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The impact of dermoscopy on the management of pigmented lesions in everyday clinical practice of general dermatologists: a prospective study

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Summary

Background:
Dermoscopy greatly improves the clinical diagnosis of pigmented lesions. Few studies have investigated, however, how dermoscopy is guiding management decisions in everyday clinical practice. In addition, most studies have been performed in the setting of dermoscopy experts working in pigmented lesion clinics.

Objectives:
To assess the impact of dermoscopy on clinical diagnosis and management decisions for pigmented lesions in everyday practice of general dermatologists.

Methods:
We performed a prospective study in general dermatology clinics in community hospitals run by dermatologists with intermediate dermoscopy experience and expertise. Each clinician independently included suspicious lesions from consecutive patients. Pre-and postdermoscopy diagnoses and management decisions were recorded. Pathology was used as reference diagnosis.

Results:
In total, 209 suspicious lesions were included in the study by 17 dermatologists. Fourteen lesions were histologically proven in situ or invasive malignant melanomas. Based on clinical diagnoses, dermoscopy improved sensitivity from 0.79 to 0.86 (P =1.0). All 14 melanomas were intended to be excised based on naked eye examination alone, independent of dermoscopic evaluation. Specificity increased from 0.96 to 0.98 (P =0.22). Dermoscopy resulted in a 9% reduction of the number of excisions.

Conclusions:
Dermoscopy reduced the number of excisions, but did not improve the detection of melanomas. Our results suggest that in everyday clinical practice of general dermatologists the main contribution of dermoscopy is a reduction of unnecessary excisions.

Introduction

Several studies have demonstrated that dermoscopy is better at discriminating between melanoma and benign pigmented lesions than naked eye examination (NEE).[1–3] However, very few studies have investigated how dermoscopy is guiding management decisions in everyday clinical practice.[4–7]

The first dermoscopy studies were performed predominantly in experimental settings. Clinicians judged lesions based on macroscopic and dermoscopic images instead of live patients, study sets often contained a disproportionately high number of melanomas (high pretest probability) and in some studies dermoscopic images were not preceded by their accompanying macroscopic images.[8–12]

More recent studies have evaluated dermoscopy in more realistic clinical settings.[3] Most of these studies have focused on the ability of dermoscopy to improve the clinical diagnosis of pigmented lesions.[1–3,8–17]

Several authors have suggested that ultimately the purpose of dermoscopy is to improve the ability to determine whether lesions need to undergo a biopsy procedure.[5,18–21] In other words, dermoscopy improves the detection of melanomas only if melanomas that would not have been biopsied based on NEE are biopsied because of their dermoscopic characteristics. Dermoscopy improves the malignant /benign ratio of excised lesions if it results in leaving benign lesions in situ that would have been biopsied based on NEE.

Most previous dermoscopy studies have been performed in the setting of specialized pigmented lesion clinics (PLCs) run by dermoscopy experts. To our knowledge there are no studies on the impact of dermoscopy on the clinical practice of general dermatologists with intermediate experience and excellence in dermoscopy. It is not unlikely that most (potential) dermoscopy users belong to this specific group of clinicians. The aim of this study was to assess prospectively the impact of dermoscopy on the clinical diagnosis and management of pigmented lesions in everyday clinical practice of general dermatologists.

Materials and methods

Participants in the study were dermatologists working in general dermatology clinics in community hospitals located in different parts of the Netherlands. They all had been performing dermoscopy for at least 6 months and had recently participated in a full-day dermoscopy course covering the basic dermoscopic characteristics of melanocytic and nonmelanocytic lesions, the ABCD rule for dermoscopy,[22] pattern analysis[23] and the more recently described (vascular) patterns and structures.[24–26]

For the current study they were instructed to include 20 consecutive eligible lesions of patients visiting their regular clinics. Patients were either newly referred (in the Dutch health system dermatological service is accessible only after referral by a general practitioner) or already under treatment at the department of the participating dermatologist. The initial or primary reason for patients to attend the dermatologist was irrelevant for the eligibility of lesions.

