LETTERS TO THE EDITOR

Pressure-volume characteristics of the rectum

SIR,—The paper by Kendall and colleagues (*Gut* 1990; 31: 1062–8) raises several methodological problems. Digital rectal examination alone is not sufficient to ensure that the whole rectum and lower sigmoid colon is devoid of faeces. We recommend the use of a paediatric sigmoidoscope without insufflation to ensure an empty viscus before embarking on a proctometrogram.¹ In support of this we have radiological evidence that the proctometrogram balloon expands into the upper rectum and lower sigmoid during distension. The presence of faeces in the upper rectum could appreciably alter the characteristics of a proctometrogram. Furthermore, no information is provided about the level of balloon placement in the rectum.

In our experience the proctometrogram balloon never empties completely upon deflation and hence retains variable but appreciable amounts of perfusion fluid at the end of a study while still in the rectum. Repeated distensions at five minute intervals as described in their study may therefore be subject to inaccurate interpretation as this variable residual amount is not accounted for. The use of a fluid perfused system to measure intraballoon pressure is subject to well known errors² which are not encountered by the solid state microtransducer system used in our study.

The frequency of the irritable bowel syndrome is such that these patients may have inadvertently been included in the normal subject group. It is now also known that subtypes within irritable bowel syndrome differ greatly in their manometric manifestations.³ The comparisons between irritable bowel syndrome patients and control subjects furthermore may not be relevant as the groups were not matched for age or sex. The inclusion of six patients with prior hysterectomy in the irritable bowel syndrome group could further invalidate the comparison as this operation can result in motility disturbances of the colon and rectum.

These various considerations will influence the acquisition and interpretation of data obtained from proctometrography. In a study by H Nyhlin (personal communication) 11 patients with irritable bowel syndrome were compared several days apart before and after the introduction of an oral compound which proved to have no influence on colorectal motility. The rectal compliance measurements of the studies were 4.6 (0.92) and 4.4 (0.46) ml/cm H₂O (mean (SEM)); 95% confidence intervals –2.3, 1.9; not significant). The normal range for the same laboratory is 8.7 (0.4) ml/cm H₂O.

In our experience functional abnormalities not detectable by other means have been brought to light by the proctometrogram.^{4,5} Our observations on reproducibility have been substantiated by Sun *et al*⁶ who also suggest that rates of inflation can influence the results obtained.

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- 1 Varma JS, Smith AN. Reproducibility of the proctometrogram. *Gut* 1986; 27: 288–92.
- 2 Dickinson VA. Maintenance of anal continence: a review of pelvic floor physiology. *Gut* 1978; 19: 1163–74.
- 3 Prior A, Maxton DG, Whorwell PJ. Anorectal manometry in irritable bowel syndrome: differences between diarrhoea and constipation predominant subjects. *Gut* 1990; 31: 458–62.
- 4 Smith AN, Varma JS, Binnie NR, Papachrysostomou M. Disordered colorectal motility in intractable constipation following hysterectomy. *Br J Surg* 1990; 77: 1361–6.
- 5 Varma JS, Bradnock J, Smith RG, Smith AN. Constipation in the elderly: a physiological study. *Dis Colon Rectum* 1988; 31: 111–5.
- 6 Sun WM, Read NW, Prior A, Daly J, Cheah SK, Grundy D. Sensory and motor responses to rectal distension vary according to rate and pattern of balloon inflation. *Gastroenterology* 1990; 99: 1008–15.

SIR,—The paper by Kendall and his colleagues concludes that the wide range of responses in irritable bowel syndrome patients and normal subjects makes it difficult to envisage how the proctometrogram could reliably detect abnormalities of rectal function, except when the rectal disease is gross. Their conclusion is based on the demonstration of wide intersubject and intrasubject variations in maximum tolerable volumes and maximum tolerable pressures and the observation that values for these indices with the irritable bowel syndrome fell within the normal range. We are surprised at this conclusion because studies carried out in our laboratory and other laboratories have not only shown that the values for distension thresholds for particular sensations are reproducible^{1–3} but also that the thresholds required to induce a desire to defecate fell below two standard deviations of the normal mean in 57% of patients with the irritable bowel syndrome.

