ORIGINAL SCIENTIFIC PAPER

QUANTITATIVE RESEARCH

Change in a child's naevus prompts referral to a dermatology service

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ABSTRACT

INTRODUCTION: Although melanoma is rare in children, parental concern about skin lesions often results in specialist referral and/or excision of benign lesions.

AIM: To review dermatology referrals of children with skin lesions to determine reason for referral, macroscopic and dermatoscopic features of referred lesions, diagnosis, management and histology for excised lesions.

METHODS: Referral letters, clinical and dermatoscopic images and outcomes were reviewed for skin lesions in children aged 0–18 years attending a teledermoscopy clinic over a 28-month period.

RESULTS: Eighty-nine children with 128 lesions accounted for 9% of all referrals to the teledermoscopy clinic. The mean age of the children was 12 years (range 2–18 years). A 'changing mole' was the most common reason for referral (35 children; 39%), followed by 'possible melanoma' (19; 21%), and congenital naevus (9; 10%). The majority of lesions were benign melanocytic naevi (112 lesions; 88%). No lesions were diagnosed as melanoma or non-melanoma skin cancer. A history of change was given for 61/112 lesions (54%). Five lesions were excised; histopathological diagnoses were two spindle cell tumours of Reed, two compound naevi and one Spitz naevus.

DISCUSSION: Change in a lesion, though a common trigger for referral, is less likely to indicate malignancy in children compared with adults and, as a sole criterion, does not necessitate specialist referral. Teledermoscopy clinics offer high quality macroscopic and dermatoscopic images and can assist in providing reassurance, where appropriate.

KEYWORDS: Dermatology; dermoscopy; melanocytic naevi; melanoma

Introduction

Melanoma is the second most common malignancy in New Zealanders aged less than 25 years; however, melanoma remains rare in children.[1] In 2011, there were only six reported melanomas in males and females under 20 years of age (0.3% of all melanomas).[2] Approximately half of all childhood melanomas arise *de novo*, the other half arising within pre-existing benign melanocytic naevi. Congenital melanocytic naevi with a projected adult size greater than 20 cm in diameter, particularly if associated with multiple satellite lesions, are a significant risk factor, with a lifetime risk of melanoma of up to 5%.[3] The risk of melanoma arising within a smaller congenital naevus is well under 1%, at least during childhood.[4]

Early recognition and complete excision of melanoma offers the best chance of cure. Diagnosis in children and adolescents may be difficult, as benign naevi have a dynamic nature, with appearance of new naevi and periods of naevus growth, particularly during pubertal years. Evolution is a criterion in the ABCDE (asymmetry, border irregularity, colour variability, diameter >6 mm, history of evolution) rule for diagnosis of melanoma,[5] and change in size is a major feature

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in the Glasgow 7-point checklist,[6] leading to potential overdiagnosis of melanoma in this age group. Spitz naevi and the pigmented spindle cell tumour of Reed are also diagnostically challenging, as they share many clinical, dermatoscopic and histological features with melanoma.

Dermatoscopic examination of naevi improves identification of malignant lesions in children. Congenital melanocytic naevi generally have a homogeneous or symmetrical structure. These naevi demonstrate two main dermatoscopic patterns: globular (often found on the head, neck and torso) and reticular (often found on the lower extremities). Larger congenital lesions may have multiple areas with different colours and topography. Acquired melanocytic naevi are more often reticular. Symmetrically distributed, peripheral globules or dots may be seen at times of growth.[7] Naevi on the scalp may be annular, with a complex dermatoscopic pattern comprising a peripheral reticular network with central hypopigmentation. Childhood Reed and pigmented Spitz naevi often have a 'starburst' pattern, with peripheral radial streaming or pseudopods, and classic Spitz naevi may have prominent and atypical vascularity. These dermatoscopic features are shared with melanoma, which further complicates the differentiation of benign lesions. Dermatoscopic views of some childhood naevi are shown in Figure 1.

