

It might be argued against the validity of the spinal-flexion test that a patient sometimes refuses to stoop, not because he is afraid of bending, but because he is afraid of getting up again. Such a patient will not rise from the recumbent to the sitting position.

GASTRIC BIOPSY WITH A MODIFIED AUSTRALIAN INSTRUMENT

BY

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Ordinary clinical methods supplemented by the use of x rays and gastroscopy fail to demonstrate an organic cause in many patients attending hospital with dyspepsia or anaemia. Many of these patients present difficulties in diagnosis and treatment, and the cause of their condition may be obscure. As part of a clinical study of dyspepsia and hypochromic anaemia we have used the method of gastric biopsy to investigate the state of the gastric mucosa. The Australian biopsy tube (Wood *et al.*, 1949) was chosen for this purpose and modified (Coghill and Wynn Williams, 1955). This paper describes modifications to the Australian instrument and outlines some experiences and difficulties in its use. Examples of results are given.

The Instrument and its Use

The original instrument has a small metal cylinder about 2.5 cm. long at the lower end with a lateral hole 2.4 mm. in diameter in its mid-part through which the knuckle of mucosa to be amputated is drawn by suction. The knife, screwed on to a wire running the length of the instrument,

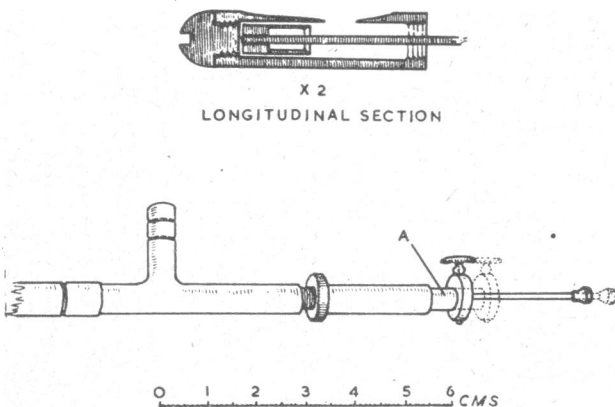


FIG. 1.—Showing the modifications described in the text. "A" indicates the "stop" inserted to control the range of movement of the knife.

is circular and fits snugly inside the cylinder, of which the distal open end is closed by a screw. When negative pressure has been applied the knife is quickly drawn upwards past the lateral hole in the cylinder by pulling on the upper end of the wire. The knuckle of mucosa is thus cut off. The instrument has previously been modified. Palmer (1950) and Badenoch and Richards (1953) constructed what were virtually new models. Rubin *et al.* (1953) made needlessly complicated and detailed modifications. Our experience has shown that a few changes can make the instrument simpler to use and enhance its value (Fig. 1).

(1) A "stop" has been inserted into the upper end of the tube to govern the distance travelled by the knife and prevent it hitting the lower end of the flexible metal tube every time it is pulled up.

(2) The metal cap on the lower end of the tube has been made to unscrew. This prevents blunting of the knife when assembling the instrument and facilitates recovery of specimens.

(3) The lateral hole in the cap through which the knuckle of mucosa is drawn has been enlarged from the original 2.4 mm. diameter to 3.2 mm. This has enabled adequate specimens to be obtained with a lower negative pressure, and usually without interstitial haemorrhage.

(4) The concavity on the outside of the metal cap around the biopsy hole needs to be wide and so ground that the edges of the hole are flush with the bore. In this way the distance travelled by the knuckle of mucosa is reduced to a minimum.

A mercury manometer has been used to measure the negative pressure generated by the hand pump.

Biopsy specimens are obtained in the morning with the patient fasting overnight and usually attending as an out-patient. The routine is that for gastroscopy. Some patients have been examined in the sitting position to assist in obtaining specimens. Remarks by Wood *et al.* (1949) and Doig and Wood (1952) on the technique of passing the tube have proved helpful. Air inflation of the stomach by a bellows attached to the upper end of the instrument has sometimes enabled it to pass to a lower depth. It is our experience that gastric biopsy with this instrument causes less discomfort to the patient than gastroscopy. We have aimed in general to obtain at least two specimens of gastric mucosa from each patient from different parts of the stomach. Each fragment measures 2–3 mm. in diameter and extends down to and includes part of the muscularis mucosae. Specimens from the body of the stomach are of the greatest value, because this part contains the characteristic chief and parietal cells and, in the normal, relatively small numbers of stromal cells.

