Dorsal column stimulation in multiple sclerosis: effects on bladder and long term findings

C H HAWKES, R BEARD, D FAWCETT, E A PAUL, D G T THOMAS

Abstract

The effect of dorsal column stimulation on bladder function in 15 patients with established multiple sclerosis was assessed by urodynamic tests. Significant improvement in flow rate and urethral sphincter pressure was recorded in about two thirds. Of 31 patients examined over five years only 13 showed initial benefit from stimulation and were given permanent stimulators; of these, only three appeared to receive lasting benefit. Early complications occurred in nine patients and five had a relapse of their disease. These results suggest that at present stimulation of the dorsal column does not have a place in the routine management of multiple sclerosis.

Introduction

Three years ago we presented our initial findings of dorsal column stimulation in 19 selected patients with confirmed multiple sclerosis. The most convincing effect was on bladder control, although this was slight. We have since extended our observations, selecting particularly those patients with known bladder disorder amenable to examination.

Patients and methods of assessment

We studied 15 patients with multiple sclerosis. Three were included in our earlier publication.1 All conformed to the “definite” group of Schumacher et al.,2 were aged under 55 years, and their condition was clinically stable for at least six months before the trial; they were

References


Institute of Neurology, Queen Square, London
C H HAWKES, MD, MRCP, honorary clinical assistant, department of neurological studies
E A PAUL, MSC, statistician, department of statistics and computer studies
D G T THOMAS, MRCP, FRCS, senior lecturer and consultant neurosurgeon

Worthing Hospital, Sussex
R BEARD, FRCS, consultant urologist

Charing Cross Hospital, London
D FAWCETT, FRCS, senior urological registrar

Correspondence to: Dr C H Hawkes, Department of Neurology, Ipswich Hospital, Ipswich IP4 5PD.
reliable observers without psychiatric history and were not taking
drugs that could affect bladder function.

The stimulation technique entailed the use of two epidural elect-
rodes, as in our earlier study.1

URODYNAMIC TESTS

Virtually all urine passed was measured by an electronic flowmeter
(DISA micriograph) sited near the patient’s bed. We measured mean
and peak flow rates and the number of “bursts” at each voiding. An
estimate of hesitancy was derived by measuring the latency between
the desire to void and voiding and the initial burst. Flow measurements began one week before dorsal column
stimulation and continued for the first two weeks of stimulation. The
following three tests were performed one week and two to four months
before stimulation and again on the seventh and 14th days during
stimulation.

Residual urine volume was estimated by catheterisation after normal
voiding.

Filling and voiding cystometry—Subtracted detrusor pressure was
recorded during filling at 10 ml/min with 35°C, diodone at room
temperature. Comparisons were made of the filling volume at which
uninhibited contractions first occurred and the amplitude of those
contractions.

Urethral pressure profiles2 were obtained, combined with assessment of
response to alpha adrenergic blockade with 10 mg intravenous
phenolamine.

Assessment of the results of flow studies and pressure profiles was by
statistical methods and is described below. All other urodynamic
findings were evaluated by reference to an arbitrary three point scale
of improvement or deterioration after discussion between neurologist
and urologist.

Results

Flow studies—The mean values during the pretreatment week were
compared with those during either the first or second week of treat-
ment. Nine of the 15 patients studied showed significant improvement
(p = 0.01; Student’s two tailed t test) in one or more aspects of
micturition. Either peak or mean flow was the variable most frequently
noted to improve (six cases). The serial analyses of urinary flow
allowed objective measurements of any response to be obtained.
The data on 10 patients whose flow studies showed improvement were
combined and plotted. The optimum bladder response to stimulation
of the dorsal column occurred on day 6 or 7. Early failure of stimula-
tion in the first week caused a rapid fall to pretreatment values, whereas
later failure was associated with more gradual decline.

Residual volume—Subjective analysis of residual urine in 14 patients
showed slight reduction of volume in three, no change or no residual
urine in nine, and a small increase in two.

