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.

J S VARMA
A N SMITH
University Department of Surgery,
Western General Hospital,
Edinburgh EH4 2XU.

- 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*.

W M SUN
A BERGIN
N W READ
Gastrointestinal Motility Unit,
Centre for Human Nutrition,
Northern General Hospital,
Herries Road, Sheffield S5 7AU

- 1 Prior A, Maxton DG, Whorwell PJ. Anorectal manometry in irritable bowel syndrome: differences between diarrhoea and constipation predominant subjects. *Gut* 1990; 31: 458–62.
- 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.