is one of the most aggressive forms of skin cancer and has a significant associated mortality [2]. Given that early removal of melanoma significantly improves clinical outcomes and life expectancy, excision of lesions either clinically or dermoscopically suggestive of melanoma is of utmost importance, while removing benign lesions should be minimized.

In the primary healthcare setting, using the ABCD (Asymmetry, Borders, Color, Diameter) acronym for melanoma screening has been widely implemented and provides a useful mnemonic to aid early clinical recognition and efficient referral to dermatology for confirmation [3]. However, other tools such as dermoscopy can notably improve diagnostic accuracy in cases where the ABCD criteria might be inconclusive [4]. It is a non-invasive tool that allows the recognition of microscopic patterns and structures not visible to the naked eye [5]. Although for the trained eye, the recognition of said patterns and structures provides great value in diagnostic accuracy and confidence in the clinical diagnosis [6], it is emphasized that it requires extensive experience and is best used by well-trained specialists [7].

To make dermoscopy more accessible to primary healthcare physicians, and consequently, to improve suspicion and timely referral to dermatology, developing a simplified model for dermoscopic evaluation is a necessary measure to implement in primary care. This allows the physician to determine whether the lesion is malignant or benign, which should be the focus of primary care. For these reasons, a three-point checklist dermoscopic evaluation was developed [8]. This emphasizes the targeted evaluation of asymmetry (either colors or structures), the presence of atypical pigmented networks, and the presence of white-blue structures [8]. Suspicion of malignant skin pathology should be present when two out of the three previously mentioned elements are observed at the dermoscopic evaluation. This method has revolutionized the clinical approach of the general physician

when suspecting a malignant skin lesion and has allowed for the optimization of referral to dermatology [9].

In the Chilean healthcare system, primary healthcare functions as a gateway for the patient to the secondary and tertiary levels of attention, where most of the specialized resources are concentrated. Therefore, the general physician working at the primary healthcare centers is the professional that will most likely be exposed to a malignant diagnosis at its earliest stages and consequently is the principal healthcare agent in charge of early suspicion and timely referral. Nowadays, most of the referrals from primary care to dermatology are done via a public teledermatology platform implemented in December 2018 [10]. This platform works as a store-and-forward teledermatology service that covers all the primary healthcare centers in the Chilean territory [11].

The implementation of this platform has allowed for the support of primary care with remote diagnostic and therapeutic suggestions from specialists [12]. It has also allowed for the optimization of referrals to the specialty and for the reduction of waiting times for a specialist evaluation [13]. Along the same line of work, there has been a recent implementation of portable dermatoscopes at some primary healthcare centers. This instrument can be used by the general physician at the primary care center to capture dermoscopic images, which can be uploaded to the Chilean teledermatology platform. The latter was implemented since it was observed at the early implementation of the teledermatology program that a considerable number of referrals for face-to-face evaluation due to melanocytic lesions were cases that required a dermoscopic examination, which could not be done in primary care [10, 11, 12].

For the aforementioned reasons, the Chilean primary healthcare context is an ideal candidate for the implementation of the three-point dermoscopy method for melanoma screening proposed by Soyer et al. [8]. Having an alerted workforce of general physicians in primary care, with support from the specialist through a public teledermatology platform, and a growing implementation of dermatoscopes in primary healthcare centers could further optimize the flow of referrals of malignant skin pathology suspicion to the specialist. Given the necessity of timely intervention in suspected melanoma cases, implementing the three-point dermoscopy

algorithm alongside current measures could have an enormous impact on early diagnosis and referral of melanoma cases in the Chilean healthcare context.

Nevertheless, in terms of medical education, there is a documented deficit in introductory lectures and medical training on skin cancer screening and risk factor management in the education of general physicians [14]. In the case of Chile, medical training for general medicine lasts seven years at most universities. Among the standard curriculum, usually, the first two years of the curriculum are comprised of basic sciences courses. From the third year to the fifth year, there is a more clinical focus on the lectures imparted, together with the gradual introduction to clinical training in hospitals and healthcare centers. Finally, the last two years of medical school are predominantly clinical training as interns at various hospitals and healthcare centers across the country.

Given the broad spectrum of courses and lectures imparted during general medical training in the Chilean context and the reduced presence of dermatology lectures in said formation, optimizing teaching interventions on the discipline could potentially improve clinical performance in the future when facing dermatological conditions in general practice. Thus, teaching innovative methods of clinical approaches, such as the three-point dermoscopy rule, should be considered in the introductory courses.