Lesions were eligible if they fulfilled the following criteria: (i) they had to be suspicious pigmented lesions, (ii) for which the participant would normally also apply dermoscopy, and (iii) if a patient had more than one eligible lesion the most suspicious lesion had to be selected. After participants identified an eligible lesion, they first had to evaluate it on the basis of NEE and to record the NEE preferential diagnosis and management strategy as if there were no opportunity to perform dermoscopy afterwards. NEE was guided by the ABCDE criteria, the ugly duckling sign and symptoms reported by patients.[27] Subsequently dermoscopy was performed and the preferential diagnosis and management strategy based on the combined NEE and dermoscopic evaluation were recorded (Fig. 1).

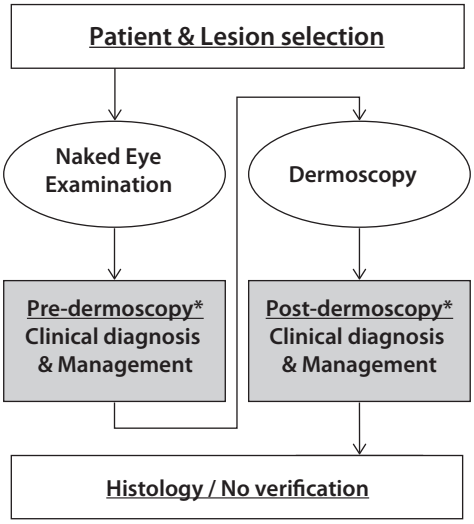
In cases where a biopsy was performed, participants were requested to send us a copy of the pathology report and to indicate whether they performed the biopsy for diagnostic purposes or for other reasons (e.g. cosmetic). Participants were requested to add a description of their method of sampling, in order to check whether they had followed instructions to include lesions in a consecutive order.

Data analysis

Preferential diagnoses were categorized as 'melanoma' or 'nonmelanoma'. Management strategies were also grouped into two categories: (i) 'intervention': a diagnostic (punch, shave or excisional) biopsy with the primary intention of histological verification and treatment of a possible melanoma and (ii) 'no intervention': follow-up, no follow-up, or an intervention for a nondiagnostic reason (e.g. cosmetic). For biopsied lesions histological diagnosis was used as the reference diagnosis.

True positives (TP) were defined as lesions classified as melanoma, and confirmed as melanoma on histological examination. True negatives (TN) were defined as lesions that were classified as 'nonmelanoma', with a subsequent diagnosis other than melanoma on histological examination or left unbiopsied because there was no suspicion of melanoma. False positives (FP) were defined as lesions classified as melanoma, but not diagnosed as melanoma on histology, or not biopsied (after dermoscopic evaluation). False negatives (FN) were defined as lesions that were classified as 'nonmelanoma', but were diagnosed as melanoma on histology. Sensitivity was computed as TP /(TP+FN) and specificity as TN /(TN+FP). Sensitivity and specificity were also calculated from a management perspective, with the clinical diagnosis 'nonmelanoma' being exchanged for 'no intervention' and the

Figure 1 Study design



*Pre- and post dermoscopy clinical diagnosis and management decisions were compared.

clinical diagnosis 'melanoma' for 'intervention'. To compare sensitivity and specificity before and after dermoscopy a statistical analysis was performed, using the McNemar test. Analyses were performed with SPSS 14.0 (SPSS, Chicago, IL, U.S.A.), and statistical significance was determined at a =0.05, and two-sided.

The impact of dermoscopy on management was analysed according to the two management categories as defined above ('intervention' and 'no intervention'), in two ways. The impact of dermoscopy on the detection of melanomas was calculated as the proportion of histologically confirmed melanomas that would not have been biopsied (management category: 'intervention') without the use of dermoscopy. In addition to this we calculated the proportional reduction of the number of 'interventions' due to dermoscopy.

