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Research paper

Treatment delay in cutaneous malignant melanoma: from first contact to definitive treatment

Peter Murchie MBChB MSc MRCGP
Cancer Research UK Research Training Fellow in Primary Care Oncology, Department of General Practice and Primary Care, University of Aberdeen, UK

SUMMARY

Background Primary excision of melanoma is often undertaken by general practitioners (GPs), usually inadvertently. It may be that primary excision in general practice leads to earlier diagnosis and definitive treatment.

Objectives To compare the duration of different components of treatment delay in patients receiving primary excision of cutaneous malignant melanoma in primary care with those receiving primary excision in hospital.

Patients and methods One-hundred and forty-two people diagnosed with melanoma between 1994 and 2004 and currently receiving structured hospital follow-up were studied. Key dates and clinical information detailing the diagnostic pathway was abstracted from patients' general practice case notes.

Results Twenty-eight percent of primary biopsies had been undertaken by GPs. The proportion of inadequate biopsies was similar for GPs and hospital doctors. Primary biopsy by a GP resulted in earlier diagnosis but did not reduce the time to definitive treatment.

Conclusions A sizeable proportion of melanomas are inadvertently excised in general practice, resulting in an earlier diagnosis but not earlier definitive treatment. GPs may no longer be more likely to inadequately excise pigmented lesions. Further research is required to elucidate the future role of primary biopsy by GPs in the diagnosis and management of pigmented lesions.

Keywords: cancer, health policy, malignant melanoma, primary care

How this fits in with quality in primary care

What do we know?
General practitioners (GPs) often inadvertently undertake primary excision of melanoma but it is not known whether this leads to earlier diagnosis and definitive treatment.

What does this paper add?
Almost one-third of primary biopsies of melanoma were undertaken by GPs with the proportion of inadequate biopsies being similar for GPs and hospital doctors. Primary biopsy by a GP resulted in earlier diagnosis but did not reduce the time to definitive treatment.

Introduction

Melanoma is increasing in incidence amongst western populations.[1] It seems likely that associated public health efforts will increase the number of potentially worrying pigmented lesions presented to general practitioners (GPs).[2] This is potentially problematic since melanoma is a difficult disease for non-specialists to

diagnose and current guidelines do not encourage GPs to perform initial biopsies on pigmented lesions if they suspect them to be malignant melanoma.[3–6] Indeed, the likely impact of these guideline recommendations has been compounded by the recent Joint National Institute of Health and Clinical Excellence and National Collaborating Centre for Cancer guidance (*Improving Outcomes for People with Skin Tumours including Melanoma*), which advises GPs to refer directly to the local hospital skin cancer multidisciplinary team, without biopsy, any lesion that they suspect may be cancerous.[6] This may put increasing pressure on secondary care, particularly in England and Wales, where since 1997, all patients in whom their GP suspects skin cancer (squamous cancer or melanoma) require to be seen within two weeks.[7]

Nevertheless it seems likely that a considerable proportion of melanomas will be excised inadvertently by GPs, a fact brought about by the frequently atypical presentation and often benign appearance of many primary melanomas.[8] It also seems possible that adequate initial biopsy of malignant melanoma in primary care could offer some advantages to patients. It seems likely that diagnosis would be achieved more quickly, meaning a shorter, less-anxious wait for the patient. It would also appear that the delay to definitive treatment could be reduced. The desirability of such reductions in the components of delay when treating melanoma should be viewed in the context of published work reporting a median increase in thickness of superficial spreading melanomas of 0.12 mm per month, of lentigo maligna of 0.13 mm per month, and nodular melanoma 0.49 mm per month.[9] This study also reported that one-third of melanomas grew 0.5 mm per month or more, a finding that highlights the need for definitive diagnosis and treatment at the very earliest opportunity.[9]

Delay in achieving a diagnosis of cancer has been previously categorised as consisting of five stages.[10] Three of these stages (appraisal delay, illness delay and behavioural delay) occur prior to the first contact with a health professional.[10] Following first contact, two further delays occur before the cancer is definitively treated, scheduling delay (the delay between the patient making the first appointment and being seen) and treatment delay (the delay between the initial appointment and definitive treatment).[10]

This paper concentrates on treatment delay for cutaneous melanoma in 142 research participants, diagnosed with cutaneous melanoma between January 1994 and January 2004. Of these patients, 40 had their initial excision biopsy in general practice and 102 had their initial biopsy in secondary care. In both contexts, the components of treatment delay are displayed graphically in Figure 1.

