

MEDICAL PRACTICE

Hospital Topics

Why are patients with acute stroke admitted to hospital?

JOHN BAMFORD, PETER SANDERCOCK, CHARLES WARLOW, MUIR GRAY

Abstract

Data on 515 consecutive patients registered with the Oxfordshire Community Stroke Project were used to compare the characteristics of those patients who were admitted to hospital within one month after their first stroke with those who remained in the community during that time. Twenty eight patients had their stroke while in hospital for other conditions, and of the remaining 487, 266 were admitted. Though patients with a severe neurological deficit were significantly more likely to be admitted, 47 out of 202 such patients were managed in the community.

In a substudy of 162 consecutive patients the general practitioners' reasons for either arranging admission to hospital or continuing with community care in the first week after the stroke were ascertained. Sixty patients were admitted. The only reason for admission was diagnostic uncertainty in five cases (though this was a contributing factor in 25) and to provide nursing or general, non-medical care in 25. Patients who lived alone were more likely to be admitted. All 12 patients who presented directly to the casualty department were admitted, though only five had had a severe stroke.

A stroke service that provides a facility for rapid outpatient and domiciliary diagnosis as well as a rapidly acting domiciliary nursing team might reduce the number of patients with stroke admitted to hospital without adversely affecting the quality of patient care: this should be properly evaluated.

Introduction

In the United Kingdom 40-70% of patients with acute stroke are admitted to hospital.¹⁻³ There has been much debate about moving the burden of care from hospitals to the community, and the high cost of hospital care has been cited as one reason for such a policy.⁴ There are about 100 000 new cases of stroke a year in England and Wales,⁵ so even a small change in admission practice for strokes would appreciably alter the balance of hospital and community care (if a 50% admission rate is assumed then a reduction of 20% would mean 10 000 extra patients remaining in the community each year). Before pursuing such a major change in policy it is important to consider why patients with stroke are admitted to hospital, to know their clinical and social characteristics, and in particular to identify the factors that affect a general practitioner's decision to opt for hospital or community care. We studied these factors in a series of patients from the Oxfordshire Community Stroke Project.

Patients and methods

The background to the Oxfordshire Community Stroke Project and the methods used have been reported elsewhere.⁵ Briefly, it is a community based, prospective study that provides a complete and unbiased sample of patients who have had a stroke for the first time from a population of about 105 000 (the population is defined as those patients registered with one of 49 collaborating general practitioners). Stroke was defined according to the criteria of the World Health Organisation as "rapidly developing clinical signs of focal and at times global (applied to patients in deep coma and to those with subarachnoid haemorrhage) loss of cerebral function, with symptoms lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular origin."⁶ Most patients, whether at home or in hospital, were assessed as soon as possible after the stroke by a neurologist participating in the study, who recorded clinical and social data. The notes of the few patients who died very rapidly were reviewed. The data on 515 consecutive patients, recruited during the first three years of the study, were used to compare the characteristics of patients admitted to hospital at any time within one month after their first stroke with those of patients who remained in the community throughout the same period.

In a substudy of 162 consecutive patients who were registered between

University Department of Clinical Neurology, Radcliffe Infirmary, Oxford OX2 6HE

JOHN BAMFORD, MB, MRCP, acting clinical lecturer
PETER SANDERCOCK, DM, MRCP, acting clinical lecturer
CHARLES WARLOW, MD, FRCP, clinical reader and consultant neurologist

Community Health Department, Radcliffe Infirmary, Oxford OX2 6HE
MUIR GRAY, MD, community physician

Correspondence to: Dr Bamford.

January and October 1984 we asked their general practitioners to complete a questionnaire that assessed the reasons behind their decision either to request admission to any hospital in the first week after the stroke or to care for the patient in the community. For this study the community was defined as any place of care other than a hospital.⁷ The questionnaire allowed the general practitioners to indicate more than one factor, but we did not ask them to rank them in order of importance.

We assessed the maximum motor deficit in the first 72 hours after the stroke. Patients were considered to have had a severe motor deficit if they had severe hemiparesis (defined as one completely paralysed limb and pronounced weakness of the other ipsilateral limb), complete hemiplegia, triplegia, or quadriplegia (after Marquardsen⁸). Patients who had any impairment of consciousness 24 hours after the stroke or a severe motor deficit, or both, were classed as having had a clinically severe stroke.