Detrusor instability was judged to have lessened if uninhibited
contractions occurred at a greater volume (using the arbitrary scale
referred to above). Five of 14 patients showed slight improvement in this
respect, eight no change, and one (whose condition relapsed
during stimulation) showed deterioration.

Pressure profiles—The results of urethral pressure profiles in 10
of the 15 patients were combined with the results in seven subjects in
our earlier1 publication. A significant fall in pressure occurred during the
period of stimulation (Wilcoxon matched pairs test: p = 0.008). All of
the 12 patients given phentolamine (before treatment) showed a fall
in urethral pressure within a few minutes. When the test was repeated
during stimulation the absolute fall in pressure was significantly less
(Wilcoxon matched pairs test: p = 0.03).

LONG TERM RESULTS AND COMPLICATIONS

Of 31 patients analysed over five years who were assessed for suit-
ability for treatment by a period of trial stimulation, 13 were given
permanent stimulators. Of these, only three continued to use the device
at follow up four or five years later. One with leg pain of central origin
continued to derive benefit, and the other two felt more mobile and
experienced more satisfactory bladder control with the device switched
on. In five of the remainder the disease gradually progressed and
stimulation was discontinued. Two others experienced waning in the
effect of stimulation within the first three months, and in three the
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electrodes were removed because of problems with positioning (two
subjects) or skin infection (one subject).

Complications were seen in nine of the 31 patients. Three experi-
enced frequent electrode movement or breakage, one developed a
“chemical” meningitis because an electrode was inadvertently placed
in the subarachnoid space, and five suffered relapses of their multiple
sclerosis within the first two weeks of stimulation—none with optic
neuritis (one patient); diplopia (one); optic neuritis, frequency and
inconvenience of micturition, dysphasia (one); increased leg spasticity
(one); inconvenince and frequency (one).

Discussion

It is generally agreed that stimulation of the dorsal column has an effect on bladder function.1 4 Our results confirm this,
with objective findings of improvement in some two thirds of
patients studied. The improvement in urinary flow probably occurred because of lowering in urethral closing pressure, as
measured by urethral pressure profile. In a few there may also have
been a reduction of detrusor instability. The drop in urethral closing pressure that occurs normally when the urethral
pressure profile is repeated after intravenous phentolamine
(10 mg) was significantly less in patients using stimulators.
Since phentolamine is an alpha adrenergic blocker it might be
speculated that the effect of dorsal column stimulation is to
reduce sympathetic outflow activity.

Many additional aspects of multiple sclerosis have been
claimed to improve by others—for example, motor function and
spasticity,4 5 tremor, sensory loss,4 6 sexual function,4 central
pain,6 leg blood flow,7 and somatosensory evoked responses.10
Unfortunately, several of these reports have been based on
clinicians’ subjective impressions of patients’ descriptions, and
where measurements have been made patients have received physiotherapy; only rarely have data been assessed statistically.

Of the components of multiple sclerosis allegedly improved we
agree that the central pain of the disease may be significantly
relieved by stimulation of the dorsal column. Improved motor
function was claimed1 in five of 18 patients. The change was
shown on the Kurtzke scale (which will detect only a fairly major
response) and therefore is a claim of considerable benefit. The
authors did not state, however, whether their patients were
encouraged or whether they received physiotherapy or any drugs
that could also produce a favourable result. No permanent
record—for example, on videotape—was taken. In the same year
a further report appeared11 in which six of 16 patients showed
lessening of muscle tone. This was assessed by subjective bedside
analysis. Two previously chairbound patients became able to
walk 50 m and 20 m respectively, and a further two showed
increased muscle tone. Detailed objective measurement of motor
function and muscle tone we11 found little change. When
improvement did seem to take place we thought that this related
to training and practice effects in highly motivated people under-
going a two week trial of a novel device rumoured to produce
miraculous relief. Spasticity and motor function show consider-
able spontaneous variability and can to some extent be manipu-
lated by the patient. Conversely, bladder function, which also
showed considerable variability, may be measured objectively. We
are therefore able to allow for spontaneous variability by multiple
observations and statistical analysis; hence our results on bladder
function are well founded. There are no comparable observa-
tions on motor function, and until they are done any result in this
sphere must be viewed with caution. Broadly similar conclusions of the benefits of stimulation were reached in a
recently published multicentre review.