What is the reason for these differences?

(1) Kendall *et al* based their results on analysis of only 10 normal volunteers. With a small number of subjects, standard deviation could be very much affected by a single unusual subject. This could have the effect of extending the apparently normal range to include patients with irritable bowel syndrome.

(2) The maximum rectal volume that the subject could tolerate could well alter with confidence and experience of the subject. It may, for example, increase as a nervous subject becomes more confident with the procedure, but conversely it could decrease if an initially more phlegmatic subject experienced pain on the first distension. Such factors would not apply to other sensory or motor indices of rectal distension. Indeed, on looking at the profiles in Figure 1 and also some of the data in Figure 6, one is struck by the reproducibility of successive tests in Kendall's study. It could be that the index that he and his colleagues have chosen is the least reproducible.

(3) Table 1 shows that the vast majority of the patients had constipation and would therefore be considered a biased sample of irritable bowel syndrome patients. Some may not fulfil the criteria of irritable bowel syndrome, used by other centres, and may well be better characterised as idiopathic constipation. There are a number of patients with constipation after hysterectomy. Indeed, it is interesting that only two patients presented with diarrhoea, and both of these had increased rectal sensitivity – patients 4 and 24. Both our study and Whorwell's study suggested that rectal sensitivity was a feature of patients with a frequent desire to defecate (unpublished observations).¹

(4) Kendall *et al* do not state in their methods whether the rectal tube was placed in exactly the same position on every occasion. The responses to rectal distension may vary con-

siderably according to the position of the balloon.

(5) Physiological systems adapt to stimuli. It is therefore likely that the gap between successive rectal distensions may have been too short to allow the rectum to return to its original basal condition, resulting in poor intrasubject variability.

Biological systems always show some variability that is difficult to control for. Kendall *et al* propose that the noise induced by intersubject and intrasubject variation invalidates the use of the proctometrogram as a clinical test. That is certainly not our experience, nor is it the experience of others. We find the test extremely useful in identifying a subset of irritable bowel syndrome patients with an abnormally sensitive rectum. We believe that the conclusions may have been different had Kendall *et al* had considered some of the important methodological factors listed above.

Finally, we have recently shown that ramp distension of the rectum over the range 10 to 100 ml/minute produced graded responses in rectal sensitivity and pressure.³ These data are also contrary to the findings of Kendall *et al*.

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- 2 Varma JS, Smith AN. Reproducibility of the proctometrogram. *Gut* 1986; 27: 288–92.
- 3 Sun WM, Read NW, Prior A, Daly J, Cheah SK, Grundy D. Sensory and motor responses to rectal distension vary according to rate and pattern of balloon inflation. *Gastroenterology* 1990; 99: 1008–15.

Reply*

SIR,—We thank Varma and Smith, and Sun and colleagues for their letters in response to our article and are happy to reply to the points that they have made.

A major difficulty in studying such pressure-volume relations lies in knowing what end points to use. In our studies we employed end points defined previously by other workers – namely, 'onset of an awareness of the sensation of distension' and the 'limit of tolerability' of the sensation. Ten healthy symptom free volunteers then underwent repeated rectal distensions over several days at different rates to define inter and intraindividual variability. We subsequently compared this information with data derived from a group of patients defined by us as having the irritable bowel syndrome and were unable to find any differences between the patient and control group.

Varma and Smith first criticise us for failing to inspect the rectum and lower sigmoid before each study using a paediatric sigmoidoscope without air insufflation. We followed the previously published work which suggested that such an investigation was unnecessary in the recently defecated individual. Indeed, it appears to remain current practice (Sun *et al*, reference 3) to perform rectal manometric studies after defecation and after digital examination only. Even if Varma and Smith are correct in their assertion that faeces might be present in the sigmoid after defecation, we find it difficult to understand how the presence of faeces in the lower sigmoid would be likely to produce the results that we found.