Results

Data characteristics

Seventeen general dermatologists with a median experience in dermoscopy of 7.5 years (range 6 months–14 years) participated in the study. Twelve clinicians (71%) reported a methodology that implied consecutive sampling. Five clinicians (29%) stated they had followed inclusion instructions, but gave no detailed description of their method of sampling.

Participants judged a mean number of 12 lesions (range 4– 20), with a total of 209 lesions. Data on clinical diagnosis and management were complete for 207 (99%) and 196 lesions (94%), respectively. In total, 99 lesions were biopsied: 72 for diagnostic purposes, 20 for other reasons (e.g. cosmetic) and seven cases in which the distinction could not be made due to incomplete data. Among the 72 lesions that were excised for diagnostic purposes there were ten invasive and four in situ melanomas (Table 1). In addition, there was one borderline lesion, described in the histology report as 'a dysplastic naevus with severe atypia, melanoma in situ not excluded'. There were no melanomas among the other 27 biopsied lesions.

Table 1 Characteristics of histologically proven melanomas diagnosed in the general dermatology setting

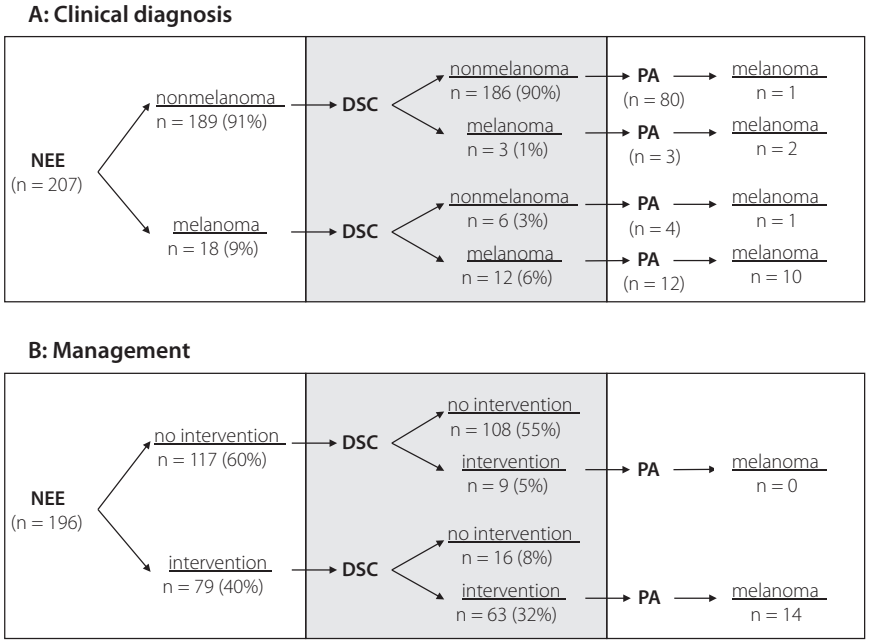
Histological type	n	Breslow thickness
SSM	4	0.15 mm, 0.85 mm, 0.98 mm and 2.8 mm
Mis	4	not applicable
LMM	1	not available
NM	1	1.1 mm
NOS	4	0.40 mm, 0.95 mm, 0.98 mm and 1.1 mm
Total	14	

SSM, superficial spreading melanoma; Mis, melanoma in situ; LMM, lentigo maligna melanoma; NM, nodular melanoma; NOS, not otherwise specified

The impact of dermoscopy on the clinical diagnosis

Based on NEE 18 lesions were classified as melanomas (Fig. 2a). After dermoscopy only 12 of these were still regarded to be melanomas, 10 of which were confirmed by histopathology. The other two lesions were diagnosed as a dysplastic naevus and a collision tumour consisting of a seborrhoeic keratosis (SK) and a basal cell carcinoma (BCC). Of the six lesions no longer classified as melanomas after dermoscopy, four were biopsied.