Claims of lessening tremor and sensory deficit11 have not been
substantiated. A few of our male patients6 reported increased
frequency of erections. We examined leg blood flow and somato-
sensory evoked potentials in a small number of patients11 12 and
found improvement in neither. Converse findings are reported11 14
but the issue has yet to be resolved.

Is dorsal column stimulation clinically worthwhile? Are the
gains in bladder function sufficient to outweigh a relapse rate of
16°,? Had our patients reported substantial alteration in their way of life as a result of stimulation then perhaps the risk would be worth running. Although objective improvement was seen on urodynamic testing, only a minority noticed amelioration in their pattern of micturition, and in all instances this was of minor degree. No patient reported reduction of socially inconvenient symptoms such as incontinence or nocturia. Given that only three (10%) of a selected group of sufferers from multiple sclerosis derived lasting benefit and that this was obtained at considerable time, expense, and inconvenience to profession and patient we conclude that at present dorsal column stimulation has no place in the routine management of multiple sclerosis. As a research procedure it holds considerable fascination, but at present further gains must be made for the patient and assessments of response need to be controlled, objective, and unemotional.

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Risk of early death in extremely overweight young men

S SONNE-HOLM, T I A SØRENSEN, U CHRISTENSEN

Abstract
The effect of pronounced obesity in youth on later mortality was studied in 1299 men with extreme overweight, defined as a weight/height² >31 kg/m², in the population of 331,919 men liable for military service in the Copenhagen area during the period 1943-1977. A random sample of 2948 drawn from the remaining study population served as a control group. All men were followed up until November 1980, by which time 33 deaths had occurred among the extremely overweight subjects compared with 89 in the control group. This gave a mortality ratio (observed to expected number of deaths) of 1.14 (95% confidence limit 0.91-1.40) for controls with a significantly greater mortality of 1.73 (95% confidence limit 1.20-2.41) for obese subjects. The relative risk, estimated from the survival time distributions, was fairly constant around 1.6 throughout the 37 years of observation. Taking into account age at and year of entry in a regression analysis did not change the relative mortality risk. The proportion of natural death was significantly higher in the obese group than in the control group until the age of 30 but not thereafter.

Obesity Research Group, Department D 105, Herlev Hospital, University of Copenhagen, DK 2730 Herlev, Denmark
S SONNE-HOLM, MD, senior registrar
T I A SØRENSEN, DR MED SCI, senior registrar
U CHRISTENSEN, MD, resident
Correspondence and requests for reprints to: Dr S Sonne-Holm.

Pronounced obesity in youth is a health hazard, manifesting itself particularly in a distinct increase in mortality from natural causes in early adulthood.

Introduction
The effect of obesity on mortality has been the subject of extensive research throughout this century. In principle the studies have been based on sampling from the population irrespective of the degree of obesity. Consequently, the number of obese subjects decreases with increasing degree of obesity and even the largest studies include rather few with morbid obesity. Owing to the increasing prevalence of obesity with advancing age this problem of design is worse the younger the population under study. Those who are severely obese in youth are, however, of particular clinical interest from both a prophylactic and therapeutic point of view. The huge life insurance studies suggest that the relative mortality risk is increasing with increasing overweight, particularly among young men. It is well recognised that this experience may hold only for the insured population due to the particular selection process in underwriting. In this study we used the obligatory draft board examination to collect an unbiased sample of reasonable size to allow assessment of the mortality among men considerably obese as young adults.

Subjects and methods
In Denmark all men are registered with the military authorities when they reach the age of 18. Except for those who volunteer before this age, all are examined by the medical board within the next few