legs was beneficial, and he was able to walk occasionally without assistance.

Autonomic function tests were performed after weaning from mechanical ventilation. A catheter was inserted into the left radial artery, and vital signs were monitored. Head up tilting to 60° resulted in a blood pressure fall from 134/99 to 51/48 mm Hg. The basal plasma noradrenaline concentration was normal. A rise of plasma vasopressin in response to hypotension was absent, suggesting involvement of the efferent baroreflex pathway. There was no overshoot with Valsalva’s manoeuvre, which suggested insufficient baroreflex function. The absence of a blood pressure rise to the cold pressor test suggested involvement of the efferent sympathetic system. A noradrenaline infusion test disclosed sympathetic supersensitivity. No β-1 supersensitivity in response to an isoprenaline infusion was observed. 1 Increase of his heart rate from 90 to 109 per minute in response to an atropine test showed that the vagal efficients were not completely involved. The results of the remaining autonomic tests were normal.

The control of blood pressure after postural change is mediated by the baroreflex system. Failure of this reflex function can be due to a lesion anywhere in this reflex pathway, whether the baroreceptors, neurotizing from the carotid sinus and aortic arch, travel via the glossopharyngeal and vagal nerves. Most of these baroreceptor afferents terminate in the nucleus tractus solitarii, the major neural relay of the baroreflex. 2,3 In addition, the nucleus tractus solitarii not only regulates baroreceptor pathways but is also involved in the central regulation of respiration and swallowing. 4 The glossopharyngeal and vagal nerves also convey the sensory impulses from the pharynx, larynx, and the respiratory system to the nucleus tractus solitarii, which contains specific centres for respiration and swallowing. 5 Our patient presented with severe orthostatic hypotension, dysphagia, lingual atrophy, and temporary failure of automatic respiration, but had no pyramidal signs, sensorial disturbances, or a neuropenic bladder. Although we cannot discuss the relation of a non-metastatic autonomic neuropathy, neither spinal nor peripheral nerve lesions were evident. Investigation of the somatic and autonomic functions suggested a medullary lesion. Severe orthostatic hypotension, the absence of overshoot of Valsalva’s manoeuvre, a negative response to the cold water test, and a positive response to the atropine test are consistent with an incomplete failure of the baroreflex arc. Although it is difficult to determine the definite lesion responsible for the failure of the baroreflex arc, a tumour located in the dorsal medulla may cause impairment of the nucleus tractus solitarii, the dorsal vagal nucleus, and the hypoglossal nucleus, which are involved in close proximity in the dorsal medulla. 6

In conclusion, a localised lesion of the dorsal medulla as reported in this case may result in severe orthostatic hypotension, bulbar palsy, and an automatic respiration in the absence of pyramidal or sensorimotor signs in the limbs.

ANKO YAMASHITA
MASAKI HIRAYAMA
YASUO KIOKE
Department of Neurology,
Nagoya University School of Medicine,
MOMOYAMA KAJI
KURE HAMAMOTO
Department of Neurology,
Nagoya University School of Medicine,
M RECEIVED 5 FEBRUARY 1989

Tardive dystonia after neuroleptic treatment of Tourette’s syndrome

We report a patient with Tourette’s syndrome who developed tardive dystonia manifest by a task specific, action induced oromandibular dystonia after 15 years of treatment with haloperidol. A 28 year old man with Tourette’s syndrome since the age of seven had been treated with haloperidol (2–4 mg daily) with good effect. After a traumatic accident his motor and vocal tics had included eye blinking, facial grimacing, shoulder shrugging, and neck movements, humming and squeaking noises, and occasional snapping-shut jaw movements. Obsessive-compulsive features included repetitive touching and counting behaviours. At the age of 28, he developed severe dystonic movements of the jaw, mouth, and tongue for the first time, which were activated by speaking. Immediately on beginning to speak he displayed forceful dystonic jaw opening and buccalolingual movements associated with a pronounced dysarthria. This was accompanied by speaking with a finger or pencil clenched between his teeth. The mouth movements were absent at rest and were not activated by eating or non-verbal jaw movements. There were also rigidity movements of the hands and fingers. After stopping haloperidol there was transient exacerbation of jaw movements which lasted for several weeks followed by persistent speech activated jaw opening oromandibular dystonia, which remained unchanged for the next 10 months. Eye blinking and cervical tics exacerbated when haloperidol treatment was stopped, and were controlled by clonazepam with partial benefit. Benzotropine and tetra-benzine were unhelpful for the oromandibular dystonia but beginning 10 months after onset there was slow improvement followed by complete resolution of the jaw dystonia, which has now been absent for 18 months.

