outbreaks of nosocomial systemic candidiasis. This explains the comparative ease with which simple measures such as changes in handwashing reagents and implementation of strict cross infection control led to containment of the outbreaks. DNA fingerprinting provides a rapid, reliable means of identifying such outbreaks so that further cases can be prevented.

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Prevalence of spina bifida occulta in patients with functional disorders of the lower urinary tract and its relation to urodynamic and neurophysiological measurements

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Abstract

***Objective*—To determine the relation between neurophysiological abnormalities and the radiological detection of spina bifida occulta in patients with dysfunction of the lower urinary tract.**

***Design*—Blind assessment and subsequent decoding of mixed batch of abdominal radiographs from patients with and without urological symptoms for evidence of spina bifida occulta and comparison of results with those of previous control series.**

***Setting*—Review study among tertiary referrals to an incontinence clinic of a city hospital.**

***Patients*—One hundred and thirty eight adults with proved urodynamic abnormalities in whom neurophysiological measurements were available.**

***Interventions*—None.**

***End point*—Correlation of neurophysiological abnormalities in lower urinary tract dysfunction with presence and type of spina bifida occulta and level of opening of posterior sacral arcs.**

***Measurements and main results*—On decoding radiographs those from patients without urological symptoms showed a similar prevalence of spina bifida occulta to that in the control series (631/2707 controls; 23%). By contrast, patients with urological symptoms had a significantly increased prevalence of spina bifida occulta at S1 and S2 and a higher level of opening of posterior sacral arcs. The increased prevalence of the bony defect was particularly striking in men with urgency and instability and in women with stress incontinence. No significant correlation was found between any particular neurophysiological abnormality and the presence of spina bifida.**

***Conclusions*—In patients with dysfunction of the lower urinary tract neurophysiological abnormalities may be associated with congenital dysraphic lesions in the lower lumbar spine and sacrum. There appears to be no direct causal relation between the radiological and neurophysiological abnormalities but the findings suggest a common aetiological factor.**

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Introduction

Spina bifida occulta in the lower lumbar spine and sacrum is generally considered to be unimportant clinically,[1,2] and similarly a high opening of the posterior sacral arcs is described as a normal variant.[3] Bony defects in the sacrum may be associated with fibrous bands or with fatty or other tumours occupying the laminal defect. This may result in compression of the nerves of the cauda equina[4-6] and interfere with nerve conduction in the sacral reflex arcs.

In 1985 Galloway and Tainsh found an increased prevalence of spina bifida occulta in a small group of adults with lower urinary tract problems.[7] We therefore decided to correlate the functional disorders previously reported from this department[8] with the presence of spina bifida occulta. Plain radiographs of the renal tracts (kidney, ureter, and bladder films) from 138 patients were reviewed and the presence and type of spina bifida occulta and level of opening of the posterior sacral arcs noted. These findings were correlated with the results of the urodynamic and neurophysiological studies.

Patients and methods

Plain abdominal radiographs were available from 138 out of 180 consecutive adult patients attending an incontinence clinic, and these 138 patients form the basis of our study. All the patients had received the usual urological and radiological assessments and in addition had been the subject of urodynamic studies and neurophysiological measurements, as described.[9] The results of the urodynamic and neurophysiological investigations have been reported.[8] The presence of spina bifida occulta and the upper level of sacral arc opening were assessed from the kidney, ureter, and bladder films. The patients were grouped for analysis by sex, as in a control study of a genetically similar population of over 2700 normal adults we found spina bifida occulta to be twice as common in men (30%) as in women (17%).[10] In order to eliminate bias the films were mixed with an equal number of abdominal radiographs taken at the same hospital from patients without urological symptoms and all films were assessed together by the same observers. When the films were decoded the prevalence of spina bifida occulta found in the patients without symptoms agreed closely with that found in the control study.[10]

The patients were further grouped according to their presenting symptoms, such as frequency or enuresis,

or the urodynamic findings, such as bladder instability or dyssynergia, as classified by the International Continence Society. Normal values for the neurophysiological measurements were obtained from 59 subjects without urinary symptoms studied previously in the same department[9] and agreed closely with other recent reports.

Statistics—Groups of subjects were compared for the prevalence of spina bifida occulta by χ^2 tests with Yates's correction and for levels of arc opening by Wilcoxon's rank sum test. Associations between neurophysiological abnormalities and radiological measurements were tested (for each sex separately) by Wilcoxon rank sum tests or Kendall's rank correlation.

Results

Table I shows the prevalence of spina bifida occulta at L5, S1, and S2 in patients and controls. Defects in the posterior sacral arcs below S2 were classed as high sacral opening and are considered below. The total number of defects exceeded the number of affected patients as several patients had defects at more than one level. The prevalence of spina bifida occulta was significantly greater in patients (both male and female) than controls at S1 and S2 but not at L5.

