Summary

A follow-up is presented of cases of *x*-ray negative haematemesis and/or melaena. Among 142 patients followed up for three to eight years there were 33 (23%) in whom a positive diagnosis was subsequently made and which may have explained the original episode.

The diagnoses subsequently made were chronic gastric ulcer in 4, duodenal ulcer in 17, carcinoma of stomach in 4, carcinoma of colon in 3, carcinoma of pancreas in 1, carcinoma of small intestine in 2, Meckel's diverticulum in 1, hereditary haemorrhagic telangiectasia in 1.

Among the less common causes special attention is drawn to pseudoxanthoma elasticum, von Willebrand's disease, diverticulosis of the colon, and the Mallory–Weiss syndrome.

Aspirin is thought to play a very significant aetiological part.

The method of investigation of these cases is discussed in detail.

REFERENCES

Alvarez, A. S., and Summerskill, W. H. J. (1958). *Lancet*, **2**, 920.
Babcock, W. W., and Jonas, K. C. (1950). *Amer. J. Surg.*, **80**, 854.
Birke, G., and Engstedt, L. (1956). *Gastroenterologia (Basel)*, **85**, 97.
Brick, I. B., and Jeghers, H. J. (1955). *New Engl. J. Med.*, **253**, 511, 555.
Donaldson, G. A., and Hamlin, E., jun. (1950). Ibid., **243**, 369.
Gordon-Taylor, G. (1943). *Brit. med J.*, **1**, 504.
Herrington, J. L. (1958). *Surgery*, **43**, 340.
Heycock, J. B., and Dickinson, P. H. (1951). *Brit. med. J.*, **1**, 620.
Jones, F. Avery, and King, W. E. (1953). *Aust. Ann. Med.*, **2**, 179.
Kaijser, R. (1936). *Arch. klin. Chir.*, **187**, 351.
Kerr, H. H., Mensh, M., and Gould, E. A. (1950). *Ann. Surg.*, **131**, 790.
LaDue, J. S., Murison, P. J., McNeer, G., and Pack, G. T. (1950). *Arch. Surg. (Chicago)*, **60**, 305.
McGregor, A. L. (1952). *J. int. Coll. Surg.*, **18**, 838.
Malloy, H. R., and Jason. R. S. (1942). *Amer. J. Surg.*, **57**, 359.
Moore, R. H. (1952). *Ann. Surg.*, **136**, 167.
Muir, A., and Cossar, I. A. (1955). *Brit. med. J.*, **2**, 7.
Osborn, G. R. (1954). *Brit. J. Surg.*, **41**, 585.
Palmer, E. D. (1952). *Ann. intern. Med.*, **36**, 1484.
Rappaport, E. M. (1955). *Gastroenterology*, **28**, 1016.
Rider, J. A., Klotz, A. P., and Kirsner, J. B. (1953). Ibid., **24**, 118.
Schiff, L. (1947). In *Signs and Symptoms*, edited by C. MacBryde. Lippincott, Philadelphia.
—— (1952). Ibid., 2nd ed.

"It followed naturally that the [New Mental Health] Bill took shape from [the Royal Commission's] recommendations; and now the title has arisen from the common euphemism of saying 'health' when we mean 'illness'; one M.P. in fact said, 'There are few subjects which cause so much distress to so many people as mental health.' (Euphemisms were of course well known to the Greeks, who called the Furies the Eumenides or kindly ones.) To object to this may seem trivial and hair-splitting. But it is in fact highly important, for there is a danger that many members of the public, and perhaps even Members of Parliament, will be misled by the title into a state of complacent satisfaction that they have now produced a finer mental health service than any other country—and therefore need do no more. They are in process, no doubt, of improving the service for mental illness: but no service for mental *health* exists yet, and the Bill makes no real proposals towards it. (The Greeks did not deceive themselves that the Furies really were kindly.)" (Editorial, *Mental Health*, **18**, 1.)