The data were entered on to the University of Oxford ICL 2988 and Digital VAX computers and analysed using the Statistical Package for the Social Sciences and Minitab.^{9,10} Confidence limits were calculated using standard methods.¹¹

Results

Between November 1981 and October 1984, 515 patients who had a stroke for the first time were registered with the Oxfordshire Community Stroke Project. Twenty eight were in hospital at the time the stroke occurred, having been admitted for other conditions; these patients were excluded from further analysis. Of the remaining 487 patients, 266 were admitted to hospital at some time during the first month after their stroke and 221 patients remained in the community throughout this period.

TABLE I—Factors reflecting extent of neurological damage in patients with stroke and their effect on admission to hospital

Extent of neurological damage	No (%) of patients not admitted (n=221)	No (%) of patients admitted (n=266)	Significance
Maximum motor deficit during first 72 hours:			
Mild	167 (61)	107 (39)	$\chi^2=65.3$, 2 df, $p<0.001$
Severe	45 (23)	149 (77)	
Unknown	9 (47)	10 (53)	
Impairment of consciousness at 24 hours:			
None	205 (55)	170 (45)	$\chi^2=57.1$, 2 df, $p<0.001$
Impaired	14 (13)	90 (87)	
Unknown	2 (25)	6 (75)	
Survival after 30 days:			
Alive	196 (51)	192 (49)	$\chi^2=20.3$, 1 df, $p<0.001$
Dead	25 (25)	74 (75)	
Severe stroke diagnosed*:			
Yes	47 (23)	155 (77)	$\chi^2=68.0$, 1 df, $p<0.001$
No	174 (61)	111 (34)	

*Severe motor deficit or impaired level of consciousness.

The study comprised 259 women and 228 men, of whom 145 (56%) and 121 (53%) respectively were admitted. Of 122 patients aged 65 and less, 74 (61%) were admitted compared with 192 (53%) of 365 aged more than 65 ($\chi^2=2.4$, NS). Table I shows the relation between admission to hospital and factors that reflect the extent of neurological damage. Though patients with serious strokes were more likely to be admitted, 47 (23%) of 202 patients who suffered a severe stroke remained in the community. The figure shows the odds ratios, with 95% confidence limits of the point estimates, for these and other factors (an odds ratio of 1.0 reflects an even chance of being admitted to hospital or remaining in the community).

RESULTS OF SUBSTUDY

Completed questionnaires were returned for 161 of the 162 patients, of whom 80 remained in the community, 60 were admitted to hospital by their general practitioner in the first week after their stroke, 12 referred themselves to hospital either by dialling 999 or by attending the casualty department, seven had their stroke while already in hospital for other reasons, and two were admitted from the outpatient department by the neurologist participating in the study.

Of the 140 patients who were first assessed by their general practitioner and might have been admitted to hospital, 45 were living alone at the time of their stroke and 26 (58%) of these were admitted compared with 34 (35%) of the 95 who lived with some other person ($\chi^2=6.03$, $p<0.05$). None of the nine patients who were resident in a private or religious nursing home at the time of their stroke were admitted to hospital.

Table II shows the reasons given by general practitioners for requesting admission to hospital for the 60 patients in the first week after the stroke; these can be divided into medical and nursing or social reasons. No medical reasons for admission were identified in 25 (42%) cases. Though the provision of nursing or general non-medical care was a contributory factor in 52 (87%) admissions, only 29 of these patients were considered to have had a severe stroke. Five patients were admitted solely because of doubts about diagnosis, and in four other cases the availability of the facilities of the stroke project for diagnosis obviated the need for admission. Thus in nine (6%) of the 140 cases (95% confidence limits 2.4-10.4%) the only major problem faced by the general practitioner was one of diagnosis.

TABLE II—Reasons given by general practitioners for requesting admission to hospital (60 patients) or for continuing community care (80 patients) in first week after stroke. Figures are numbers (%) of patients

Reason	Given as one of several reasons	Given as only reason
<i>Patients admitted to hospital (n=60)</i>		
Medical:		
To make or confirm diagnosis	25 (42)	5 (8)
For medical treatment—eg, pneumonia, subarachnoid haemorrhage	18 (30)	3 (5)
Nursing or social:		
For nursing or general care	52 (87)	25 (42)
Other—eg, patient or relative's request	4 (7)	
<i>Patients remaining in community (n=80)</i>		
Stroke was mild	61 (76)	34 (42)
Patient's request	17 (21)	
Relative's request	8 (10)	
To allow patient to die at home	7 (9)	5 (6)
Stroke project facilities available*	31 (39)	4 (5)

*Rapid outpatient assessment or domiciliary consultation service.