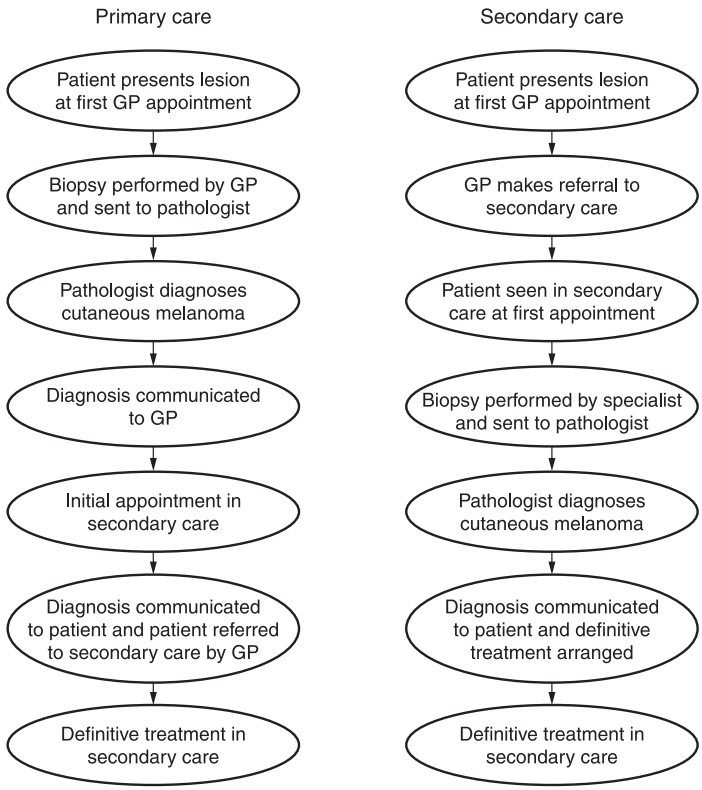

Figure 1 Diagnostic biopsy in primary and secondary care

Methods

Setting and participants

The study was conducted in a small sample of people diagnosed with cutaneous melanoma between 1994 and 2004. All were currently recurrence free, receiving hospital follow-up and had consented to participate in a randomised trial of integrated GP-led follow-up for melanoma.[11] The age range of participants was 21–86 years (Mean (standard deviation (SD)) 53.9 (15.2)) and 51.4% of the sample were female. The mean time since diagnosis was 64.8 months (range 1–317 months). Patient characteristics, site of primary melanoma and the person with the initial concern about the primary lesion are displayed in Table 1. Patients were registered at 35 general practices throughout the Grampian region.

Data collection

Ethical approval was received from the Grampian research ethics committee and informed consent obtained from each participant. Each of the 35 general practices was visited sequentially and the general practice case notes of each participant were pulled. A GP researcher conducted a detailed review of each set of case notes and abstracted key dates from the diagnostic pathway of each participant. These included date of initial presentation in general practice, date and location of initial biopsy, date of first referral from general practice, date of definitive diagnosis, date

Table 1 Patient characteristics

Characteristic	Mean (SD)			
Age (years)	53.9 (15.2)			
Sex (%)				
Male	69 (48.6)			
Female	73 (51.4)			
	GP excision	Hospital excision		Totals (% of total)
Site				
Head and neck	6	21		27 (19.0)
Upper limb	10	9		19 (13.4)
Lower limb	13	32		45 (31.7)
Torso	2	15		17 (12.0)
Back	9	16		25 (17.6)
Groin	0	1		1 (0.7)
Acral	0	5		5 (3.5)
Other	0	3	$\chi^2 = 0.081$	3 (2.1)
Person with initial concern				
Patient	34	82		116 (81.7)
GP	2	2		4 (2.8)
Spouse	2	17		19 (13.4)
Unclear	2	1	$\chi^2 = 0.105$	3 (2.1)
First biopsy location				
General practice	40			
Hospital	102			
Adequacy of first GP biopsy				
Adequate (%)	23 (71.9)			
Incomplete (%)	9 (12)			
Adequacy of first hospital biopsy				
Adequate (%)	40 (75.0)			
Incomplete (%)	12 (23.1)		$P = 0.604$	

of first hospital appointment, and dates of subsequent and definitive hospital treatment.

Statistical analysis

Data were handled on a personal computer using Microsoft Access 2000, and statistical analyses were performed using SPSS version 15. For each element of delay the median delay in days and interquartile ranges were determined. In each case, elements of delay were compared for those receiving the first biopsy in general practice or in hospital, using the Mann–Whitney *U* test.

Results

Of the 142 biopsies, 40 (28.2%) were undertaken by GPs and 102 (72.8%) by hospital doctors. In all but one case where the GP had undertaken the biopsy, a diagnosis of melanoma was not suspected by the GP undertaking the biopsy.