The aim of this study was to review the reason for referral of children with skin lesions to a dermatology clinic, macroscopic and dermatoscopic features of referred lesions, dermatologist management plans and the histology of excised lesions.

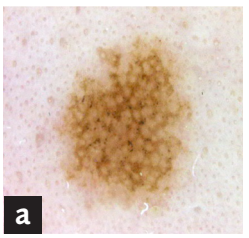
Methods

The review included referrals for all children aged 0–18 years assessed over a 28-month period from January 2010 to May 2012 through the virtual lesion clinic, a teledermatoscopy service offered by the Dermatology Department, Waikato Hospital in Hamilton, New Zealand (NZ).[8] Referrals included melanocytic and non-melanocytic skin lesions. Referral letters, macroscopic and dermatoscopic clinical images and outcomes were reviewed.

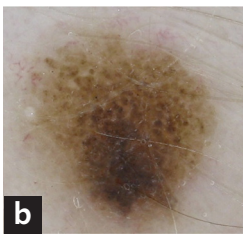
The referral source, referral diagnosis and comorbidities were recorded from the initial patient referral letter. Whether the lesion was of concern to the doctor or to the patient/guardian was confirmed on questioning by the melanographer (a health professional skilled in clinical and dermatoscopic imaging) at the time of imaging.

The presence of ABCDE criteria was recorded. The pattern recognition method for melanocytic lesions was used to record dermatoscopic characteristics, including global dermatoscopic patterns and local dermatoscopic features. The global der-

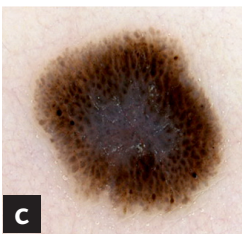
*Figure 1. Dermatoscopy of childhood naevi (original magnification x 10)**



(a) Facial naevus with reticular 'pseudonetwork'

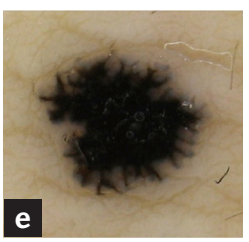


(b) Globular naevus

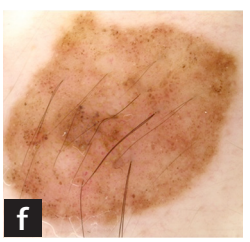


(c) Spindle cell tumour of Reed with peripheral dots and globules during a period of growth

(d) Scalp naevus with complex pattern consisting of a peripheral reticular network and a central structureless area



(e) Spindle cell tumour of Reed with starburst pattern and radial streaming



(f) Small congenital melanocytic naevus with globular pattern

* These images can be viewed in colour in the web version of this paper

matoscopic pattern was decided by two independent dermatologists. Diagnosis and management plans were reviewed, as well as the histological diagnosis for excised lesions.

Results

Eighty-nine patients with 128 lesions, aged 2–18 years, were referred during the 28-month study period. There were 53 females and 36 males. They accounted for 9% of the 961 patients seen at the virtual lesion dermatology clinic during this time. Referrals were from general practitioners in 125 cases; three referral letters were missing. The mean age of referred children was 12 years, with the number of referrals increasing by patient age.

The majority of patients were NZ European (67/89; 75%) and NZ Maori (16/89; 18%). This is in keeping with local demographic data (2006 Census data). Acne, asthma and atopic dermatitis were common comorbidities; however, the majority of referred children were described as being in good health. No children under five years were reported to have a history of sunburn. However, previous sunburns increased with the age of the patient and all patients over 15 years of age had a history of some or multiple episodes of sunburn. Two patients gave a history of having a first-degree relative with melanoma and 10 patients reported having a second-degree relative with melanoma.

A 'changing mole' was the most common reason for referral (35/89; 39%) followed by 'possible melanoma' (19/89; 21%), 'congenital naevus' (9/89; 10%) and 'multiple naevi' (9/89; 10%).