Table II also shows the general practitioners' reasons for deciding to continue with community care throughout the first week after a patient's stroke. In only one case was the patient managed at home because no hospital beds were available.

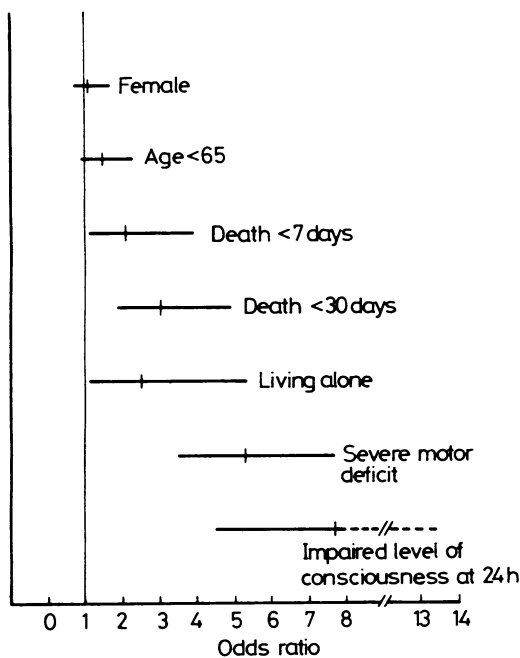
The 12 patients who did not consult their general practitioner were all admitted directly from the casualty department, though only five had had a severe stroke.

Discussion

If a policy of increased community care is to be pursued, either in the belief that it will be less expensive⁴ or because of the suggestion that hospital care may actually impede rehabilitation in some groups of patients with stroke,^{12,13} it is important that both the characteristics of these patients and the views of the general practitioners, who usually determine their place of care, are known. We did not study the relative merits of hospital and community care; nor did we introduce any major new service apart from help with the diagnosis in some patients who remained in the community. Rather we report the various factors that influence general practitioners, who are trying to obtain optimal care for their patients, based on the services currently available in Oxfordshire. We can, however, make a comparison between those patients remaining in the community and those admitted to hospital; this is not possible in hospital based studies. Though there may be differences among regions in the provision of various hospital and community services, we believe that the results of our study can be used to suggest improvements in the provision of services that might lead to more community care for patients with acute stroke without any deterioration in the standards of care.

Our findings are in broad agreement with those of other studies,^{3,14} notably that having a severe stroke and living alone are factors that increase the odds of being admitted to hospital after a

stroke (figure). It is important to emphasise, however, that in our study 23% of patients with severe strokes and 42% of patients living alone were managed entirely in the community. Wade and Hewer reported that in the Bristol area 26% of patients with stroke managed at home were severely disabled.¹⁴ Brocklehurst *et al* attempted to find out general practitioners' reasons for admitting patients with stroke to hospital (though not for keeping them in the community) but were able to obtain a response in only 53% of cases.³ In our study 87% of patients were initially assessed by their general practitioner, and the response to the questionnaire was 99.4%, which reflects the close cooperation of the participating general practitioners in all aspects of the Oxfordshire Community Stroke Project. Not surprisingly, the provision of nursing and general, non-medical care was identified by the general practitioners as a reason for admission in 87% of cases; more interestingly, in 42% of cases it was considered to be the only reason for admission despite only 56% of these patients having had a severe stroke. Thus whether "high technology" hospitals are the most appropriate or cost effective way of providing care for this type of patient is doubtful.



Factors associated with admission to hospital of 487 patients whose first stroke occurred outside hospital. Vertical lines represent odds ratio for each factor; horizontal lines represent 95% confidence limits for that odds ratio. *Based on 140 patients in substudy.