GPs undertook 35 excision biopsies, two shave biopsies and three punch biopsies. Hospital doctors undertook 93 excision biopsies, seven punch biopsies and two shave biopsies ($\chi^2 = 0.606$).

Where pathology reports were available, there were no significant differences in the completeness of biopsies undertaken by GPs or in hospital.

Key elements of diagnostic delay are summarised in Table 2. Where the primary biopsy was performed by the GP, definitive diagnosis was achieved in significantly less time (median 36.5 days versus median 77.0 days, $P < 0.001$). Median delay between first presentation to the GP and primary biopsy in primary care was 23.5 days (interquartile range (IQR) 8.5–23.5).

Despite earlier definitive diagnosis in the group having primary excision in general practice, there was no difference in the time between presentation and definitive treatment (median 88.0 days, $P = 0.426$).

Where the definitive diagnosis was achieved following primary biopsy in secondary care, the median time lapse between biopsy and definitive diagnosis was 13 days (IQR 8.0–19.0) and between definitive diagnosis and GP referral was six days (IQR 6.0–8.5). The subsequent median delay until the patient was seen at the hospital outpatient clinic was 21 days (IQR 7.0–39.5), with the subsequent median delay to definitive treatment being 6.5 days (IQR 1.0–36.3).

There was no significant difference in the Breslow depth of lesions primarily excised in general practice or hospital.

Discussion

Summary of findings

In this small sample, 28.2% of cases of cutaneous malignant melanoma were diagnosed following primary biopsy in primary care. Primary excision in general practice reduced the time to definitive diagnosis of melanoma by a pathologist, but did not reduce the interval between diagnosis and definitive treatment. The median delay between presentation and first biopsy by a GP was about three and a half weeks. Following biopsy by a GP, there was a median delay of two weeks until the diagnosis was established and a further median

Table 2 Comparisons in delay (initial biopsy in primary care versus initial biopsy in hospital)

	GP first biopsy (median (IQR))	Hospital first biopsy (median (IQR))	*P* value[a]
Delay element (days)			
Presentation to definitive diagnosis	36.5 (23.8–78.3)	77.0 (48–141)	<0.001
Presentation to definitive treatment	88.0 (45.5–122.0)	88.0 (53.0–169.0)	0.426
Presentation to first biopsy	23.5 (8.5–23.5)	54.0 (58.3–105.5)	0.002
Presentation to first GP referral	39.5 (31.3–76.3)	1.0 (0–5.0)	<0.001
Presentation to first hospital appointment	75.0 (45.0–103.5)	41.0 (15.0–89.0)	0.002
GP referral to first hospital appointment	21.0 (7.0–39.5)	34.0 (15.0–76.0)	0.016
First hospital appointment to First hospital treatment	6.0 (1.0–17.5)	8.0 (1.0–20.0)	0.594
First hospital appointment to definitive treatment	6.5 (1.0–36.3)	41.0 (21.7–72.0)	<0.001
Breslow depth at diagnosis (mm)	0.9 (0.4–2.0)	0.65 (0.3–1.5)	0.585

[a] Mann–Whitney *U* test.

delay of six days until the patient was referred to secondary care. It took a further four weeks for the patient to be seen and definitively treated in secondary care.

Strengths and limitations

This small study was conducted using good-quality and detailed information abstracted by a GP researcher from general practice case notes. In nearly every case it was possible to construct a detailed picture of the diagnostic pathway for individual patients by a careful reading of consultation notes and correspondence between the GP and the hospital. The study provides information on delays inherent in current NHS systems, leading to delays for patients in achieving definitive diagnosis and treatment of their cutaneous melanoma. The study also hints at a need for a larger more definitive study likely to have several key practical implications for the reorganisation of the primary–secondary care interface to optimise the diagnosis of cutaneous melanoma.

The study had several limitations. Most importantly it was a non-randomised observational study and there were several sources of potential bias. Firstly, data were all from melanoma survivors, with no metastatic disease at diagnosis, and no evidence of recurrence at the time of sampling. Furthermore, we were comparing GP-excised lesions, which in most cases had been diagnosed as benign by the GP, with those referred to hospital, about which the GPs may have been more concerned. For this reason it was not possible to exclude the possibility that there were important differences between the lesions tackled in primary care and those referred to secondary care.