To date 1,189 biopsy attempts have been made on 437 patients and 776 specimens obtained. Little or no tissue was obtained on 413 attempts. The failure rate was 35 per 100 attempts. Specimens have been obtained from 32 patients on more than one occasion. In most of the failures no tissue was obtained, but in 13 the specimen came from the oesophagus and, in 6 patients with a gastro-enterostomy, from the jejunum. The instrument could not be moved past the cardia in 13 patients. In two of these there was a large hiatus hernia and in one the tube could not be advanced beyond the upper end of the oesophagus. With the smaller (original) biopsy hole a negative pressure of minus 500 mm. Hg was found necessary to obtain specimens of adequate depth. With the larger hole adequate specimens are obtained at a pressure of minus 200 mm. Hg.

Histological Technique

The biopsy fragment is fixed in 10% formol-saline and halved. The two halves are embedded in paraffin so that a section from each is cut perpendicular to the surface. In the majority of cases staining with haematoxylin and eosin is sufficient for diagnosis. When fuller information is required, however, other stains are used in additional sections—for example, mucicarmine, Motteram's modification of Bowie and Vineberg's stain for pepsinogen granules (Motteram, 1951), and Masson's trichrome stain.

Illustrative Cases

In this and the next section brief details of a few patients are given to illustrate some of our findings. Carcinoma was found unexpectedly once (Case 6).

Case 1.—A woman aged 31 with intermittent sore tongue and flatulent dyspepsia for six months. Her haemoglobin was 10.4 g./100 ml. (70%) (14.8 g.=100%), and rose on

treatment to 13.3 g./100 ml. (90%), but her symptoms were unchanged. There was anxiety and depression over a domestic situation, with recent loss of one stone (6.4 kg.) in weight. There were no physical signs of disease. The blood W.R. and Kahn test were negative. A barium-meal examination showed no abnormality. *Gastric biopsy*: Normal mucosa (Fig. 2).

Case 2.—A man aged 46 who for some months complained of intermittent attacks of epigastric pain two hours after meals relieved by food and alkalis. He had had abdominal fullness after meals from the time when he was first married three years previously. He was worried and depressed about a minor operation undergone by his wife. A barium-meal examination showed no abnormality. Two histamine test meals showed no free HCl. *Gastric biopsy*: Chronic atrophic gastritis (Fig. 3). The mucosa was

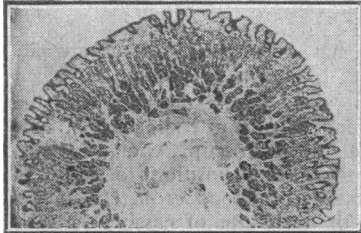


FIG. 2.—Case 1. Normal body mucosa. H. and E. (×20.)

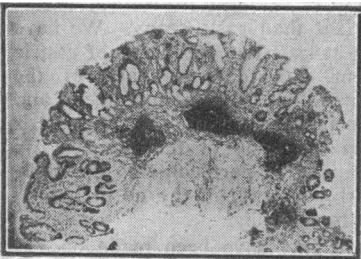


FIG. 3.—Case 2. Chronic atrophic gastritis. H. and E. (×20.)

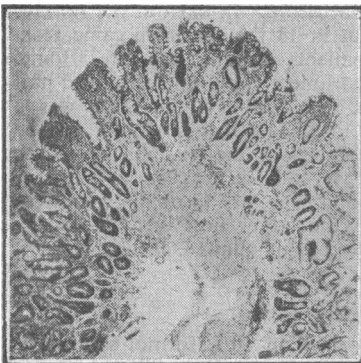


FIG. 4.—Case 3. Chronic atrophic gastritis. H. and E. (×25.)

composed of scanty mucous glands separated by abundant chronic inflammatory small round cells. Lymph follicles were conspicuous and there was notable intestinal metaplasia.