It is noteworthy that all patients in our study who were residents in private or religious nursing homes before their stroke remained there, although over half had had a severe stroke. This suggests that general practitioners did not perceive a need for admission to hospital of patients in a nursing home, where extra care can be organised rapidly. A recent non-randomised study in Bristol showed that augmented domiciliary care (though without a 24 hour emergency service) did not significantly reduce admissions to hospital,¹⁵ but, as the authors pointed out, this lack of effect could equally well have been due to methodological flaws in the study. Their experience emphasises that however advantageous a policy of augmenting community services might seem it must be properly evaluated before being generally implemented. Nevertheless, we think that the results of our study show that there is considerable scope for increased community care and that further trials should be considered, especially if they include the rapid mobilisation of community services.

In about 6% of cases the only major problem faced by the general practitioner was one of diagnosis, and in four cases the diagnostic

services provided by the Oxfordshire Community Stroke Project were considered to have obviated the need for admission. Uncertainty of diagnosis was thought to be a contributing factor in 42% of admissions; in 40% of these cases the patient was judged not to have suffered a severe stroke. Because a general practitioner sees only four or five patients suffering from a stroke for the first time each year it is not surprising that at least one will cause some doubt over diagnosis. In many areas general practitioners already have access to pathology departments and electrocardiography, allowing them to investigate adequately most patients with stroke. Relatively few patients require more specialist investigations such as computed tomography; those who do can be selected on simple clinical criteria, and many could undergo scanning as an outpatient.¹⁶ Our study suggests that the availability of a competent and rapid domiciliary and outpatient diagnostic service might obviate the need for admission of a substantial number of patients.

Many patients with stroke are admitted after self referral to the casualty department, yet our results suggest that many of them have not had a severe stroke.^{3,14} It should be possible for hospital doctors to assess a patient in the casualty department, arrange the basic investigations, but not necessarily admit the patient to hospital. For this to be a reasonable and practical line of management some form of community nursing and rehabilitation service must be easily and quickly available to ensure continuity of care and adequate medical supervision of such patients when they get home. Such a policy might be more applicable to urban areas, where self referral to casualty departments is more common. An experimental scheme of this type (though not restricted to patients with stroke) is operating in Hackney, and early experience suggests that it is possible to implement such a policy (Miss P Hibbs, personal communication).

Our study has provided much clearer information than was previously available on general practitioners' reasons for either admitting patients with stroke to hospital or continuing to care for them in the community. We conclude that there is scope for increased community care of patients with acute stroke and agree with Brocklehurst *et al* that adverse nursing and social factors are likely to result in admission,³ though a sizable proportion of patients with severe strokes, in Oxfordshire at least, are managed in the community. Any additional community nursing and support services, however, should be able to react quickly (that is, on the same day as the stroke) to organise the turning, toileting, and feeding of the patient and to advise relatives or other carers. The provision of a hospital based, rapid diagnostic service oriented towards the community might also have a part to play, especially in cases of mild neurological deficit. The current admission practice of junior hospital staff in casualty departments might be changed if they had access to some form of stroke service that could liaise with the patient, family, hospital, and general practitioner. This type of service, however, must be properly evaluated, preferably by a randomised trial.

Though it varies in different areas, the tendency towards a dichotomy between hospital and community based practice may well be impeding the most efficient provision of services to patients with stroke. Any change in policy towards more community care may benefit the patients but is unlikely to be appreciably less expensive than hospital care if standards of patient management are to be maintained.¹⁷

This work is being supported by grants from the Medical Research Council and the Chest, Heart, and Stroke Association. We thank the participating general practitioners and all consultants who allowed us to study their patients, our research nurses Mrs S Price and Mrs E Mogridge, all the practice receptionists and nursing staff who have helped in many ways, and the voluntary care drivers of Oxfordshire who have provided invaluable help in transporting patients.

The following departments are collaborating in the Oxfordshire Community Stroke Project: university department of clinical neurology (Dr J Bamford, Dr P Sandercock, Dr C Warlow, Mrs S Price, Mrs E Mogridge, Mrs H Storey); department of neuroradiology (Dr A Molyneux, Dr P Anslow); department of neuropathology (Dr J Hughes, Dr M Esiri, Dr E Ilgren); and university department of community medicine and general practice (Professor M Vessey, Dr K McPherson, Dr G Fowler, Mrs L Jones). General practitioners collaborating (name of liaison partner from each practice only) are: Dr A McPherson, Oxford; Dr A Markus,

Thame; Dr D Leggatt, Oxford; Dr M Agass, Berinsfield; Dr D Otterburn, Abingdon; Dr S Street, Kidlington; Dr V Drury, Wantage; Dr R Pinches, Abingdon; Dr N Crossley, Abingdon; and Dr H O'Donnell, Deddington.