POST-VAGOTOMY DIARRHOEA: ITS CAUSE AND PREVENTION

BY

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Long-term studies of the results of vagotomy with gastric drainage (Burge and Pick, 1958) have shown that the operation is better than gastrectomy in the surgical treatment of chronic duodenal ulcer. In their work these authors found that a change in bowel habit after vagotomy was the only feature which could possibly detract from the operation. Of their patients 30% showed some small change on direct questioning. Many patients were previously constipated and welcomed the slight looseness which followed operation. Others, however, found themselves confronted with a real disability marked by early morning diarrhoea with urgency. A few have shown severe disabling diarrhoea. Our own long-term studies prove that in most cases the symptom is permanent. At one time we felt that, because of post-operative diarrhoea, the operation of vagotomy might not come to take its place as the standard surgical procedure.

Up to now the cause of this diarrhoea has been unknown. Most authors have believed that these symptoms are due to infection consequent upon gastric hypoacidity or to gastric stasis.

During our studies we found that extirpation of the coeliac plexus in the dog caused diarrhoea (Von Mering and Aldehoff, 1899). It seemed to us that vagal denervation of the coeliac plexus might be the cause of post-vagotomy diarrhoea in man.

No worker has published, as we do now, two series of cases, one with the coeliac division of the posterior vagus intact and the other with the vagal supply of the coeliac plexus interrupted by division of the posterior vagus above the origin of its coeliac branch.

We have found by stimulation tests (Burge and Vane, 1958) in animals and on man that preservation of the coeliac division of the posterior vagus does not interfere with complete gastric vagotomy.

Although a few important papers have described the anatomy of the abdominal vagus (McCrea, 1924, 1926), our own dissections in the post-mortem room have brought to light anomalies, not mentioned in these papers, which are important now that vagotomy has become the standard surgical procedure.

We have found that the coeliac division of the posterior vagus usually arises at a level below the gastric cardia (Fig. 1). In this case when the posterior vagus nerve is divided denervation of the coeliac plexus must occur. Sometimes the coeliac branch was found to arise at a higher level, though still below the diaphragm (Fig. 2). In such a case it would seem possible that when a posterior nerve trunk is overlooked the coeliac innervation may be preserved. In some cases we found that the coeliac division arose within the chest and passed, closely applied to the abdominal wall, the coeliac plexus (Fig. 3). It seems likely that this nerve must sometimes

be missed during standard vagotomy. Although the coeliac division may arise in this way above the diaphragm it may give gastric branches which need division.

Operative Procedure

Using a foot-down tilt, the abdomen is opened by a high left paramedian incision and the left lobe of the liver mobilized in the usual way and retracted to the right. A small incision is made in the peritoneum to the left of the oesophagus and the right index finger passed behind the oesophagus to make a hole through the peritoneum on its right. In doing this the coeliac division of the posterior vagus must be felt like a string as it passes the posterior abdominal wall. The anterior vagus nerve or nerves are dealt with by complete section. It is useful to pass a thread round the main posterior vagal trunk for traction. A hole is made in the small omentum, and it is divided upwards from the pyloric region to the diaphragmatic hiatus.

The left gastric artery and vein are divided separately between ligatures. This step in the operation is made easier if the assistant stretches the stomach by holding the fundus outside the wound. We at one time considered an attempt to divide the gastric branches of the posterior vagus while retaining the left gastric vessels as well as the coeliac branch of the nerve. However, the presence of many small branches arising from the coeliac division and passing to the stomach with the left gastric vessels made us decide to divide the left gastric artery and vein. We have always proved that gastric nerve section is complete by test before performing posterior vertical gastro-enterostomy.

Clinical Findings

From long-term studies carried out by Burge and Pick it was found that 30% of their series of 301 patients who had had vagotomy and gastro-enterostomy replied "Yes" to the question, "Do you have diarrhoea or loose motions?" This series was drawn from many cities in England, and it is interesting to note that the incidence was the same in each city.

Before performing this selective vagotomy we had available for comparison 25 consecutive cases of vagotomy the completeness of which was proved by test and in which no attempt had been made to preserve the coeliac division. Since using this selective operation we have carried out another series of 25 consecutive cases in which the coeliac division was preserved while maintaining complete gastric section. The incidence of diarrhoea in these two series was determined, and is set out in the table. An occurrence of 10 cases (40%) in the first series is compared with no occurrence whatsoever in the second series.