This study aimed to evaluate the impact of brief medical training on the three-point dermoscopy algorithm for third-year medical students new to dermatology and to estimate the levels of sensitivity and specificity of distinguishing malignant from benign lesions.

Methods

Participants

Third-year medical students in the context of the introductory course to general medical semiology. In the context of this introductory course, there are a set of lectures regarding basic dermatological semiology, where an optional basic dermoscopy lecture, with a clinical focus and posterior case discussion, is given. All students who participated in the two-hour lecture on basic dermoscopy were introduced to the general aspects of dermoscopy, the three-point dermoscopy algorithm for melanoma screening proposed by Soyer et al. [8], and clinical examples and case discussion of dermoscopic images from the textbook *Dermoscopy: The Essentials* [15].

Procedure

After the lecture, introductory discussion, introduction of the three-point dermoscopy method, and illustrative case discussion, the students proceeded to answer a questionnaire

of 50 clinical images of melanocytic lesions from the textbook *Dermoscopy: The Essentials* [15]. Students were instructed to classify the lesion as benign or malignant based on the three-point dermoscopy algorithm for melanoma screening previously discussed in the lecture. From the 50 clinical images evaluated, 25 images were malignant pathology, and 25 images were benign pathology. Of the malignant pathology, 21 cases were malignant melanoma, and four cases were basal cell carcinomas. From the benign pathology, 23 cases were unspecified melanocytic nevi, and two cases were seborrheic keratosis.

Assessment of sensitivity and specificity for determining whether a lesion was benign or malignant according to the evaluation from the third-year medical students using the three-point dermoscopy checklist was performed.

Statistical Analysis

A descriptive analysis of sensitivity, specificity, and predictive values for the determination of malignant vs benign conditions based on the three-point dermoscopy algorithm for melanocytic lesions was performed. Interobserver agreement was calculated using the Fleiss method to determine the Kappa value with a confidence interval of 95% [16]. Kappa value scores were interpreted as kappa value = 1, perfect agreement; kappa value ≥ 0.75 and <1 , excellent agreement; kappa value ≥ 0.4 and <0.75 , moderate agreement; kappa value <0.4 , poor agreement [17]. All analyses were conducted using Microsoft Excel (Office 365, Microsoft Excel v16.66.1 for macOS, Copyright 1985–2022 Microsoft Corp, Redmond, USA).

Ethical Aspects

All students who attended the optional dermoscopy lecture and case discussion voluntarily participated in the final evaluation. Informed consent was obtained from all participants. Anonymization of the responses was ensured by a third-party online app that recorded each student's responses. The analysis was conducted in compliance with the Declaration of Helsinki of ethical principles for medical research.

Results

Of the 67 students that participated in the study, two students presented connectivity problems with the third-party app that recorded the anonymous responses, and some of the responses were lost. Thus, the sensitivity, specificity, and predictive values were calculated using the 65 complete responses recorded.

Out of the 50 dermoscopic images containing pigmented lesions, a total of 3250 responses were recorded. Suspicion

Table 1. Total responses of malignant and benign conditions as classified using the three-point checklist in 65 medical students new to dermatology

	True malignant lesion	True benign lesion
Malignant diagnosis response	1341	668
Benign diagnosis response	154	1087
Total Responses	3250	

Table 2. Specificity, sensitivity, and predictive values of responses from the students to determine malignant lesions using the three-point checklist

	Malignant pathology determination	Range
Sensitivity	89.70%	73.91–100
Specificity	61.99%	37.03–88.88
Positive predictive value	66.75%	-
Negative predictive value	87.59%	-
Global efficiency	74.71%	-

of malignant pathology was recorded 1495 times, while suspicion of benign pathology was recorded for 1755 responses. The erroneous classification of malignant pathology as benign conditions was observed in 154 responses, while the misclassification of benign conditions as malignant pathology was observed in 668 cases (Table 1).

Regarding sensitivity to identify malignant pigmented lesions, a range of 73.91 to 100% was observed, with an average sensitivity of 89.70%. Specificity ranged from 37.03 to 88.9% with an average specificity of 61.99% (Table 2). Moderate interobserver agreement was observed, with a kappa value of 0.50 with a 95% confidence interval ranging from 0.47 to 0.54. The predictive values and global efficiency of the evaluation are reported in Table 2.