Tardive dyskinesia and tardive dystonia have only rarely been reported in patients with Tourette’s syndrome after chronic neuroleptic treatment. 7,8 Our patient developed an action induced oromandibular dystonia after 15 years of treatment with haloperidol. Diagnosis of tardive dystonia occurring on a background of Tourette’s syndrome may be difficult. In this case, the patient’s dystonia differed from dystonic tics sometimes associated with Tourette’s syndrome in being highly localised, action induced, repetitive, patterned, not suppressible, and unaccompanied by an urge to move. His hyperorism was also more consistent with oromandibular dystonia than dystonic jaw tic. Because cranial and cervical dystonia have been reported in a few patients with tic disorders not exposed to neuroleptic drugs, 1 the possibility of a coincident primary dystonia unrelated to neuroleptic drugs also deserves consideration. The history of prolonged neuroleptic exposure, exacerbation of dystonia after stopping haloperidol, and disappearance of dystonia over 12 months after stopping haloperidol are clinical features much more indicative of tardive dystonia induced by neuroleptic drugs than spontaneous dystonia.

Although tardive dyskinesia has been uncommon in patients with Tourette’s syndrome, vigilance for the appearance of new involuntary movements when they appear dyskinetic or dystonic rather than tic-like, is appropriate in the management of Tourette’s syndrome with neuroleptic drugs.

DANIEL TARYS
EDISON MIYAWAKI
Division of Neurology,
Hong Kong Hospital,
and Department of Neurology,
Harvard Medical School,
Boston, MA 02115, USA

Should patients with central core disease be screened for malignant hyperthermia?

Malignant hyperthermia is a potentially fatal condition of hypermetabolism in skeletal muscle triggered by certain anesthetic agents. Although neuromuscular disorders may predispose to anesthetic complications in their own right, only central core disease and malignant hyperthermia myopathy are associated with the characteristic alterations in muscle responses diagnostic for susceptibility to malignant hyperthermia. 1 Central core disease is characterised by weakness, wasting, and orthopaedic complications. Muscle fibres show rounded and faintly staining, known as cores. Malignant hyperthermia myopathy is a non-specific histological myopathy, sometimes with cores, occurring in a concentration of patients, susceptible to malignant hyperthermia. Most susceptible patients show normal muscle histology. A few show central core disease or malignant hyperthermia myopathy. Conversely, many patients with central core disease are susceptible to malignant hyperthermia. Indeed an assumption has grown that all patients with c
mia and do not require screening. Our study shows that this assumption is wrong and patients with central core disease should be screened for malignant hyperthermia so that they are not denied potentially valuable anesthetic agents.

We studied clinical data, in vitro contracture test data, and histological data in 19 members from six families (table). In three families (I, V, and VI), presentation was with a myopathy diagnosed on clinical and biochemical examination. The proband of family I had central core disease and screening for malignant hyperthermia was prompted on this basis. In the other three families (II, III, and IV), presentation was with a malignant hyperthermia reaction and on screening, histological diagnoses of central core disease were made. Screening for malignant hyperthermia was performed according to the European Malignant Hyperthermia Group protocol, except for those patients screened before its introduction. The in vitro contracture test was interpreted as susceptible to malignant hyperthermia when reacting abnormally to both halothane and caffeine used separately, hyperthermia for malignant hyperthermia when reacting normally to both agents, and equivocal for malignant hyperthermia when reacting abnormally to only one agent. Clinically all equivocal patients are regarded as being susceptible to malignant hyperthermia under anesthesia. Before the European Malignant Hyperthermia Group protocol the in vitro contracture test was performed in a similar but not identical manner, patients being classified as positive or negative for malignant hyperthermia. The positive patients would include both the susceptible and the equivocal classification. Separate muscle samples were taken for histological examination. These samples were frozen in isopentane cooled in liquid nitrogen. Frozen sections were cut at 10 μ thickness and stained with haematoxylin and eosin, NADHTR, myosin ATPase, periodic acid Schiff’s, oil red O, and Gomori stains with standard methods.