Incidence of Diarrhoea

	No. of Cases	With Diarrhoea	With Severe Diarrhoea
Series 1 (coeliac nerve cut) ..	25	10 (40%)	2 (8%)
,, 2 (,, ,, intact) ..	25	0	0

Discussion

As the operation of vagotomy with gastric drainage has become more popular in recent times, surgeons using it have become more aware of post-operative diarrhoea, which although usually mild can sometimes be severe. We thought that this symptom might be caused by vagal denervation of the coeliac plexus, and decided that the simple method of comparing the two series of cases, one with the coeliac division divided and one with it intact, was the only satisfactory method of proving or disproving our theory.

In each centre in England where the operation was done, even when the series has been small, there has been a very constant incidence of diarrhoea on direct questioning. We must stress that it is unusual for the patient to complain of diarrhoea without this direct question. In view of this constant figure of 30% in the total series of Burge and Pick and in the figures from each centre, and the comparable figure of 40% in our own series, we conclude that the complete absence of diarrhoea in the 25 cases in which we have preserved the coeliac division must be significant.

Summary

The incidence and severity of post-vagotomy diarrhoea are discussed. Strong evidence is put forward for the first time that this condition is caused by denervation of the coeliac plexus when the posterior vagus nerve is divided. Important anatomical anomalies of the origin of the coeliac divisions are described. The technique of vagotomy with preservation of the coeliac

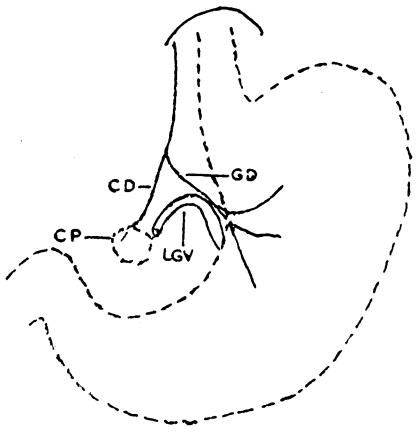

FIG. 1

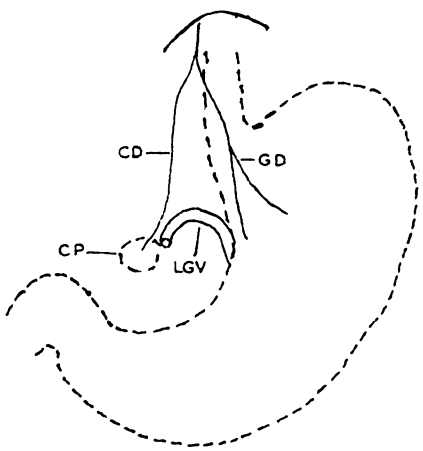

FIG. 2

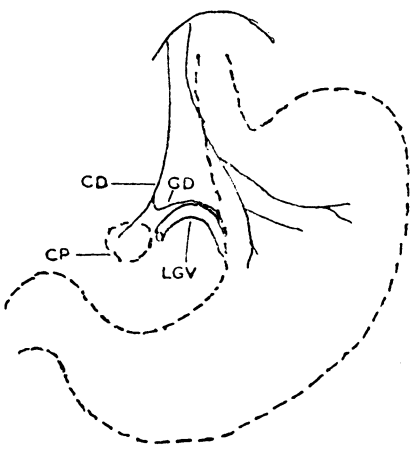

FIG. 3

CD=Coeliac division. CP=Coeliac plexus. GD=Gastric division. LGV=Left gastric vessels.

division is detailed. Complete gastric nerve section is demonstrated by stimulation.

Two series of cases are compared. Since the coeliac innervation has been preserved there has been no case of diarrhoea.

REFERENCES

Burge, H., and Pick, E. J. (1958). *Brit. med. J.*, **1**, 613.
—— and Vane, J. R. (1958). Ibid., **1**, 615.
McCrea, E. D. (1924). *J. Anat. (Lond.)*, **59**, 18.
—— (1926). *Brit. J. Surg.*, **13**, 621.
von Mering and Aldehoff (1899). *Zbl. inn. Med.*, **20**, 462.

VANCOMYCIN: REPORT ON TREATMENT OF PATIENTS WITH SEVERE STAPHYLOCOCCAL INFECTIONS

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This paper describes the use of vancomycin in the treatment of nine patients in Hammersmith Hospital who suffered from severe staphylococcal infection of the blood stream, lungs, or operation wounds.