Although this was a relatively small sample of participants, there are no compelling reasons to believe that their diagnostic experience differed markedly from that of others in the area. Obtaining a date for definitive diagnosis was difficult in some cases since actual copies of the pathology report were only available in 84 cases (32 GP excisions and 52 hospital excisions).Where pathology reports were not available, the date when a hospital letter first definitively stated the diagnosis was used. This may have resulted in an overestimate of the delay to definitive diagnosis in those having a primary biopsy in secondary care. This problem was limited to the ascertainment of a date for definitive diagnosis. The study was limited to the consideration of treatment delay. Nevertheless, this was an important source of delay in the diagnosis and treatment of cancer, where practical measures to reduce delay could be identified and implemented.

Context

In this study, in only one case had the GP undertaking a primary biopsy actually suspected melanoma. In all other cases the diagnosis was not expected, and this may account for the median delay between initial presentation and first biopsy in general practice being slightly more than three weeks. This accords with earlier research indicating that GPs have difficulty in diagnosing melanoma.[3,12] Importantly, the data confirmed that a sizeable proportion of cutaneous melanoma cases are inadvertently excised by GPs.[8] Earlier work suggested that GPs are more likely to incompletely excise cutaneous melanoma when undertaking primary biopsy.[8] As a result, current guidelines do not support GP excision of pigmented lesions.[4–6] This does not accord with the findings here.

Implications

These data support the view that GPs find melanoma difficult to diagnose and that a diagnosis of cutaneous melanoma frequently follows inadvertent biopsy in primary care of lesions not thought to be malignant, comprising almost one-third (28.9%) of this small sample. Were this to be representative, then the two-week rule operated in England and Wales is unlikely to have much impact on diagnostic delay in this group of patients.[7] This view is supported by a report combining data from 52 audits from around the UK that found that only 42% of confirmed skin cancer had been referred via the two-week rule.[13] In this small sample GPs were no more likely to incompletely excise the melanoma than specialists, but the strength of this conclusion is hampered by a large amount of missing data (58 cases). Compared with excision in secondary care, primary biopsy by a GP led to a significantly quicker diagnosis, but further treatment did not appear to be particularly expedited thereafter and there was no reduction in the time to definitive treatment.

Taken together these data have three important implications. Firstly, the maximum benefit of primary biopsy by a GP is hindered by the fact that the GPs in this sample delayed for about three and a half weeks after presentation before undertaking the primary biopsy. Presumably this reflects a lack of diagnostic confidence. Practical and sustainable educational interventions to improve GPs' skills in diagnosing melanoma should be sought to reduce this delay or facilitate confident urgent referrals to secondary care.

Secondly, it seems self-evident that when primary excision of a cutaneous melanoma in undertaken by a GP, whether inadvertent or intentional, it should result in earlier definitive treatment. The fact that it

does not suggests important sources of process delay at the primary–secondary care interface. In this sample, following biopsy by a GP, there was a two-week median wait until the diagnosis was established. It then took a further six days for the result to be communicated to the GP and for the referral to be made. Subsequent to the referral of a patient with definite melanoma, it took a median of nearly three weeks for them to be seen at the outpatient clinic, with definitive treatment following a week thereafter. Given the nature of melanoma, and the possibility that up to one-third of lesions are increasing in thickness by 0.5 mm per month or more, these delays are far from ideal.[9] The actual reasons for them should be identified and remedied.

Thirdly, it may be timely to explore whether GP minor skin surgery continues to be suboptimal to that of specialists, a view that underpins current guidelines.[4–6] In the current climate, guidelines discouraging primary biopsy by GPs, compounded by the guarantee of specialist review of all cases of suspected skin cancer within two weeks, may result in an unmanageable burden on specialists, with adverse outcomes on diagnostic and treatment delay.[4–7] Historical reports suggest that several aspects of GP minor surgery, including a tendency to incompletely excise lesions and to discard up to 40% of biopsy specimens without pathology, are suboptimal.[8,14] These reports, however, predate several developments in primary care such as general practitioners with special clinical interests (GPwSIs) and more widespread availability of training in dermatology and minor surgery.[15,16] Furthermore, they are inconsistent with the current data that suggest that GPs, at least in northeast Scotland, may be no more likely to incompletely excise malignant melanoma than hospital specialists. At the very least, given the number of melanomas that are likely to continue to be excised inadvertently in primary care, we should seek reassurance that GP performance is acceptable. In addition we should seek to develop sustainable educational initiatives that include efforts to optimise the skills of GPs to diagnose and biopsy skin lesions in primary care. Such strategies may also include appropriate methods to utilise modern technologies (e.g. digital images and teledermatology) and improve the use of existing rapid-referral mechanisms by GPs. Diagnostic skills should be viewed as a particular priority, when it is considered that an *in situ* melanoma may potentially progress to one with a Breslow depth of greater than 2.0 mm in four months.[9]