In family I a 37 year old woman (case 1; proband) diagnosed both clinically and histologically as having central core disease underwent a further biopsy to screen for susceptibility to malignant hyperthermia. Her mother (patient 2), daughter (case 3), and son (case 4) were also screened. In family II an 11 year old with scoliosis had a suspected malignant hyperthermia reaction during general anesthesia for a fractured arm (case 1). Her, she sister (patient), and father (case 3) were screened for malignant hyperthermia. The original proband in family III was a woman aged 17 who died of probable malignant hyperthermia during an anesthetic. The sister of the proband (case 1), a maternal uncle (case 2), and his daughter (case 3) were screened. Several years later the third cousin (case 5) to the original proband had a malignant hyperthermia reaction. She and her two daughters (cases 6 and 7) were screened. The proband in family IV was a 23 year old man (case 1). He had had several general anesthetics since infancy for congenital dislocation of the hip. On two occasions he developed muscle rigidity after suxamethonium, the final occasion and was associated with cyanosis and a core temperature of 43°C prompting his referral for malignant hyperthermia screening. His sister (case 2) was also screened. In family V the proband (case 1) was clinically and histologically diagnosed as having central core disease. She and her mother (case 2) were screened for malignant hyperthermia. The proband (case 1) in family VI was screened for malignant hyperthermia because of known central core disease.

The tables gives the results. Not all patients with central core disease were susceptible to malignant hyperthermia even within the same family. In family I, the proband had central core disease and was susceptible to malignant hyperthermia. Her daughter also had central core disease but was negative for malignant hyperthermia. In family V, the proband was susceptible, whereas her mother was negative. Although the mother’s symptoms were mild, she had classic central core disease histologically. In family VI, only the proband was biopsied. She had congenital dislocation of the hip, scoliosis, and weakness and wasting of both legs, with a classic histological picture of central core disease, but was negative for malignant hyperthermia. The study indicates that patients with central core disease should be screened for malignant hyperthermia. They should not be assumed to be susceptible. A significant number are negative for malignant hyperthermia and if they are assumed to be susceptible this will unnecessarily deny them potentially valuable anesthetic. It is important to know the reliability of the in vitro contracture test results in this study. A collaborative study from all European centres has yet to be published. In this unit, no clinically fulminant patient with malignant hyperthermia has tested negative and a review of 402 probands shows a good correlation in malignant hyperthermia as result with the severity of the clinical reaction. This is supported by the finding of 100% sensitivity and 78% specificity using the essentially similar North American protocol.

The data indicate that whereas central core disease and malignant hyperthermia may be related conditions, they are not the same. A similar genetic locus, chromosome 19, has the potential to diagnose at least for malignant hyperthermia this is thought to involve mutation of the ryanodine receptor. Eight mutations so far have been identified but less than 50% of malignant hyperthermia cases are linked to chromosome 19, malignant hyperthermia showing considerable heterogeneity. It is possible that a single gene is mutated in central core disease and malignant hyperthermia, but the protein product has more than one function. Perhaps the location of the mutation and the genetic background of the individual dictate whether one or both conditions are lost or present. It is difficult for malignant hyperthermia and central core disease may be separate. One of the issues raised by this study is the definition of malignant hyperthermia myopathy. On seeing cores in the biopsy of a patient undergoing screening for malignant hyperthermia, she had a diagnosis of central core disease or malignant hyperthermia myopathy be made? We think that recourse should be made to the clinical information. If the patient is symptomatic and susceptible to malignant hyperthermia a diagnosis of central core disease is appropriate. However, if asymptomatic and susceptible to malignant hyperthermia, malignant hyperthermia myopathy is probably benign. Malignant hyperthermia myopathy should not be diagnosed in patients negative for malignant hyperthermia, because the name implies malignant hyperthermia susceptibility. Hypertrophic patients negative for malignant hyperthermia with cores may be diagnosed as having central core disease, even when clinically only mildly myopathic. Central core disease is known to have a broad range of clinical expression. The mother of the proband in family V had only mild proximal weakness in both legs, which may have gone undiagnosed had it not been for her daughter’s central core disease. Histologically, this mildly affected mother had classic central core disease. She was negative for malignant hyperthermia and a diagnosis of central core disease was applicable. Arguably, the affected members in family III had malignant hyperthermia myopathy, as they were susceptible to malignant hyperthermia and despite their central cores, they were only clinically mildly affected. Some of the members in this family complained of slight weakness and calf hypertrophy and had raised resting creatine kinase (2100 IU in case 2). A notable histological feature in this family, compared with