References

- 1 Cochrane A. The burden of cerebrovascular disease. *Br Med J* 1970;iii:165.
- 2 Hewer RL. Stroke rehabilitation. In: Gillingham FJ, Mawdsley C, Williams AL, eds. *Stroke: proceedings of the ninth Pfizer international symposium*. Edinburgh: Churchill Livingstone, 1976.
- 3 Brocklehurst JC, Andrews K, Morris P, Richards BR, Laycock PL. Why admit stroke patients to hospital? *Age Ageing* 1978;7:100-8.
- 4 Hunt LB. Implementation of policies for community care—the DHSS contribution. *Health Trends* 1985;17:4-5.
- 5 Oxfordshire Community Stroke Project. Incidence of stroke in Oxfordshire: first year's experience of a community stroke register. *Br Med J* 1983;287:713-7.
- 6 Aho K, Harmsen P, Hatano S, Marquardsen J, Smirnov V, Strasser T. Cerebrovascular disease in the community: results of a WHO collaborative study. *Bull WHO* 1980;58:113-30.
- 7 Acheson ED. That over used word community. *Health Trends* 1985;17:3.
- 8 Marquardsen J. *The natural history of acute cerebrovascular disease*. Copenhagen: Munksgaard, 1969.
- 9 Nie NH, Hull CH, Jenkins JG, et al. *Statistical package for the social sciences*. New York: McGraw Hill, 1975.
- 10 Ryan T, Joiner L, Ryan B. *Minitab reference manual*. Boston: Duxbury, 1982.
- 11 Armitage P. *Statistical methods in medical research*. Oxford: Blackwell Scientific Publications, 1971.
- 12 Andrews K, Stewart J. Stroke recovery: he can but does he? *Rheumatology and Rehabilitation* 1979;18:43-8.
- 13 Court C, Capildeo R, Rose FC. Medico-social aspects of stroke: a domiciliary follow up. In: Greenhalgh RM, Rose FC, eds. *Progress in stroke research*. Vol 1. London: Pitman Medical, 1979.
- 14 Wade DT, Hewer RL. Hospital admission for acute stroke: who, for how long, and to what effect? *J Epidemiol Community Health* (in press).
- 15 Wade DT, Hewer RL, Skilbeck CE, Bainton D, Burns-Cox C. Controlled trial of home-care service for acute stroke patients. *Lancet* 1985;ii:323-6.
- 16 Sandercock P, Molyneux A, Warlow C. Value of computed tomography in patients with stroke: Oxfordshire Community Stroke Project. *Br Med J* 1985;290:193-7.
- 17 Opat LJ. Domiciliary care for the elderly sick—economy or neglect? *Br Med J* 1977;ii:30-3.

(Accepted 8 February 1986)

MATERIA NON MEDICA

Generous wine

Portuguese is an impenetrable tongue. On a recent visit to the lodges of the Madeira Wine Company in Funchal we wandered into what looked like a carpenter's shop, to discover that it was, in fact, where they made the casks. Our interest must have shown on our faces, because a stocky workman in overalls came over to us, talking rapidly in Portuguese, of which we understood not one word. Finally, desperate to be understood, he said haltingly, "Eu—cooper."

He beamed with pride at the word he had produced, and we beamed back with admiration. So great was the pleasure of the moment that he chose to prolong it by conducting us personally on a little tour of the premises. In his cooerage he showed how his beautiful casks were made, knocking on them to demonstrate the hardness of the wood. "Carvalho, carvalho." It was only when he sketched a galleon in the air with his hands that we understood he meant "oak."

Madeira is a fortified wine, which, after fortification with wine alcohol, undergoes a process known as "estufagem." This entails heating the wine, in casks, in a loft, for a period of six months. The process gives the wine its characteristic "burnt" taste, and prolongs its life.

We were shown rooms full of casks of various sizes, containing wines of different types and colours and ages. It is said that George Plantagenet, Duke of Clarence, in 1478 was drowned in a butt of malmsey, in the Tower of London, possibly on the orders of his brother, Edward IV. Previously it had seemed like a fanciful tale which Shakespeare, perhaps, embroidered. Now, having seen the casks, it no longer seems so fanciful. In the very largest of them it might have been possible to drown not only the unfortunate duke, but his horse as well. One of the Madeira Wine Company's products is named "Duke of Clarence." It seems a fitting memorial.

