(for example, improperly grounded monitoring device, an assistant in contact with the patient and the floor). Provided adequate precautions are maintained and means of treating cardiac emergencies are at hand, depressed patients with pacemakers, particularly demand implanted pacemakers, can be successfully treated with electroconvulsive therapy.

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Abdominal and thoracic pressures during defaecation

Hiatus hernia is common in the Western world but said to be rare in the developing countries.¹ Its precise aetiology is unknown. Muller² suggested that raised intra-abdominal pressure when straining at stool might be a causative factor. Burkitt¹ postulated that the fibre-depleted diet of the West results in small hard stools needing greater effort to evacuate than the bulky soft stools associated with the high fibre diet of the poorer countries. Thus the greater straining at stool might create a greater pressure gradient across the diaphragm, eventually pushing up the stomach and producing a hiatus hernia. We investigated this theory by measuring the absolute intra-abdominal and intrathoracic pressures and the gradient between them during defaecation. We also compared pressures in the sitting with those in the squatting position.

Methods and results

Five healthy medical students (four men and one woman) of average build, aged 22 to 24, and not taking any drugs, were studied after an overnight fast. Each sat on a commode, screened for privacy, after pressure-recording tubes had been put into position. Intra-abdominal pressures were measured by a tube which was swallowed and positioned with its tip in the mid-point of the stomach. Intrathoracic pressures were measured by a second tube swallowed and slowly withdrawn while the pressure was constantly recorded. The position of the diaphragm was located by detecting reversal of the respiratory pressure changes and the tip of the tube positioned 10 cm above this point. Both tubes were calibrated before each study and the pressures recorded in centimetres of water. Each tube was of polyvinyl, 120 cm long with a lumen of 1.4 mm. Each had three lateral openings just proximal to the sealed distal end. They were perfused with water at 3 ml/min with a Harvard constant infusion pump. Pressures were measured with a transducer (Bell and Howell) connected to an M-19 multichannel recorder (Devices). After the tubes had been passed and the subject settled he or she was asked to prepare for passing stools, then to strain as hard as possible and attempt to empty the bowels. Three actually passed stools. Each then squatted over a bedpan on the floor and, after the tubes had been repositioned, repeated the effort.

The individual intra-abdominal and intrathoracic pressures are shown in the table. Straining on the commode produced a mean ($\pm$ SEM) intra-abdominal pressure of 195 ± 28.2 cm H₂O and a mean intrathoracic pressure of 67 ± 8.1 cm H₂O. This difference is statistically significant ($P < 0.01$).

Pressures (cm H₂O) within chest and abdomen during defaecation when sitting and squatting. Figures for each individual subject are means of five recordings

Subject	Sitting			Squatting		
	Abdomen	Chest	Difference	Abdomen	Chest	Difference
1	292	94	198	100	60	40
2	213	67	146	138	83	55
3	173	59	114	173	43	130
4	178	45	133	175	45	130
5	120	72	48	75	40	35
Mean ($\pm$ SEM)	195.2 $\pm$ 28.2	67.4 $\pm$ 8.1	127.8 $\pm$ 21.8	132.2 $\pm$ 19.7	54.2 $\pm$ 7.9	78.0 $\pm$ 19.2

Mean pressures when squatting were intra-abdominal 132 ± 19.7 cm H₂O and intrathoracic 54 ± 7.9 . This difference also is statistically significant ($P < 0.05$). Although the pressures and the pressure gradient across the diaphragm were lower when squatting than when sitting on the commode the differences were not significant. The woman had lower pressures than the men.

Comment

This study shows that the intra-abdominal pressure always considerably exceeds the intrathoracic when straining maximally to defaecate. If this pressure gradient across the diaphragm occurs often and for prolonged periods the stomach might gradually be pushed up into the chest. This is consistent with Burkitt's hypothesis that the higher incidence of hiatus hernia in Western countries may be related in part to prolonged periods of straining at hard stools. Squatting for defaecation seems to offer a little protection, since the pressure gradient was less, but the difference was not statistically significant. Martin and Odling-Smee³ found that squatting was no better than sitting in preventing the transmission of intra-abdominal pressure to the leg veins. Hiatus hernia is usually asymptomatic. Symptoms of oesophagitis due to reflux of gastric juice often occur without any detectable upward shift of the cardia. Nevertheless, oesophagitis associated with hiatus hernia causes much ill health: its prevention would be worthwhile. Our findings are consistent with Muller's and Burkitt's hypotheses.

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Unusual complication after suprapubic bladder puncture

Suprapubic bladder puncture is a useful method of obtaining uncontaminated urine specimens for bacteriological investigations. Complications are infrequent and usually unimportant. A case of osteomyelitis after suprapubic bladder puncture is reported.

Case report

During a suprapubic bladder puncture in a 53-year-old woman with recurrent urinary tract infections the pubic bone was scratched with the puncture needle. An adequate urine specimen was obtained and *Escherichia coli* were isolated from it. Intravenous pyelography and cystoscopy two and three days respectively after the bladder puncture were normal. On the day of cystoscopy the patient developed septic fever, and *E coli* were isolated from three blood cultures. Gentamicin was given, and the patient became afebrile after six days. Fourteen days later clinical signs of osteomyelitis in the left pubic bone developed. X-ray examination was normal, but two weeks later radiological signs of osteomyelitis were evident. *E coli* were isolated from a bone biopsy. The patient was treated with gentamicin for another six weeks. She made an uneventful recovery. The *E coli* isolated from urine, blood, and bone had similar biochemical identification reactions

and sensitivity patterns against 11 antibiotics. Fifty per cent inhibitory concentrations (IC_{50}) were identical for both ampicillin and mecillinam. Serotyping was not done.