### Clinical, in vitro contracture test, and histopathological data

<table>
<thead>
<tr>
<th>Case</th>
<th>Myopathic symptoms</th>
<th>In vitro contracture test results</th>
<th>Percentage of fibres with central cores</th>
<th>Percentage of type 1 fibres</th>
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<tr>
<td>I.1</td>
<td>Severe</td>
<td>Susceptible</td>
<td>58</td>
<td>98</td>
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<td>I.2</td>
<td>Mild</td>
<td>Negative</td>
<td>2</td>
<td>90</td>
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<tr>
<td>I.3</td>
<td>Severe</td>
<td>Negative</td>
<td>54</td>
<td>95</td>
</tr>
<tr>
<td>I.4</td>
<td>Absent</td>
<td>Negative</td>
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<td>35</td>
</tr>
<tr>
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<td>Severe</td>
<td>Susceptible</td>
<td>49</td>
<td>96</td>
</tr>
<tr>
<td>II.2</td>
<td>Absent</td>
<td>Negative</td>
<td>0</td>
<td>46</td>
</tr>
<tr>
<td>II.3</td>
<td>Severe</td>
<td>Susceptible</td>
<td>25</td>
<td>100</td>
</tr>
<tr>
<td>III.1</td>
<td>Absent</td>
<td>Negative</td>
<td>0</td>
<td>25</td>
</tr>
<tr>
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<td>Susceptible</td>
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<td>Susceptible</td>
<td>3</td>
<td>51</td>
</tr>
<tr>
<td>III.5</td>
<td>Absent</td>
<td>Susceptible</td>
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<td>Negative</td>
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<tr>
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<td>Susceptible</td>
<td>15</td>
<td>96</td>
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<td>Negative</td>
<td>96</td>
<td>99</td>
</tr>
<tr>
<td>VI.1</td>
<td>Severe</td>
<td>Negative</td>
<td>17</td>
<td>100</td>
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</tbody>
</table>

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the others, was normal percentages of type I fibres, rated at very high levels (90% or more in the other families).

P J HALSALL
Leeds Malignant Hyperthermia Investigation Unit
I R BRIDGES
Neuropathology Laboratory, Division of Clinical Sciences (Pathology), Almoinm in Building, Leeds University, Leeds LS2 9JT, UK.and Department of Haematology, Leeds General Infirmary, Great George Street, Leeds LS1 3EX, UK.

Correspondence to: Dr L R Bridges, Neuropathology Laboratory, Division of Clinical Sciences (Pathology), Almoinm in Building, Leeds University, Leeds LS2 9JT, UK.