Figure 2 The effect of dermoscopy on (**A**) the clinical diagnosis and (**B**) management decisions



NEE, naked eye examination; DSC, dermoscopy; PA, pathology

One was diagnosed as a BCC, one as a common naevus and one as a collision tumour consisting of a BCC, an SK and a sebaceous adenoma. The fourth lesion, which was clinically diagnosed as a common naevus after dermoscopy, proved to be a malignant melanoma on histology (Breslow thickness 1.1 mm). The two lesions that were not biopsied were clinically diagnosed as lentigo maligna before dermoscopy, but were regarded as benign lentigines after dermoscopy and left in situ.

After dermoscopy three lesions regarded as 'nonmelanoma' by NEE were reclassified as melanoma. Two of these were confirmed by histology (Breslow thickness 0.40 mm and an in situ melanoma) and one was diagnosed as a dysplastic naevus. There was one lesion that was incorrectly diagnosed as a dysplastic naevus, both before and after dermoscopy, but turned out to be a melanoma (Breslow thickness 0.95 mm).

Sensitivity was calculated to be 0.79 (11 /14) for NEE alone and 0.86 (12 /14) for NEE aided by dermoscopy. Specificity was 0.96 (186 /193) before and 0.98 (190 /193) after dermoscopy

had been performed. Statistical analysis demonstrated that the improvements of sensitivity and specificity by the addition of dermoscopy were not statistically significant (P =1.0 and P =0.22, respectively).

The impact of dermoscopy on management decisions

In 13% (n = 25) of lesions management changed after dermoscopy had been performed (Fig. 2b): for 16 lesions (8%) a diagnostic biopsy was abandoned and for nine lesions (5%) a diagnostic biopsy was induced. Histological evaluation of these nine lesions demonstrated three common naevi, three dysplastic naevi, one benign lentigo, one congenital naevus and the borderline lesion that was described before. The predermoscopy management for this borderline lesion was noted as 'follow-up'. Dermoscopy had no influence on the management of the 14 histologically confirmed melanomas, as all were intended to be excised (diagnostic biopsy) based on the NEE, before dermoscopy had been performed.

Before dermoscopy 40% (79 /196) of included lesions were intended to be excised (diagnostic biopsy). After dermoscopy 37% (72 /196) of the lesions were excised. The malignant /benign ratio of excised lesions decreased from 1 : 5.6 (14 /79) before to 1:5.1 lesions (14 /72) after dermoscopy had been performed. Dermoscopy resulted in a reduction of the total number of diagnostic biopsies of 9% (7 /79). Neither sensitivity nor specificity (P =1.0 and P =0.23) was increased by dermoscopy, if calculated based on management decisions instead of clinical diagnoses.

Discussion

To our knowledge this is the first prospective study that has evaluated how dermoscopy influences the clinical diagnosis and is guiding management decisions made by general dermatologists in their routine daily practice.

Sensitivity increased after addition of dermoscopy to the NEE, although not statistically significantly. The sensitivities of NEE (0.79) and dermoscopy (0.86) in our study were comparable with the summary estimates of sensitivity in a recent meta-analysis of clinical dermoscopy studies by Vestergaard et al.[3] (0.71 and 0.90, respectively).

There were two melanomas in our study that had wrongfully been classified as benign lesions based on NEE, but were correctly classified as melanoma due to dermoscopy. In one instance, however, a melanoma, correctly classified based on NEE, was reclassified as a benign melanocytic lesion after dermoscopy had been performed. This did not affect the decision to excise this particular lesion, but it illustrates the danger of false reassurance due to dermoscopy.