Sixty-nine lesions (54%) were said to be of concern to both the patient/guardian and the referring doctor. The remainder were of concern to either the patient/guardian (21%) or the referring doctor (25%).

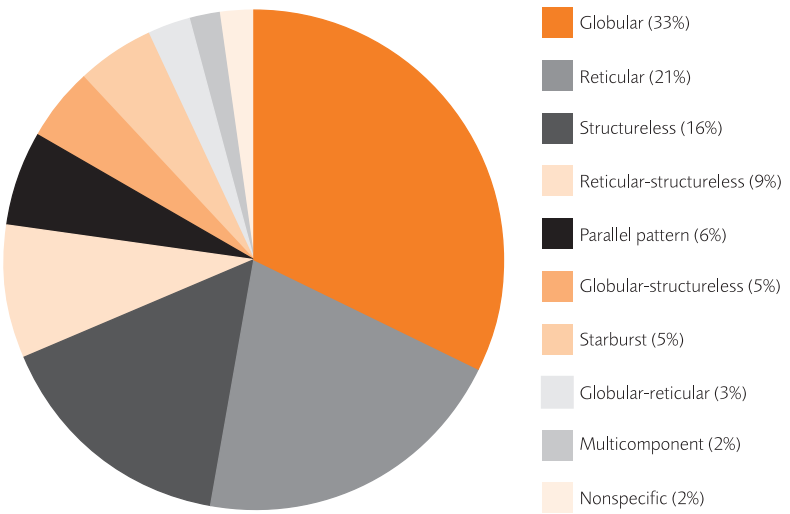
The majority of lesions were melanocytic (112/128; 88%). In more than half of these lesions (61/112; 54%) there was a history of change/evolution. Twenty-nine percent of lesions had a diameter greater than 6 mm, which likely reflects referral of congenital melanocytic naevi. Otherwise positive findings for ABCDE criteria were uncommon.

WHAT GAP THIS FILLS

What we already know: Melanoma in children is rare. However, childhood and adolescence are periods of physiologic naevogenesis and evolution, which may make clinical differentiation from melanoma difficult.

What this study adds: The main reason identified in this study for New Zealand general practitioners to refer children with skin lesions to secondary care was change in a naevus. The majority of lesions had a benign dermatoscopic pattern and did not require surgical intervention.

*Figure 2. Dermatoscopic patterns of melanocytic naevi**



* The percentages equal more than 100% due to rounding

Global dermatoscopic patterns of melanocytic lesions are shown in Figure 2. The majority of the melanocytic lesions had a single predominant pattern (92/112; 82%), with globular (37/112; 33%) being the most common, followed by reticular (23/112; 21%), structureless (18/112; 16%), parallel pattern (7/112; 6%) and starburst (5/112; 5%). Eighteen lesions had two patterns, usually concentric: reticular-structureless (10/112; 9%), globular-structureless (5/112; 5%) and globular-reticular (3/112; 3%). Two lesions had three patterns.

The most common dermatologist diagnosis was benign melanocytic naevus (112/128 lesions; 88%), including congenital naevi (19), acral naevi (8), atypical naevi (4) and spindle cell tumour of Reed (4). Criteria for atypical naevus were not

defined. The rest of the lesions were benign non-melanocytic lesions. No lesions were diagnosed as melanoma or non-melanoma skin cancer.

Dermatologist diagnosis for the majority of lesions referred as a 'changing mole' was benign melanocytic naevus (31/35, 89%). These included atypical naevi, acral naevi and congenital melanocytic naevi.

Of lesions referred as 'possible melanoma', 16/19 (84%) were dermatoscopically benign melanocytic naevi, including one Spitz naevus, which was recommended for excision. The remainder were benign non-melanocytic lesions.