TABLE I—*Spina bifida occulta in patients and controls. Figures in parentheses are percentages*

		Patients	Controls	Significance	95% Confidence limits*
L5	Men	3/51 (5·9)	30/1359 (2·2)	NS	0·82, 9·39
	Women	2/87 (2·3)	15/1348 (1·1)	NS	0·47, 9·29
S1	Men	27/51 (52·9)	384/1359 (28·3)	p<0·001	1·62, 5·01
	Women	35/87 (40·2)	219/1348 (16·2)	p<0·001	2·20, 5·45
S2	Men	11/51 (21·6)	147/1359 (10·8)	p<0·05	1·14, 4·51
	Women	10/87 (11·5)	67/1348 (5·0)	p<0·05	1·23, 5·02

*95% Confidence limits for odds ratio.

Table II analyses the prevalence of spina bifida occulta in relation to symptoms. In many cases patients presented with a complex pattern of functional urinary tract disorders. In both men and women the prevalence of spina bifida occulta was significantly increased as compared with controls (p<0·001). The increased prevalence of spina bifida occulta in men with urgency and instability and in women with stress incontinence and urgency was highly significant (p<0·001). In many of the other groups the higher percentage prevalence of spina bifida occulta as compared with controls did not achieve significance.

The level of opening of the posterior sacral arcs was higher in the patients (table III), and the difference was highly significant (p<0·001). Table IV shows the distribution of levels of sacral arc opening in patients who did not have spina bifida occulta compared with controls. As all defects at S1 and S2 were included in the group with spina bifida only S3 to S5 levels are considered here. Evidently even in those patients who did not have spina bifida in the upper sacral spine there was a tendency for the arcs to open at a higher level than in controls, whereas in the control study a high level of sacral arc opening was shown to correlate closely with the presence of spina bifida occulta. The higher level of sacral arc opening in the patients was therefore not simply attributable to the increased prevalence of spina bifida occulta.

No significant correlation was found between any particular neurophysiological abnormality and the presence of spina bifida occulta.

TABLE II—*Overall prevalence of spina bifida occulta in patients, grouped by symptoms or urodynamic findings, compared with controls. Figures in parentheses are percentages*

	Men		Women	
	Total No	Spina bifida	Total No	Spina bifida
Controls	1359	402 (30)	1348	229 (17)
All patients	51	28 (55)***	87	37 (43)***
Stress incontinence	0	0	34	17 (50)***
Urgency	23	14 (61)***	40	17 (43)***
Non-contractile bladder	3	1 (33)	2	1 (50)
Enuresis	10	6 (60)	14	6 (43)*
Acute retention	5	2 (40)	6	3 (50)
Chronic retention	11	5 (45)	13	4 (31)
Urinary tract infection	1	0	19	7 (37)*
Dyssynergia	10	8 (80)**	6	2 (33)
Instablity	17	12 (71)***	21	7 (33)

* p<0·05; ** p<0·01; *** p<0·001.

TABLE III—*Upper levels of posterior sacral arc opening in patients compared with controls. Figures in parentheses are percentages*

	Men		Women	
	Controls	Patients	Controls	Patients
Total No	1359	51	1348	87
Spina bifida	402 (30)	28 (55)	229 (17)	37 (43)
S1	84 (6)	9 (18)	44 (3)	8 (9)
S2	31 (2)	3 (6)	25 (2)	8 (9)
S3	185 (14)	17 (33)	140 (10)	27 (31)
S4	504 (37)	14 (27)	516 (38)	28 (32)
S5	549 (40)	8 (16)	612 (45)	15 (17)

TABLE IV—*Upper level of posterior sacral arc opening in patients and controls who did not have spina bifida*

	S3	S4	S5	Significance
Men:				
Patients	6	10	7	p<0·01
Controls	80	353	511	
Women:				
Patients	12	20	14	p<0·001
Controls	72	455	580	

Discussion

This study establishes that there is a highly significant association between functional disorders of the lower urinary tract and the presence of spina bifida occulta. The further correlation with high levels of opening of the posterior sacral arcs independent of the presence of spina bifida occulta draws attention to the need to assess the sacrum as a whole. No particular correlation was found between specific abnormal results on neurophysiological measurement and the presence of spina bifida occulta, though in women with stress incontinence the increased prevalence of spina bifida occulta was highly significant, and this was one of the groups with significantly abnormal neurophysiological measurements.

It seems likely that the neurogenic defects in patients with lower urinary tract dysfunction arise from a combination of factors. Neurological defects resulting from the presence of spina bifida occulta may be one. Others may include unrecognised past neurogenic damage or neurological disease undocumented in the history, toxic factors such as alcohol, or local trauma—for example, sustained in childbirth.

