Flatulence

The patient with dizzy turns is the bane of the neurologist, and the equivalent to the gastroenterologist must be the person complaining of flatulence and abdominal distension. Both problems are as common as they are apt to be baffling to investigate. Though patients believe intestinal gas often causes abdominal symptoms, the physician does not always agree. He tends to regard such complaints as functional and to emphasize that the gaseous content of the bowel is influenced chiefly, if not entirely, by the amount swallowed.

A recent study suggests that this view could be mistaken. Analyses of the volume and composition of intestinal gas were made in 11 normal persons by infusing the inert gas argon at a constant rate through a small intestinal polyvinyl tube and collecting the washout gases at the rectum. Within 15 to 20 minutes of the start of the infusion gas could be collected at the rectum at roughly the same rate as that of the infusion. After an initial washout phase in which the quantities of nitrogen and other gases in the gut at the start of the study were obtained, a steady state of gas output was achieved which could be related to gas production. Calculations based on the first phase showed that total volumes of 30 to 200 ml were present, predominantly as nitrogen, the remainder being mainly hydrogen and carbon dioxide with occasionally some methane. In the steady state the quantity of nitrogen washed out tended to be small and relatively constant, and the main gaseous component was carbon dioxide, with lesser amounts of hydrogen and methane.

The importance of swallowed air as a contributor to the nitrogen content of the bowel cannot be assessed from these experiments, because all such gas was removed by constant gastric suction. The steady-state studies suggest that 1-2 ml/min is added by diffusion. The presence of hydrogen and methane are a tribute to bacterial activity. Neither gas can be found in the bowel of germ-free animals or newborn babies, and other studies show that hydrogen is normally produced in the colon, unless there is excessive growth of bacteria in the small intestine. Furthermore the addition of a small amount of a sugar such as lactose to the bowel considerably increases gas formation.

Production of gas in the human intestine is insignificant in quantity compared with that of ruminants, and the clinical problems lack the dramatic quality of cattle bloat. Abdominal distention is a common complaint in association with carbohydrate malabsorption, a feature emphasized by the fact that production of hydrogen in the breath has been used as an indirect indication of sugar intolerance. The rate of carbon dioxide output in flatus closely follows that of hydrogen and is also probably in great part a product of fermentation reactions in the large bowel. Certain foods such as beans have a reputation with the public as gas producers, a reputation confirmed by studies showing a large increase in production of flatus and the concentration of hydrogen in expired air of people consuming the beans. The factor responsible for the gas would seem to be in a component containing nonabsorbed oligosaccharides such as raffinose and stachyose. The relative importance of swallowed air and of gas generated in the bowel as causes of symptoms has yet to be assessed. In people not complaining of flatulence the swallowed air probably contributes about 60%, at the most to the output of flatus as determined by nitrogen content. But whether the flatulent are in general swallowers of air or generators of gas or even specially sensitive to distension remains obscure.

Modified Prefrontal Leucotomy

Prefrontal leucotomy is a subject on which opinions are divergent and firmly held. The divergence is not surprising in view of the lack of knowledge. It is an astonishing fact that in the 35-year history of leucotomy, during which more than 100,000 patients must have been operated on, no prospective controlled trial has been carried out to compare its effectiveness with nonsurgical treatment. There has been one controlled trial in which different forms of leucotomy have been compared with each other. The fact that some doctors are enthusiastic about the operation, whereas others refuse to refer their patients as a matter of principle, is also not surprising in view of the seriousness of the conditions for which the operation is carried out and the irreversible damage it inflicts on what may be the highest centres of the human mind and spirit. In this situation a certain rigid extremism of opinion can be predicted from psychological theory, and this rigidity is not conducive to the scientific impartiality of judgement which is an essential intellectual background to a good clinical trial.

However, there is general agreement on at least one point. The original standard leucotomy in its various forms, in which the white matter of both frontal lobes is severed in a coronal plane anterior to the lateral ventricles, should not be used. This operation, which was introduced by Egas Moniz in 1936 and won him the Nobel prize in 1949, has been found to have too many undesirable side effects, and in two retrospectively controlled trials the leucotomized patients fared no better than similar unoperated patients. In a recent ten-year follow-up of 134 men who underwent standard leucotomy nearly half were disabled by seizures and a
Electrical Activity of the Stomach

The motor activity of the stomach subserves two functions, mixing and emptying. They are affected by a variety of exogenous stimuli, including the nature and consistency of the gastric contents. There is in addition rhythmical electrical activity in the stomach, which appears to be important in the regulation of gastric motility. In recent years physiological studies in animals and man have defined its significance in greater detail.

Fifty years ago W. C. Alvarez first observed that strips of longitudinal muscle taken from different parts of the stomach had different spontaneous rates of contraction. Higher rates of contraction were found in muscle strips taken from near the cardia. He suggested that at the proximal end of the stomach there was a gastric pacemaker. A few years later, in 1921, he recorded slow rhythmical electrical activity, which has since become known as the "basic electrical rhythm." It originates in longitudinal muscle and has been found to occur in many species at a rate of 3 to 6 cycles per minute. This electrical activity is not necessarily accompanied by muscular contractions. When contractions do occur they are synchronized with this slow-wave activity, which suggests that it is a controlling mechanism for the rate of gastric contractions.

The basic electrical rhythm spreads distally towards the antrum. Transections in the mid-stomach reduce the rate in the distal stomach, which provides further evidence that the proximal area acts as the pacemaker. Recent studies in the dog suggest that the gastric pacemaker is sited on the proximal greater curvature.

At the distal end of the stomach there is also rhythmical electrical activity known as the "pacemaker potential" of the gastroduodenal junction. It was thought to spread from the gastric antrum only as far as the junction of the stomach and duodenum. As a result of work in animals the pylorus has been described as an "electrical insulator." A recent study from Sheffield by H. L. Duthie and his colleagues indicates that, in man, 3-cycle-per-minute potential extends from the antrum into the proximal 10 cm of the duodenum. These data were obtained by implanting silver electrodes in the stomach and duodenum of ten patients undergoing cholecystectomy. The implants were removed through the drainage bag six days after operation.

Thus the antrum, pylorus, and duodenum of man appear to act as an electrically co-ordinated unit. It is of interest that the rate of conduction across the pylorus was about four times as fast (2 cm/sec) as in the antrum (0.5 cm/sec). The exact route of conduction from antrum to duodenum has not been defined but it might be via the few longitudinal muscle fibres that continue from the antrum across the pylorus.

Ingestion of water, citrate, and oleate slowed the frequency of the antral pacemaker and its effect spread from the pylorus to the proximal duodenum.

Certain gastric operations such as segmental resection and proximal gastrectomy divide the proximal and distal parts of the stomach. At times they are associated with de-