Dermoscopy did not improve the detection of melanomas, as all 14 melanomas were intended to be excised before dermoscopy was performed. Dermoscopy did, however, result in the decision to excise a dysplastic naevus with severe atypia, that would have

been left in situ to be followed up if dermoscopy had not been performed. This excision may have prevented the development of an invasive melanoma, but this is, of course, speculative.

Specificity slightly improved as a result of performing dermoscopy, but the difference was not statistically significant. Our estimates of specificity (0.96 before and 0.98 after dermoscopy) were higher than the summary estimates in the meta-analysis of Vestergaard et al.[3] (0.81 and 0.90, respectively). The difference can be explained by the fact that our study was based on all suspicious lesions for which dermoscopy was used, including those that were not biopsied. Many of the studies in the meta-analysis only included lesions that were biopsied. Our results were comparable with a study by Stanganelli et al.[14] (specificity of 0.99 before and 1.00 after dermoscopy) that included unbiopsied lesions in their analyses as well.

Dermoscopy reduced the number of excisions by 9%, which is considerably lower than the figure reported in other studies.[4–6] In a randomized study Carli et al.[4] reported that 38% fewer excisions were performed in the dermoscopy study arm compared with the NEE arm. Two prospective studies that investigated the influence of dermoscopy on the management of lesions preselected for excision by NEE found a reduction of the number of excisions of 40% and 70%.[5,6]

The a priori possibility for dermoscopy to reduce the number of (unnecessary) excisions in our study was probably limited, due to the fact that the malignant /benign ratio of (intended to be) excised lesions was very low before dermoscopy had been performed (1 : 5.6). There are a number of possible explanations for this. Most previous dermoscopy studies were performed in PLCs. A considerable proportion of patients seen at PLCs have a high a priori melanoma risk and are therefore regularly screened. As a consequence it is likely that the spectrum of melanomas diagnosed in general dermatology clinics differs from those in PLCs. Melanomas presented in general dermatology clinics may be in a more advanced stage, with more clear-cut clinical characteristics, making it easier to diagnose them based on NEE alone. This explanation is weakened, however, by the fact that two[4,6] of the three earlier mentioned studies that reported a considerable reduction of the number of excisions were performed in a similar patient population as our study: patients who had been referred by general practitioners (in the third study the patient population was not described). In addition, the median Breslow thickness of melanomas in our study and two of the three PLC-setting studies were comparable (Breslow thickness was not reported in one study). An alternative explanation would be that general dermatologists have a higher threshold for performing biopsies of lesions, possibly because they are used to managing patients with a relatively low a priori melanoma risk, compared with the patient population seen by expert dermoscopists in PLCs. In addition, the management decisions made by general dermatologists, with less expertise in dermoscopy, are likely to be less dependent on dermoscopy. As a relatively

large proportion of the lesions that were included in our study were melanomas (7%), our results suggest that general dermatologists perform dermoscopy only if they have a (relatively) high level of suspicion of melanoma. As a final note, the smaller reduction of the number of biopsies could not be explained by cosmetic interventions, as these were excluded from the analyses.

In conclusion, we found a comparable impact of dermoscopy on sensitivity and specificity in everyday clinical practice of general dermatologists as was recently reported in a meta-analysis based on studies that were mostly performed in expert PLC settings.[3] From a management perspective, however, dermoscopy did not improve the detection of melanomas. The reduction of the number of excisions was considerably less than has been reported in dermoscopy-expert PLC settings. In our study in the case of one melanoma dermoscopy resulted in false reassurance, changing the clinical diagnosis from melanoma to naevus. It is of great importance that more studies are performed to evaluate the risk of FN due to dermoscopy in nonexpert settings. Unfortunately we had no histological verification of lesions that were initially regarded as melanoma, but were not excised because of their dermoscopic characteristics. This limited our ability to detect possible negative effects of dermoscopy on the detection of melanomas. More studies focusing not only on clinical diagnoses, but also on the management decisions, with a larger number of melanomas are needed, further to determine the benefits and safety of dermoscopy in nonexpert settings.

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