All the subjects in the control group were originally part of a study of the prevalence of renal calculi.[11] In addition to having an abdominal *x* ray examination, all completed a detailed questionnaire and were interviewed by one of the participating clinicians to elicit any urological symptoms. In our review of these data we failed to show any significant correlation between the presence of spina bifida occulta or high sacral arc opening and the presence of symptoms. Functional disorders in all epidemiological surveys are assessed on a subjective rather than objective basis because of the numbers concerned. In addition, the presence of these subjects in a normal group in itself indicates that their symptoms were probably mild rather than of the

intractable variety, which had resulted in the tertiary referral of our patients to an incontinence clinic.

Over 23% of the normal adults (631/2707) had spina bifida occulta; as they had not been subjected to a formal study we do not know whether any of them had neurological defects too minor to warrant clinical referral. In these subjects the bony lesion may not be associated with any nerve deficit, or the absence of associated factors contributing to neurological damage may leave them symptom free.

Despite the significant correlation between the presence of spina bifida occulta and urodynamic abnormalities, no specific correlation was found between the bony defect and any abnormal neurophysiological response. James and Lassman showed in their patients with spina bifida occulta that the neurological lesions were due not to direct interference with nerves in the spina bifida defect but to traction effects from cord tethering or to compression effects on the conus and cauda equina from associated lesions such as lipomas.[4] Similar lesions in our patients may have been contributory in the development of neurogenic defects. Alternatively our results may indicate the lack of any direct association between the radiological and neurophysiological findings and suggest that both are the result of abnormal development of the tail bud in early gestation but that there is no direct causal link. It is important for future studies to establish whether there are lesions in some of these patients causing pressure or traction effects as these lesions may be amenable to surgery.

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Optimum duration of antithyroid drug treatment determined by assay of thyroid stimulating antibody in patients with Graves' disease

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Abstract

***Objective*—To determine the optimal duration of antithyroid drug treatment by monitoring serum thyroid stimulating antibody values in patients with Graves' disease.**

***Design*—Prospective longitudinal trial of patients with Graves' disease followed up for 24 months after withdrawal of treatment.**

***Setting*—Tertiary referral centre.**

***Patients*—A total of 64 consecutive patients with untreated Graves' disease, eight of whom were subsequently excluded. Fifty six patients completed the study.**

***Interventions*—All patients were treated initially with carbimazole 40 mg, then with decreasing doses that maintained a euthyroid state. Treatment was scheduled to continue for 18 months but was withdrawn earlier if serum thyroid stimulating antibody became undetectable.**

***End point*—Serum values of thyroid stimulating antibody (assayed by stimulation of human thyroid cells in vitro) and thyroid hormones and thyroid state every three months during treatment and afterwards every six months for 24 months.**

***Measurements and main results*—In 44 patients serum thyroid stimulating antibody became undetectable during treatment and treatment was withdrawn (median duration of treatment nine months, range 3-18 months). In 12 patients the antibody could be detected during 18 months of treatment. Among the first group of 44 patients initial values of the antibody before treatment were significantly lower than in the second group of 12 patients (median 225% (range 138-1236%) *v* 570% (250-1480%), $p<0.001$); the incidence of relapse was also lower (41% *v* 92%, $p<0.001$); and among those who did relapse the disease free interval after treatment was longer (median 12 months *v* 1 month, $p<0.001$). Moreover, the initial median serum values of thyroid stimulating antibodies were not related to the occurrence of relapse or remission as these did not differ between patients who did and did not have a relapse (median 267% (range 139-1480%) *v* 220% (range 138-1236%).**

***Conclusion*—Monitoring of serum thyroid stimulating antibody was a good guide to the duration of treatment as it allowed the treatment period to be considerably shortened in a large group of patients with no loss of efficiency.**

Introduction

Patients with Graves' disease may be treated with ablative or non-ablative treatment. Thyroidectomy is rapid and radioactive iodine treatment simple for the patient; both are effective in the long term but carry an obvious risk of hypothyroidism.[1-3] Non-ablative treatment with antithyroid drugs is less efficient but preferred by many as the best choice for new patients because it is well tolerated and does not carry the risk of secondary hypothyroidism.[4,5] Both short term[6,7] and long term[8,9] treatments have been proposed. We aimed at determining whether drug treatment could be stopped more appropriately when serum thyroid stimulating antibody became undetectable.

Patients and methods

Patients—Sixty four untreated patients with Graves' disease diagnosed by clinical signs of hyperthyroidism accompanied by increased thyroid hormone concentrations (free triiodothyronine >8·9 pmol/l; free thyroxine >23·4 pmol/l) and homogeneous thyroid scans were entered consecutively into the study from July 1983 to June 1985. Eight patients were subsequently excluded