Comment

The complication rate of suprapubic bladder puncture is low. Local haematomas in the abdominal wall are occasionally reported.¹ Microscopic haematuria and fever are usually transient and without clinical significance,² and suprapubic abscesses seem to be extremely rare. Osteomyelitis of the pubic bone after urological surgery is rarely reported,³ and osteomyelitis after suprapubic bladder puncture seems never to have been reported. Even though serotyping was not done the biochemical characteristics and antibiotic sensitivity pattern of the bacterial isolates strongly implicate the urinary tract as the source of the *E coli* isolated from the pubic bone. Most likely minute quantities of infected urine were inoculated in the periosteum when the puncture needle was withdrawn. Bacteraemias after cystoscopy are not uncommon, but haematological spread to the pubic bone in an otherwise healthy person seems unlikely. In our case bacteraemia with subsequent trapping of the bacteria in the periosteum might have occurred. In any case the development of inflammation was most probably related to the periosteal lesion. The short interval between the puncture and the clinical and radiological signs of osteomyelitis also favours this view.

Suprapubic bladder puncture secures uncontaminated urine specimens and is the best method in the diagnosis of urinary tract infections. Our case shows that serious complications can be encountered if the technique is wrong. By adhering to the recognised procedure such complications can be avoided.

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Trial of doxantrazole in asthma

Sodium cromoglycate has been of benefit to patients with asthma.¹ Several oral antiallergic compounds possessing many of the properties of cromoglycate in vitro have recently been synthesised. These could be of benefit to patients unable to use an inhaler effectively. One of these, doxantrazole, was shown to inhibit the acute bronchoconstrictor response to inhaled allergen in atopic asthmatic subjects,² though this has not been confirmed.³ We report a longer-term comparison of doxantrazole, cromoglycate, and placebo.

Patients, methods, and results

Fourteen patients (eight men and six women) aged 22-62 years were studied. All had asthma of at least two years' duration, an FEV_1 above 1 litre, positive skin tests, and more than a 10% improvement in FEV_1 after salbutamol. All had had symptomatic relief from cromoglycate and had stable asthma without seasonal fluctuation. Patients taking corticosteroids by mouth were excluded but five continued regularly to inhale them. Initial assessment included the best of three FEV_1 and peak expiratory flow rate (PEFR) measurements. Patients filled in a diary card recording daily symptoms, bronchodilator usage, and the best of three PEFR readings morning and evening. After a two-week run-in period to confirm that PEFR and symptoms were reasonably stable, they stopped cromoglycate and received each of the following treatment regimens double blind for one month each in random order: (1) doxantrazole tablets 200 mg thrice daily and placebo cromoglycate (lactose) four times a day, (2) placebo doxantrazole tablets (dicalcium phosphate) thrice daily and cromoglycate 20 mg four times a day, (3) placebo doxantrazole tablets thrice daily and placebo cromoglycate four times a day. They attended every two weeks for spirometry, PEFR, and blood tests and were questioned about side effects and treatment preference. If patients deteriorated and had to be withdrawn they were treated as necessary and allowed to continue with the next treatment period once they had returned to their previous stable baseline for two weeks.

There were no significant side effects or haematological or biochemical changes with any drug. Eleven patients completed all treatment periods, two withdrew during doxantrazole, and one during both doxantrazole and placebo month. Pulmonary function tests showed no statistically significant difference for any treatment period (table). Bronchodilator usage was less during the

Mean results during treatment with doxantrazole (dox), cromoglycate (SCG), and placebo

Measurement	When measured	Dox	SCG	Placebo	Significance
PEFR { am	Mean	317	362	347	NS
	Last				
FEV ₁ { pm	2 weeks	373	397	389	NS
	2 Weeks	2.2	2.4	2.3	NS
	4 Weeks	2.5	2.4	2.1	NS
	Last	5.0	3.8	4.7	Dox v SCG* P<0.05
Bronchodilator usage (puffs/day)	2 weeks				
Patients withdrawn		3	0	1	
Patients' preference		1	7	2	(P<0.1)+

*Parametric analysis of variance.

+ χ^2 test.

cromoglycate month ($P<0.05$) (dox v SCG). Symptom scores showed no significant difference apart from the nocturnal asthma score, which was higher for doxantrazole than cromoglycate. Four patients noticed no difference in any treatment period, seven preferred cromoglycate, two placebo, and one doxantrazole ($P<0.1$).

Comment

This study failed to show any benefit from doxantrazole in this group of 14 asthmatic patients. There was some evidence of a small response to cromoglycate in that PEF rates tended to be higher, patient preference greater, and bronchodilator usage lower, though the individual differences were small and of borderline significance. We have therefore studied a group of patients with only a small response to cromoglycate under the conditions of this study. They were selected, however, as being those most likely to be cromoglycate responders from a large pool of adult asthmatic patients in Southampton. In previous studies of adult asthma benefit has usually been seen in respect of patients' preference or reduction in other treatment rather than in improved pulmonary function. The response to each drug was assessed in several ways—withdrawal from the study, daily PEFR, fortnightly FEV_1 , daily inhaler usage and patient preference. Assessment is difficult since improvement may show itself in different ways: some patients improve pulmonary function while not changing inhaler usage, others show no change in pulmonary function but use less bronchodilator. Conventional analysis of any one index may underestimate the value of a drug, a problem common to most longer-term studies in asthma. Doxantrazole has shown considerable antiallergic activity in animals and in-vitro experiments with passively sensitised chopped human lung.⁴ An initial study showed some protection for asthmatic patients after acute antigen challenge⁵ but the results were not confirmed in a subsequent study³ nor in exercise-induced asthma.⁵ The reason for the disappointing results in man after the early promise from laboratory and animal studies is not clear.

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