Dermatologist management advice was simple reassurance for 109/128 lesions (85%). Five of 128 lesions were surgically excised (4%). Re-imaging was recommended for eight lesions. One child did not return for follow-up. One spindle cell tumour of Reed was re-imaged at six months, found to have significantly enlarged and was recommended for excision (pending at time of publication). The remaining six lesions for re-imaging were benign melanocytic naevi with unusual features (3), congenital melanocytic naevi with a history of change (2), and one Reed tumour with a history of change and significant parental concern. Re-imaging in these six lesions did not change outcome (patients/guardians were provided with simple reassurance or advised to monitor the lesion).

Excised lesions are shown in Figure 3. These were diagnosed clinically as atypical naevi, spindle cell tumour of Reed and Spitz naevi. All were benign naevi histologically, including two spindle cell tumours of Reed, two compound naevi and one Spitz naevus.

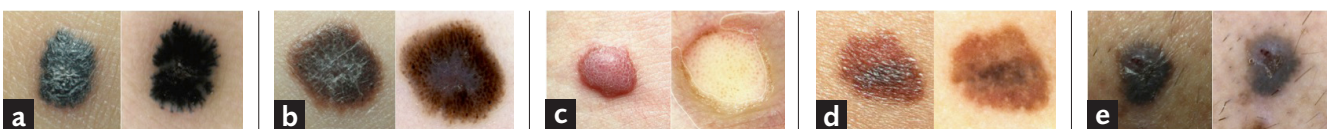
Discussion

While melanoma in children is rare, significant concern exists amongst patients and caregivers. Nine percent of patients seen in our virtual lesion clinic were young people aged up to 18 years, despite the rarity of melanoma in this age group.

Referrals increased with patient age and the majority of referrals were for adolescents. This is expected, since the majority of referrals were triggered by a new or changing mole and puberty represents a time of particularly rapid naevogenesis. More than half of the patients in our study gave a history of recent naevus evolution. Studies of dermatoscopic stability of naevi have shown younger age to be a significant factor associated with change. In one study, the odds of change for moles in children and adolescents (aged 0–18 years) over a period of 2.5 to 4.5 months was 2.6 times that of patients aged 36–50 years.[9] Approximately one-quarter of melanocytic lesions had changed in this age group and, importantly, changed naevi were more likely to be benign compared with adults.

Change alone is not a reliable sole indicator of malignancy in children and adolescents. Symmetrical increase in size, structural and colour changes are usual, particularly at puberty when moles may become lighter or darker in colour. Moles that are flat in childhood often become raised uniformly (dermal naevus) or a central papule

*Figure 3. Excised lesions**



a
Referral: Three-year-old girl with possible Spitz naevus dorsum of foot
Dermatologist diagnosis: Spindle cell tumour of Reed
Histological diagnosis: Spindle cell tumour

b
Referral: Five-year-old girl with changing mole right thigh
Dermatologist diagnosis: Atypical naevus
Histological diagnosis: Spindle cell tumour

c
Referral: Fourteen-year-old boy with possible melanoma right ankle
Dermatologist diagnosis: Spitz naevus
Histological diagnosis: Spitz naevus

d
Referral: Fifteen-year-old boy with changing mole on back
Dermatologist diagnosis: Atypical naevus
Histological diagnosis: Compound naevus

e
Referral: Fifteen-year-old boy with changing mole right cheek
Dermatologist diagnosis: Atypical naevus
Histological diagnosis: Compound naevus

* These images can be viewed in colour in the web version of this paper

appears that is surrounded by macular pigmentation (compound naevus). Typically, scalp and facial moles become dome-shaped, skin-coloured and have a smooth, firm surface in adults, while moles on the trunk retain their pigmentation but become soft and wobbly with a papillomatous or warty surface. On dermatoscopy, enlarging naevi tend to have peripheral lines, brown globules or clods around the entire lesion,[7] unlike melanoma, in which focal areas of radial streaming, black dots and clods are characteristic as it becomes increasingly irregular in shape.[10]