Case 4.—A man aged 67 with pernicious anaemia in remission. *Gastric biopsy*: The features were those of chronic atrophic gastritis (Fig. 5). No parietal or chief cells were present. A few glands of pyloric type were observed. There was intestinal metaplasia, but the numbers of goblet and Paneth cells were not considerable. Moderate numbers of chronic inflammatory cells were present in the stroma with occasional lymph follicles.

Case 5.—A man aged 54 with advanced haemochromatosis. *Gastric biopsy*: There were large amounts of haemosiderin

in the cells of the gastric glands, especially in the deeper part of the mucosa (Fig. 6). No inflammatory changes were present.

Case 6.—A man aged 59 had had a partial gastrectomy 14 years previously for a chronic gastric ulcer. Severe epigastric pain and a small haematemesis followed three weeks after the onset of anorexia and mild dyspepsia. There was marked koilonychia, anaemia (Hb, 6.4 g./100 ml. (43%); M.C.H.C., 23%), and epigastric tenderness. The symptoms rapidly subsided in hospital. On barium-meal examination a small gastric ulcer was seen low on the lesser curve. No ulcer was found eight

days later on gastroscopy, but there were swollen reddened folds of mucosa on the posterior wall and lesser curve which readily bled. *Gastric biopsy*: The gastric mucosa showed the appearances of chronic atrophic gastritis (Fig. 7). In addition, in two of the three specimens obtained there was carcinomatous change, affecting particularly the superficial part of the mucosa. The growth was anaplastic in character.

Comment.—So far our findings confirm that variably intense changes from the normal ("gastritis") are not uncommon in the gastric mucosa and may be encountered in different clinical states. We are correlating the histological findings with the clinical state, the gastroscopic appearances, the haematological condition, and the gastric function. We intend to see if histological changes can be used to guide treatment.

in the cells of the gastric glands, especially in the deeper part of the mucosa (Fig. 6). No inflammatory changes were present.

Complications

This method of gastric biopsy has been used long enough for it to be possible to assess its dangers. As a diagnostic procedure it is not entirely without risk, but we believe that, while this should be recognized, adequate precautions can reduce untoward effects to a minimum.

We have noted a very few minor ill-effects, such as faintness at the time of the examination. One patient vomited persistently afterwards, but did not bleed. Nine patients (2.1%) suffered the more serious complication of haemorrhage. In three it was slight (a few drachms). In one, bleeding occurred without entry into the stomach being effected (Case 7). In one there was melaena only. In three there was haematemesis of $\frac{1}{2}$, $1\frac{1}{2}$, and 2 pints (280, 850, and 1,140 ml.) respectively. In one, life was



FIG. 5.—Case 4. Mucosa from the body of the stomach of a patient with pernicious anaemia. H. and E. (×25.)

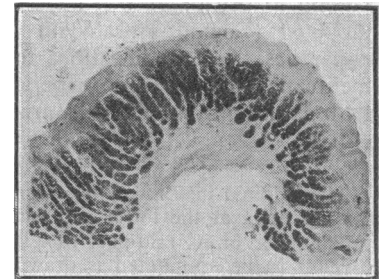


FIG. 6.—Case 5. Mucosa from the body of the stomach of a patient with haemochromatosis. Prussian blue reaction. (×20.)

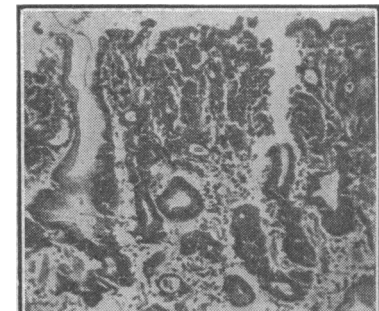


FIG. 7.—Case 6. Atrophic gastric mucosa with carcinomatous change. H. and E. (×32.)

endangered (Case 10). Two patients needed transfusion with blood. One patient died unexpectedly following a minute perforation of the upper oesophagus. Brief summaries of illustrative cases follow.