They question whether we were able to empty the balloon between inflations. Because we measured the volume inserted into the balloon on each occasion and also the volume recovered we were able to ensure that accumulation of fluid in the balloon did not occur. They criticise the use of a fluid filled catheter to detect intraball pressure (standard practice by most other workers). We agree that different absolute values could be obtained using different catheters but find it difficult to see how the varying inter and intraindividual results we obtained could be the result of using different catheters.

They also question whether our normal subject group, all of whom were symptom free and without past or current history of bowel symptoms, could have inadvertently included subjects with irritable bowel syndrome. If it is possible for an adult who feels healthy and who is not aware of any symptoms referable to the gastrointestinal tract to be suffering from irritable bowel syndrome then we have to admit guilt, but then anybody studying normal human physiology of the gut will commit the same mistake.

Varma and Smith also make further points concerning irritable bowel syndrome, suggesting that there may be subgroups who could perform differently. We would not disagree with this possibility and indeed two of our patients with predominant diarrhoea (cases 4 and 24) had maximal tolerable volumes to distension which were at the bottom of the patient range. The point that we made in our paper, however, is that neither of these two patients fell outside the 95% confidence limits for our normal range and while there may indeed be a difference between irritable bowel syndrome patients who are at the extremes of symptoms, neither of these two extremes can be regarded as being 'abnormal.'

They question the past history of the patients and their age: we also considered this and mentioned it in our discussion. It seems likely that failure to control for differences between age and sex of the two groups would have increased the differences between the groups rather than reduced them.

They comment that rectal volumes tolerated by subjects would vary with the confidence and experience of the subjects. We wholeheartedly agree with this statement and indeed this was one of the aims of our study. Our results showed that variability progressively reduced in an individual as the study continued. This is discussed in detail in our paper.

They go on to mention that individual variability would not be so great if other sensory or motor indices of rectal distension were used. The major difficulty identified and discussed in our paper is that the proctometrogram as traditionally employed relies on sensory end points, which are subject to individual interpretation rather than independent measurement.

They comment that the tracings which we published of the pressure-volume relations seem to be consistent in each individual and indeed we would agree with this. Our point again, however, is that it is the sensory end points that are variable, even though the pressure-volume curve is consistent. The major problem in analysis of pressure-volume curves, however, is to adequately define in mathematical terms the pressure-volume curve itself. It is of doubtful use to talk about compliance (as do many workers in the field), since as is evident from all published data, the slope of the pressure-volume curve varies during inflation so that there are a number of compliances rather than a single value.

Sun *et al* also criticise our selection of patients and suggest that our sample was biased towards constipation. Thirteen of 26 patients were constipated, two were predominately diarrhoea sufferers, five had both diarrhoea and constipation, the rest were unaffected by major alterations in stool consistency. These patients therefore do not seem too different from those reported in other recent studies of irritable bowel syndrome such as that of Prior *et al* (Sun *et al*, reference 1) in which 27 of 55 irritable bowel patients were constipated. We would not argue with their suggestion that patients with diarrhoea predominant symptoms may differ from those with constipation predominant symptoms and also are aware that those individuals with diarrhoea in our study had the lowest tolerated volumes of the groups. We point out again, however, that none of these individuals fell outside the range of normality as defined by our volunteer data, so that while proctometrography may differentiate between irritable bowel syndrome patients with diarrhoea and constipation, it is difficult to see how the technique could be used to distinguish the irritable bowel syndrome from normal.

From the interest which our article has stimulated it is evident that more data are required to understand the basic factors influencing pressure-volume relations in the rectum. We look forward to seeing more data from both correspondents to help clarify these difficulties.