Discussion

Early detection of melanoma and optimal referral to the specialist start in primary care [18]. Early detection of malignant pigmented skin pathology followed by complete resection of the lesion significantly improves prognosis. General physicians working in primary care are likely to face malignant melanocytic lesions at their earliest stages and thus should be trained on the initial approach for suspicion of malignant

melanocytic lesions and should be active agents in the referral process [19]. Developing and implementing diagnostic tools and clinical prediction rules that aid in early diagnosis is of special value in this context, especially when detection occurs as an incidental finding on the clinical examination for another reason. Dermoscopy is an evidence-based tool that facilitates the differential workup and allows for the early diagnosis of malignant melanocytic lesions [20]. It has been widely recommended as a diagnostic tool to be implemented in the primary healthcare setting [21]. Medical training is usually deficient in preparing general practitioners for an adequate approach to melanocytic lesions. The curriculum in skin cancer prevention and initial approach is highly heterogeneous in the training of general physicians working in primary care [22].

It has been demonstrated that for medical education on dermoscopy, a theory-based approach based on real clinical scenarios enhances learning and pattern recognition [23]. In image interpretation education for young trainees, developing automaticity in pattern recognition is a key component for consolidating learning and performance in the clinical scenario [24]. Fast-thinking and non-analytical thinking are common features observed in expert pattern recognition, which usually develops over years of clinical practice [25]. Nevertheless, if said patterns can be documented, simplified, and taught as a founding base for students new to dermoscopy, satisfactory clinical performance in real clinical scenarios can be achieved, without the need for extensive training on the subject. This ultimately improves the flow of referrals to dermatology and could have a notable impact on the early detection and management of malignant skin pathology.

In the Chilean healthcare system, primary care works as a gateway for more specialized levels of attention. For that reason, general practitioners working at primary healthcare centers are very likely to encounter numerous cases of pigmented lesions, either through spontaneous consultation or incidental findings in the physical examination.

Nowadays, access to dermoscopy in primary healthcare centers is being implemented through the telemedicine program for remote diagnostic support from specialists [26]. This modality of attention improves access to care in settings where dermatology evaluation is limited, especially in the diagnosis and treatment of melanoma and non-melanoma skin cancers [27].

However, general physicians must have a minimum baseline knowledge of what structures and patterns to observe when performing a dermoscopic evaluation; thus, teaching interventions such as the one reported in this study could be of great value for the general clinical practice and should be encouraged and implemented early in medical education.

The educational intervention reported in this study show rates of sensitivity and specificity for differentiating malignant and benign conditions similar to previous experiences performed on medical students [28,29]. For specific

evaluation of the three-point dermoscopy rule, the rates of sensitivity reported are also comparable to general physicians and dermatologists without experience in dermoscopy, but with lower levels of specificity [30]. In addition, interobserver agreement showed to be remarkably similar to other experiences conducted on general physicians and dermatologists with little experience in dermoscopy [30]. Moreover, it has been demonstrated that minimal interventions such as brief lectures on dermoscopy and pattern recognition, based on case discussion and with a focus on future clinical practice, appear to have a significant impact on diagnostic performance in general physicians using dermoscopy [31], which can also be extrapolated to physicians in training, such as the results evidenced in this study. In this line of work, encouraging brief educational interventions on dermoscopy with a clinical and practical approach during the training of medical students could also significantly contribute to their education and allow for a solid approach when encountering pigmented skin lesions in the future.

Finally, as medical education progresses and hours of clinical practice are gradually introduced and the medical students are exposed to the clinical context, it would be interesting to study the learning, applicability, and student performance of the three-point dermoscopy rule and where it endures over time. Performing a follow-up during the last years of medical school is of utmost importance to determine the real impact of the aforementioned interventions in the future clinical approach of pigmented lesions in primary care.

Conclusion

When evaluating melanocytic lesions, the focus of primary healthcare and general medical education should emphasize the correct determination of malignant or benign pathology rather than making a specific diagnosis. Teaching the three-point dermoscopy rule to medical students new to dermatology through a theory-based approach based on real clinical scenarios yields satisfactory levels of sensitivity and specificity in differentiating malignant from benign pigmented skin lesions, with outcomes comparable to general physicians. Encouraging this type of teaching intervention early in the training of general practitioners could improve the future clinical approach to pigmented lesions in primary care, and ultimately, further optimize the flow of referrals of malignant pathology to the specialist.

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