Taken together these findings suggest that a larger, more-definitive study is required, firstly to clearly define the duration of and reasons for delay in the diagnostic pathway of cutaneous melanoma, and secondly, to revisit the issue of GP skills in excising pigmented lesions. At the present time there is insufficient evidence to define the precise role of or most appropriate level of input of GPs in the management of pigmented lesions, with the result that GPs are largely discouraged from involvement.[4–6] A study, such as that outlined above, may usefully inform the future development of skin cancer diagnostic services. It may be that current advice to refer practically all suspect lesions is supported.[4–6] However, it could be that initial primary excision by GPs in primary care could become the investigation of choice for all pigmented lesions. Equally, it may be found that GP performance of primary skin biopsy is supported, but only for particular lesions, exhibiting particular characteristics at particular sites.

Conclusions

Large numbers of melanomas are inadvertently excised in general practice, resulting in an earlier diagnosis but not earlier definitive treatment. GPs may no longer be more likely to inadequately excise pigmented lesions. Further research is required to elucidate the future role of primary biopsy by GPs in the diagnosis and management of pigmented lesions.

ETHICS COMMITTEE

Full ethical approval was granted by Grampian Research Ethics Committee on 10th November 2003 (Project No: 03/0262).

REFERENCES

1 Lens MB and Dawes M. Global perspectives of contemporary epidemiological trends of cutaneous malignant melanoma. *British Journal of Dermatology* 2004;150:179–85.
2 Jackson A, Wilkinson C and Pill R. Moles and melanomas – who's at risk, who knows, and who cares? A strategy to inform those at high risk. *British Journal of General Practice* 1999;49:199–203.
3 Del Mar CB and Green AC. Aid to diagnosis of melanoma in primary medical care. *BMJ* 1995;310:492–5.
4 Scottish Intercollegiate Guidelines Network. *Cutaneous Melanoma: Guideline Number 72.* Edinburgh: Scottish Intercollegiate Guidelines Network, 2003.
5 Roberts DLL, Anstey AV, Barlow RJ and Cox NH. UK guidelines for the management of cutaneous melanoma. *British Journal of Dermatology* 2002;146:7–17.
6 National Institute for Health and Clinical Excellence and National Collaborating Centre for Cancer Guidance. *Guidance on Cancer Services. Improving outcomes for people with skin tumours including melanoma: the manual.* London: National Institute for Health and Clinical Excellence, 2006.

7 Department of Health. *The New NHS. Modern, dependable.* (Government White Paper). London: HMSO, 1997.
8 Korshid SM, Pinney E and Newton Bishop JA. Melanoma excision by general practitioners in northeast Thames region, England. *British Journal of Dermatology* 1998;138:412–17.
9 Liu W, Dowling JP, Murray WK *et al.* Rate of growth in melanomas: characteristics and associations of rapidly growing melanomas. *Archives of Dermatology* 2006;142:1551–8.
10 Andersen BL and Cacioppo JT. Delay in seeking a cancer diagnosis: delay stages and psychophysiological comparison processes. *British Journal of Social Psychology* 1995;34:33–52.
11 Murchie P, Hannaford PC, Wyke S, Nicolson MC and Campbell NC. Designing an integrated follow-up programme for people treated for cutaneous malignant melanoma: a practical application of the MRC framework for the design and evaluation of complex interventions to improve health. *Family Practice* 2007;24:283–92.
12 Bedlow AJ, Cliff S, Melia J *et al.* Impact of skin cancer education on general practitioners' diagnostic skills. *Clinical and Experimental Dermatology* 2000;25:115–18.
13 Cox NH. Evaluation of the UK 2-week referral rule for skin cancer. *British Journal of Dermatology* 2004;150:291–8.
14 Lowy A, Willis D and Abrams K. Is histological examination of tissue removed by general practitioners always necessary? Before and after comparison of detection rates of serious skin lesion. *BMJ* 1997;315:406–8.
15 Brown JS, Smith RR, Cantor T, Chesover D and Yearsley R. General practitioners as providers of minor surgery – a success story? *British Journal of General Practice* 1997;47:205–10.
16 Salisbury C, Noble A, Horrocks S *et al.* Evaluation of a general practitioner with special interest service for dermatology: randomised controlled trial. *BMJ* 2005;331:1441–6.

CONFLICTS OF INTEREST

None.

ADDRESS FOR CORRESPONDENCE

Dr Peter Murchie, Department of General Practice and Primary Care, University of Aberdeen, Foresterhill Health Centre, Westburn Road, Aberdeen AB25 2AY, UK. Tel: +44 (0)1224 553066; fax: +44 (0)1224 550683; email: p.murchie@abdn.ac.uk

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