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*This is an abbreviated version. The original version addressed all the points made. *Ed.*

Why do patients with ulcerative colitis relapse?

SIR,—Dr J W Paulley takes issue with our criticism that previous studies of psychological factors and ulcerative colitis relapse are uncontrolled (*Gut* 1990; 31: 1419). In support of his argument he cites three studies in which radiotherapy patients, healthy siblings, and healthy volunteers are used as 'control' groups against which ulcerative colitis patients are compared. The data as presented by Dr Paulley are, however, misleading. In the first study¹ radiotherapy patients were only used as controls for the purpose of personality comparisons. The data concerning colitis relapse are uncontrolled and anecdotal. The second study² is a comparison of personality characteristics between 23 patients with inflammatory bowel disease (12 with ulcerative colitis) and their healthy siblings and makes no attempt to study colitis relapse. This study is considerably flawed since the decision to use sibling controls was based on previous data suggesting that siblings had different personalities. Unfortunately, we have been unable to obtain a copy of the 1957 Czech study³ as there is no United Kingdom source (British Library, personal communication). We suspect, from his limited description, that this too is a personality assessment.

Unfortunately, personality studies are of limited value in the study of ulcerative colitis as it is difficult to distinguish premorbid characteristics from illness related changes. It is clearly inappropriate to use controls who do not suffer from episodic bloody diarrhoea and who are not at risk of incontinence, surgery, and

cancer. We recognised that matched disease controls are not easy to find but the above studies are inappropriately controlled.

The relapsing nature of colitis offers an ideal opportunity to undertake controlled studies of the psychological factors associated with relapse. Patients in relapse may be compared with those in remission and in cohort studies patients may act as their own controls. Using such a design we found that 20% of patients reported stressful life events in the three months before relapse. In the absence of controlled data this suggests an association, but patients in remission reported a similar number of events.⁴

Finally, Dr Paulley believes that in forming our conclusion that psychological factors are unimportant in colitis relapse we have 'listened to commonly recited, but uncorroborated views of others, rather than checked the original sources.' We suggest that such criticisms are commonly voiced because others have also checked the original studies and found them lacking.

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- 1 Paulley JW. Ulcerative colitis: a study of 173 cases. *Gastroenterology* 1959; 16: 566-76.
- 2 McMahon AW, Schmitt P, Paterson JF. Personality differences between inflammatory bowel disease patients and their healthy siblings. *Psychosom Med* 1973; 35: 91-103.
- 3 Roubicek J, Martonova F. Psychopathology of ulcerative colitis. *Cesk Psychiatr* 1957; 53: 220-30.
- 4 Riley SA, Mani V, Goodman MJ, Lucas S. Why do patients with ulcerative colitis relapse? *Gut* 1990; 31: 179-83.

Sedation for upper gastrointestinal endoscopy

SIR,—The paper by Daneshmend *et al* (*Gut* 1991; 32: 12-5), outlining the results of a postal questionnaire from 665 endoscopists, provides some alarming statistics - 52 deaths, and a further 119 respiratory arrests and 37 cardiac arrests in a two year period.

I suggest that most of these incidents could have been avoided if the following precautions had been observed: (a) all patients were monitored with pulse oximetry; (b) all patients received supplemental oxygen; (c) a trained medical observer devoted total attention to the sedation and cardiorespiratory well being of the patient; (d) oxygen was continued in the postendoscopy period when indicated.

In the experience of many endoscopy units a combination of midazolam and fentanyl given in doses appropriate to the age and condition of the patient provides satisfactory sedation that is safe provided that the above precautions are observed.

It is a pity that some endoscopy units seem to be isolated from departments of anaesthesia, who may be able to help with advice and trained personnel to make the procedure safer.

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SIR,—I was interested that in the results of the reported study of postal questionnaires inquiring about the sedation practice of endoscopy clinicians only 2% of respondents stated they did not use sedation. It has been my practice since 1976 to offer no sedation to patients but