The prevalence in hospital of strains of *Staphylococcus pyogenes* resistant to several antibiotics has led to "the present-day pharmaceutical equivalent of the Gold Rush . . . for new antibiotics" (*Lancet*, 1957). Hospital in-patients are now not uncommonly infected by strains of staphylococci resistant to four or five of the antibiotics to which this species is normally sensitive. Furthermore, all the antibiotics which can be used in the treatment of staphylococcal infections of the lungs, blood stream, or other deep-seated lesions, and which have been introduced since penicillin and streptomycin, are predominantly bacteriostatic.

The isolation of vancomycin from *Streptomyces orientalis* by McCormick *et al.* (1956) was important, for the drug is bactericidal for Gram-positive cocci (Ziegler *et al.*, 1956; Geraci *et al.*, 1956). Moreover, the numerous strains of *Staph. pyogenes* tested against it have been almost invariably sensitive (Fairbrother and Williams, 1956). As shown by Garrod and Waterworth (1956), neither cross-resistance with other antibiotics nor the development of material degrees of resistance *in vitro* has been found.

The drug is poorly absorbed from the intestine. The current preparation is too irritant for intramuscular injection, and, in any case, the drug is not well absorbed by this route. It must therefore be given intravenously.

Geraci *et al.* (1956) found that vancomycin was almost entirely excreted in the urine with a small amount in the bile and faeces. It begins to accumulate in the blood after the first two or three days' treatment.

Although direct intravenous injections can be given, there is a material risk of thrombophlebitis unless veins are used in rotation. The method of intravenous administration least likely to cause thrombophlebitis is by infusion in about 250 ml. of diluent over about 30 minutes or, where applicable, by admixture with a saline or 5% dextrose "drip." Because of the need to give the drug intravenously, and because of its toxicity (see below), vancomycin is at present mainly used for severe staphylococcal infections in hospital, and it is such a group of nine patients that is described here.

Treatment of Patients

The nine patients were not selected; they comprise all those treated with vancomycin at Hammersmith Hospital up to August, 1958, except for three patients who received the drug only when *in extremis*. Information given in the following case reports is summarized in Tables I, II, and III. Eight of the nine patients (Cases 1–8) had failed to respond to other antibiotics before vancomycin was used.

Table I shows the patients' presenting illness, the nature of the staphylococcal infection, and the response to vancomycin. Those who received an adequate course of the drug responded well clinically.

Table II indicates the antibiotic sensitivity pattern and phage type of the strains of *Staph. pyogenes* isolated and the preceding courses of antibiotics given to the patients.

Severe loss of auditory acuity followed treatment in several patients, and Table III shows the incidence and its relation to high blood urea levels.

TABLE I.—*Infections and Response to Treatment*

Case No.	Age and Sex	Admitted to Hospital for Treatment of	Site(s) of Staphylococcal Infection(s)	Response to Vancomycin Treatment	
				Clinical Response	Elimination of Infecting Staphylococcus
1	78 M	Gangrene of foot (arteriosclerotic) with mild diabetes	Transfusion and amputation wounds (leg), lungs	Rapid complete recovery	No
2	37 F	Asthma with chronic suppurative bronchitis	Lungs	Slow but good recovery from acute-on-chronic infection	,,
3	19 wks. M	Paroxysmal cough	Lungs (throat swabs)	Slow but good recovery	,,
4	28 F	Bilateral lobar pneumonia with anuria	Blood	,, ,, ,, ,,	Yes
5	42 M	Bronchopneumonia with renal failure	Lungs, blood	Rapid recovery	,,
6	49 M	Post-operative anuria (following partial nephrectomy)	Wound, blood	Recovery from staphylococcal infection but died of *Ps. pyocyanea* septicaemia	,,
7	55 F	Oliguria and biliary peritonitis (following cholecystectomy)	Cholecystectomy wound, lungs, peritoneal cavity		No
8	73 M	Bilateral basal pneumonia	Lungs	Rapid initial improvement on vancomycin but relapsed and died when other chemotherapy substituted	No follow-up specimens seen, but presumed not eliminated
9	63 F	Persistent vomiting (due to carcinoma of stomach)	Blood		No