In addition to lesion evolution, other factors may make diagnosis of melanoma more difficult in children, including the overlapping features of melanoma with childhood Sptiz naevi. Of our five excised lesions, three of the five were Spitz or Reed naevi. Excision of these lesions is recommended if they are large (>1 cm), ulcerated or rapidly changing.[11] Given diagnostic challenges, clinical inspection alone is often unsatisfactory. Dermatoscopy is a non-invasive tool, providing additional information by allowing inspection of structures in the epidermis and superficial dermis *in vivo*. Previous studies have shown dermatoscopy improves diagnostic certainty and reduces excision rates in children.[12,13] Surveillance using serial digital dermatoscopy provides a safe management option for atypical, flat melanocytic lesions.[14]

The most frequent dermatoscopic patterns in our study were globular (33%) and reticular (21%). It is proposed that globular and reticular naevi arise via different mechanisms.[15] Globular naevi are thought to arise via an endogenous process and to be derived from dermal melanocytes during childhood. They tend to persist throughout life, eventually adopting the clinical appearance of a dermal naevus. In contrast, reticular naevi are thought to develop later in life via an exogenous pathway, with proliferation of epidermal melanocytes stimulated by intermittent exposure to ultraviolet light.

Our dermatoscopic findings are consistent with other studies of melanocytic lesions in children. A multicentre cross-sectional study by Zalaudek et al.[16] examined 5481 naevi in 480 individuals to assess prevalence of dermatoscopic naevus subtypes by age. In this study, the globular pattern was the most frequent subtype in patients aged up to 20 years, accounting for 46.8% of all naevi. Reticular naevi accounted for 29.7%. Another study from Spain of naevi in children aged 1–15 years found a dominant globular pattern in 53.3% of children and a dominant reticular pattern in 15.6%.[17]

Importantly, in our study no lesions were diagnosed clinically or histologically as melanoma. Therefore, we were unable to calculate the number needed to excise ratio for benign naevi to melanoma in our group. Children are more likely to have benign lesions excised compared with adults. A study by Moscarella et al.[18] of 10 years of dermatopathology reports in patients aged less than 20 years found 22 564 lesions excised by dermatologists. There were 38 melanomas and 22 526 benign lesions, giving a number needed to excise of 594 benign lesions for every melanoma. This value is approximately 20–100 times reported rates for adults.[19]

Since surgery in children may have adverse effects, both directly as a consequence of surgery and by promoting anxiety affecting future interactions with health professionals, unnecessary procedures should be avoided. Reducing unneccessary surgery also has economic benefits. Teledermoscopy clinics seem to offer a useful avenue to facilitate this by providing specialist opinion prior to excision. There are a number of advantages of such clinics over traditional face-to-face appointments, including reduced waiting and consultation times. The majority of patients in our group were provided with simple reassurance and only 4% of referred children had lesions excised. Concerning features that led to excision included a history of rapid change in a Spitz naevus, ulceration, and multicomponent dermatoscopic patterns.

One of the strengths of this study was that the structure of the teledermoscopy clinic allowed a complete dataset for all referred lesions, including pairing of referral letters with clinical and dermatoscopic photography and histological reports. Standardised questions were asked of all patients attending clinics, minimising missing data.

Limitations of this study include the unavailability of histological diagnosis for all lesions. Given our study population and the benign nature of the majority of lesions, histological diagnosis was felt to be unethical. Our data reflects local practice in the Waikato region of New Zealand, which may differ from other centres. Access to a teledermatoscopy clinic may encourage a lower threshold for specialist referral amongst our local general practitioners; however, this does not influence the clinical characteristics of lesions themselves. The history of evolution was given by referring doctors and patients rather than by documented change by serial photography and therefore may be inaccurate to some extent.

In conclusion, there are high levels of concern about melanoma in children, particularly when a mole is changing. Naevus evolution is unlikely to represent malignancy in this age group compared with adults; none of the changing naevi in this study were malignant. Change as a sole criterion does not necessitate specialist referral. However, where significant concern remains, teledermoscopy clinics can help provide support and reassurance for patients and doctors and reduce unecessary excisions.

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COMPETING INTERESTS
None declared.