Comparison of gastric body and antral pH

Sir.—We read with interest the recent paper by McLauchlan et al. on the comparison of gastric body and antral pH. In our opinion, the most important aspect of this study is that pH values increase immediately after endoscopy, which was used to anchor pH probes to the gastric mucosa. This finding clearly deprives endoscopic gastric pH measurements of all diagnostic value.

The premeal and postprandial pH patterns the authors found by anchoring glass electrodes to the gastric body and antrum mucosa do not differ from those of Fimmel et al., who used unfixed glass pH probes. This means that the endoscopic anchoring procedure does not provide better information and besides, it is certainly unpractical for clinical purposes. In addition, it alters the gastric environment to the point that a long period of continuous pH measurements (three hours) is lost to analysis and it cannot be excluded that the malfunction of the authors’ recording electrodes was due to this anchorage. In fact, they failed to record daytime pH in one case and night-time pH in another case and, in our experience, this frequency and long duration of defective pH monitoring are unusual with glass electrodes which are not fixed to the gastric mucosa.

The authors’ analysis of nocturnal pH measurements gives rise to some questions. First of all, it is not clear why they selected the time interval from 2300 to 0500. This is a short and unusual nocturnal period and, if their intention was to isolate the time when patients were exclusively recumbent in bed, this would have made sense in the case of comparison with upright position time periods. Besides, in this way the authors did not examine the decline in acidity occurring in the early morning hours4, which represents a characterising feature of the well known circadian rhythm of basal acid secretion in healthy subjects.5 It would have been very interesting to see whether this event has any different effects on body and antrum pH recordings.

Secondly, the authors’ conclusion that there are regional gastric pH differences at night is not sustained by their experimental findings. In reality, the majority of their healthy subjects showed low and similar nocturnal pH values in the body and the antrum, and there was no statistical difference between median pHs in the overall population (eight subjects), as results from Table 2 of their paper. Even though the percentage of night time spent below 3 pH units was significantly higher in the body than in the antrum, the pH threshold and the nocturnal time interval that one can arbitrarily select may affect this finding to the point that it is meaningless and this is particularly true in a methodological study including such a low number of subjects. Unfortunately, the authors concentrated their attention on the only two subjects with high nocturnal pH levels, thus overlooking the overall results which show that the pH of the two gastric regions is similar in fasting conditions and consequently the electrode positioning in one or another part of the stomach is unlikely to cause relevant differences in pH readings. Furthermore, care must be taken in attributing the increased pH values recorded by continuous intragastric pHmetry to the backflow of duodenal contents into the stomach, although they were higher in the antrum than in the body. At present the application of this technique in the detection of duodenogastric reflux requires further validation, but, as pH electrodes are mainly sensitive to variations in hydrogen ion activity and do not sense electively any ions which predominate in enteric fluids, we believe that such an indirect diagnostic method will never produce reliable results. In fact, there is the possibility that other factors, such as gastric hyposecretion, may be responsible for the rise in pH values the authors attributed to duodenogastric reflux. In this regard, pH was increased in their two oldest subjects (56 and 45 years) and a significantly reduced acidity has already been reported by comparing healthy volunteers of 40–59 and 18–39 years in approximately the same nocturnal period.6 In addition to an age related gastric hyposecretion, these two subjects, who had evidence of antral gastritis, could present a concomitant chronic atrophic gastritis of the fundus which would have also played a role in increasing pH values, but, unfortunately, biopsy specimens were taken only by the antrum.

Finally, the study by Hostein et al. cannot be quoted to sustain the authors’ interpretation of the nocturnal rise in pH values, because it clearly stated that long term intragastric pH measurement is not a suitable tool for diagnosing duodenogastric reflux in fasting conditions.

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References


Reply

Sir.—We are grateful for the interest which Drs Savarino and Mela have expressed in our work and for their detailed comments.

The aim of our study was to determine whether there was significant regional variations in intragastric pH. In view of the constant changes in gastric size and shape, we believe that anchoring the electrode to the mucosa is essential in order to monitor local intragastric pH over a period of time and while the subject undertakes normal activities. The endoscopic procedure for clipping the electrode to the mucosa is technically difficult and we do not advocate its use for routine studies of intragastric pH. It is, however, a valuable new technique for scientific studies in which precise localisation of electrodes in the upper gastrointestinal tract is required. The loss of satisfactory 24h recordings in two of our subjects was not because of damage to the electrodes by the fixation procedure but to malfunction of the digitrapper recording boxes.

We analysed nocturnal pH from 2300 to 0500 h as the patients all remained recumbent and fasted over this period. On looking at the individual pH traces, there is no evidence of differences between antral and body pH later in the morning.

We agree that taking all the patients together, there was no statistically significant difference in night time antral and body pH. We felt, however, it only honest and correct to draw attention to the episodic rise in nocturnal pH which occurred in two of our subjects and which was different in the antrum and body. The cause of this episodic rise of nocturnal pH is unclear and duodenogastric reflux is only one possible explanation. We have recently performed more detailed studies in a further subject, showing intermittent rise of night time pH.

Aspiration of gastric contents during some of the episodes produced abundant amounts of non-bile stained fluid with a pH the same as that registered by the in situ electrode. On other occasions, however, when the pH was raised no aspirate could be obtained from the stomach raising the possibility that the electrode was recording mucosal pH caused by contraction of the stomach. We certainly agree with Drs Savarino and Mela and also with Dr Hostein and colleagues that studying intragastric pH (even with fixed dual electrodes) is not a specific tool for diagnosing duodenogastric reflux.

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References


Piezoelectric shockwave fragmentation of biliary calculi

Sir.—We were interested to read that EI and colleagues (Gut 1989; 30: 680–5) observed no macroscopic or light microscopic changes in the walls of their 10 stone containing human gall bladders subjected in vitro to 1000-4000 discharges from the Wolf Piezolith 2200 lithotripter.

We compared the macroscopic, light microscopic and scanning electron microscopic changes in stone containing gall bladders from 16 patients treated by 2000-2500 discharges from a Wolf Piezolith 2300 lithotripter at power level 3-4 for between four hours and five days before planned cholecystectomy. In comparison with stone containing gall bladders from age and sex matched control cases, the gall bladders excised within 48 hours of lithotripsy showed focal epithelial denudation, mural oedema, and serosal and mucosal vasodilatation with petechial haemorrhages.

Scanning electron microscopy of the mucosa showed denudation of groups of columnar epithelial cells, while intact cells were seen in the mouths of crypts. Our one gall bladder removed five days after lithotripsy was lined by intact epithelium.

Although human gall bladder epithelium normally
Comparison of gastric body and antral pH.

V Savarino and G S Mela

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