5 Laroch MG. Should we use muscle biopsy to diagnose malignant hyperthermia susceptibility? Anesthesiology 1993;79:1-4.

MATTERS ARISING

Multiple sclerosis in the north Cambridgeshire districts of East Anglia

The north Cambridge survey is a welcome addition to the United Kingdom series of prevalence studies.1 We agree that a multi-centre prevalence study would add to the epidemiological knowledge of multiple sclerosis. However, we cannot agree that the inclusion of “suspect cases” in their prevalence figures. As we have pointed out in a previous paper, the measurement of multiple sclerosis can be distorted by using ill defined criteria for measuring the disease.2 We contend that the Poser criteria alone (which do not contain a suspect category) should be used in measuring the prevalence of multiple sclerosis. For this reason, we used only the Poser criteria in our survey of West Sussex, and deliberately did not include a suspect category.3 As Poser himself says, “for the purposes of prevalence studies only the categories of clinically definite and clinically probable should be used; possible multiple sclerosis should never be included.” Our concern is that a “suspect” category, which seemed to have been defined differently in the south west of England,4 Cambridge and Southamptom surveys, could lead to confusion in interpreting and comparing prevalence figures. This is because there are no clear criteria of what constitute so called “suspect” cases, and workers are free to use their own criteria. As Robertson says, the inclusion of a suspect category “introduces noise, and generally obscures the overall picture.”5 We agree with this, and argue that any cases that do not fall into the Poser criteria should be regarded as prevalence figures. To do so would introduce some clarity into what we are striving to measure. In our view, future prevalence surveys should use the Poser criteria and not include “suspect” cases.

The Cambridge team suggest that the very presence of a latitudinal gradient within the United Kingdom has only recently been questioned.6 It is, in fact, a decade ago that Williams and McKenna7 made the comment “we find no convincing evidence of a latitudinal effect in the United Kingdom.” A mortality study of multiple sclerosis in the United Kingdom found no gradient south of the Dutch border and discussed the possibility that the high, but diminishing, Scottish rates were artefactual.8 The most serious challenge to the latitudinal hypothesis appeared in a letter in the BMJ in which a convincing argument was presented to show that the hypothesis was inconsistent with United Kingdom data.

So the challenge to Limburg’s hypothesis is not recent.9 What is recent is that most researchers in the field are at last coming to realise the weakness of the data on which the hypothesis was based.

MARGARET RICE-OLEXY Regionall Rehabilitation Unit, Northwick Park and St Marks, NHS Trust, Watford Road, Harrow, Middlesex, UK.

EDWARD S WILLIAMS
Croydon Health, Knotty House, 17 Addiscombe Road, Croydon, Surrey CR9 6HS, UK.

B OBANOD M KERRAN
Athinon Motel Hospital, London, UK.


NOTICE

Announcement from the British Neuro-psychiatry Association: 1996 summer meeting

The 1996 Summer meeting will be held on 14-16 July at Robinson College, Cambridge. It will include topics on neurodevelopment, language, and the presentation of short scientific papers and single case videos by members. The Association’s AGM will be held on 16 July.

For further details of these meetings please contact: Sue Garratt, Administrative Assistant, BNPA, 17 Clocktower Mews, London N1 7BB. Telephone/Fax: 0171 226 5949.

For details of membership of the BNPA, which is open to medical practitioners in psychiatry, neurology, and related clinical neurosciences, please contact: Dr Jonathan Bird, Secretary, BNPA, Senden, Neurological Hospital, Stoke Lane, Stapleton, Bristol, BS16 1QT. Telephone: 01179 701212 ext 2925/2992 or Sue Garratt at the address given above.

CORRECTION


In the table, p223, CT localisation of patient B is Left frontal.

NA [no abnormalities]

The first sentence, left hand column p223, should read—Both CT and MRI showed abnormalities that were not in accordance with EEG findings.

BOOK REVIEWS

All titles reviewed here are available from the BMJ Bookshop, PO Box 295, London WC1H 9TE. Prices include postage in the United Kingdom and for members of the British Forces Overseas, but overseas customers should add £2 per item for postage and packing. Payment can be made by cheque in sterling drawn on a United Kingdom bank, or by credit card (Mastercard, Visa or American Express) stating card number, expiry date, and your full name.


The third edition of Sophie Levitt’s excellent book will be of interest and indeed is essential reading for anyone involved in the management of the cerebral palsies, including parents. A major theme throughout the book is the importance of collaboration with parents and the detailed section on practical procedures is written with parents as well as therapists in mind. Forwards to the second
Should patients with central core disease be screened for malignant hyperthermia?

P J Halsall, L R Bridges, F R Ellis and P M Hopkins

*J Neurol Neurosurg Psychiatry* 1996 61: 119-121
doi: 10.1136/jnnp.61.1.119-a

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