We communicated with our enthusiastic guide in the way people without a common language sometimes can, when they have a will to. He even managed to teach us one or two words. As a parting gesture he pointed out to us the heartwarming words stencilled on the side of each cask—"Vinho Generoso."—ANNA-MARIA ROLLIN, consultant anaesthetist, Epsom.

Opercula

The bizarre behaviour of medical students needs no emphasis, although I have a feeling that this is less so nowadays. Much of this behaviour is related to feelings of wellbeing and bonhomie. Some, however, has been more productive and useful. It is the work of one such student that I wish to record, albeit it is non-medical in character.

Shepherd Thomas Taylor was Norfolk born. In 1860 he joined the medical school of King's College, London, which was then situated in Portugal Street near the Strand. He lodged in Argyll Square, King's Cross, and there his attention was first drawn to coal hole covers, or, as he was later to name them, "opercula"—from the Latin operculum, meaning a covering or lid. These were made of cast iron and covered the chutes once used to feed coal to the cellars of the larger houses of the period.

As Taylor said in 1929, when he was 90 years old, "I determined to try to reproduce them on paper, and, although I had no particular artistic skill, I found no difficulty in making a fair sketch of the more difficult devices. I took no actual casts from the opercula themselves, but simply made notes in my pocket book of their characteristic features. My eyes got so accustomed to the work that I could immediately recognise the smallest difference

between any two opercula without comparing one with another. I might have added largely to the series if I had remained in London, but at the close of my curriculum I had more important duties to attend to in my native county." (He later became physician to the Norfolk and Norwich Hospital and the Jenny Lind Infirmary for Children.)

His wanderings in search of specimens took him to Hampstead Road, Blackfriars Road, Gower Street, and Carey Street as well as to Regent Street, Oxford Street, Trafalgar Square, and Holborn. He drew about 150 designs, some delicately made, as in Euston Road; some of extreme simplicity, as in Regent Street; others more complex, as in Newcastle Street, with undertones of the Gothic Revival.

How many have survived today? Tottenham Court Road provided a veritable galaxy in the mid-nineteenth century, but few, if any, remain now. I myself saw a few in Mayfair some years ago. Whose job is it to save them? Westminster City Council claimed that the responsibility was with the owner of the coal hole. Some while back it provided red lights and railings to guard any uncovered hole, while charging £4 10s (£4.50) for a modern replacement. In 1962 the late Sir John Betjeman attended an exhibition of opercula at Gallery One in London. In 1965 the Golden Head Press of Cambridge reproduced a charming booklet, then costing fifteen shillings (75p), of the original drawings published in 1929, which, as far as I am aware, is now unfortunately out of print.—I M LIBRACH, Romford.

A man of 50 with a family history of Huntington's chorea has recently started twitching in his sleep and suffering occasional memory lapses. Might this be early signs of the disorder developing in him?

Huntington's chorea always shows an autosomal dominant pattern of inheritance. In the present case, with one grandparent having the disease and the father having died young, the patient's chances of inheriting the condition are 1:4. The features of twitching of the muscles and lapse in memory are certainly compatible with early Huntington's chorea, which frequently presents at this age. I strongly recommend that he see a neurologist; if the diagnosis of Huntington's chorea is confirmed, there are important implications for his family and genetic counselling may be necessary.—R W ROSS RUSSELL, consultant neurologist, London.

A 34 year old nulliparous woman has on several occasions over the past three years noticed a few drops of milk that were easy to express from both nipples. She is otherwise healthy and not taking oral contraceptives. Is there any cause for concern?

Galactorrhoea, often associated with oligomenorrhoea or amenorrhoea, is usually caused by a raised concentration of serum prolactin. In a nulliparous woman the latter may have a physiological basis such as stress or repeated stimulation of the nipples, may be caused by certain drugs—for instance, dopamine receptor blocking agents or central nervous system (dopamine) depleting agents—or may result from thyroid dysfunction or a hypothalamic or pituitary lesion, including tumours. It may therefore be prudent to refer the patient to an endocrinologist for appropriate investigation.—G J LEWIS, consultant gynaecologist, Stourbridge.