Case 7.—A woman aged 74 with pernicious anaemia. The tube could not be passed beyond the cardia, and after a few gentle manoeuvres it was withdrawn. No biopsy was attempted. A few hours later she vomited 7 oz. (200 ml.) of red blood, and the next day passed one melaena stool. Apart from possible instrumental trauma, no local or general reason for the bleeding could be found.

Case 8.—A woman aged 47 with pernicious anaemia not fully responding to liver extract or vitamin B₁₂, the Hb fluctuating between 80 and 90%. She vomited 1½ pints (850 ml.) of blood a few hours after the passage of the tube. *Gastric biopsy:* Marked atrophy of the mucosa with slight chronic inflammatory changes but considerable intestinal metaplasia (Fig. 8). Goblet and Paneth cells were very abundant.

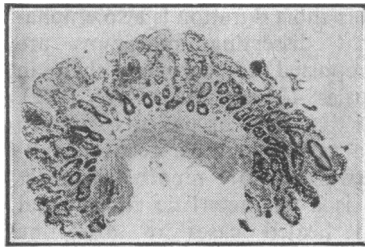


FIG. 8.—Case 8. Mucosa from the body of the stomach of a patient with pernicious anaemia. H. and E. (×20.)

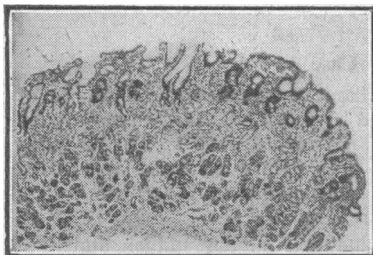


FIG. 9.—Case 9. Chronic superficial gastritis. H. and E. (×20.)

Case 9.—A woman aged 76 who had had intermittent epigastric fullness after meals, and nausea with occasional vomiting, for 20 years. She lived with her husband and daughter, who had both had an attack of vomiting a few days before the patient became ill with the same symptoms. A few hours later she vomited about 2 pints (1,140 ml.) of blood and was admitted at once to hospital. The blood pressure was 190/80, and Hb 6.6 g./100 ml. (45%). With transfusion and oral iron the Hb rose to 10.4 g. (70%); M.C.V., 76 cubic microns; M.C.H.C., 30%. There was a histamine-fast achlorhydria on three occasions. Gastric secretion was collected hourly one night from 5 p.m. to 10 a.m., a small quantity of HCl being found in the first sample only. A barium-meal examination one month after the haematemesis showed no abnormality. No other cause for the bleeding was discovered. At biopsy a piece of mucosa of the usual size was obtained at the third attempt. Within two hours the patient began to vomit and lost 2 pints (1,140 ml.) of blood. Her condition gave no grounds for anxiety, but 2 pints (1,140 ml.) of blood was transfused. *Gastric biopsy:* Chronic superficial gastritis (Fig. 9). Chief and parietal cells were present in the lower half of the mucosa, but were absent in the upper part, their place being occupied by chronic inflammatory small round cells.

Case 10.—A woman aged 60 with pernicious anaemia and chronic myeloid leukaemia. A specimen of mucosa was obtained without incident. Bleeding began at home about ten hours later and she lost much blood as melaena. After admission to hospital bleeding continued for a further four days, mostly as melaena, and 6 pints (3,400 ml.) of blood was transfused. Her condition was serious for some days. Histologically the mucosa was atrophied and thin. In retrospect this patient should not have been submitted to gastric biopsy.

Case 11.—A nervous woman aged 72 in a good state of health. She had had indigestion for nine years, but a barium-meal examination was normal; Hb, 17.2 g./100 ml. (111%). The biopsy tube could not be moved past the

hypopharynx and the attempt was soon abandoned. Afterwards she was distressed and agitated, complaining of pain in the throat and neck, and across the shoulders and the lowest part of the chest in front. The neck became tender, but there was no surgical emphysema. Pulse and temperature were unaffected throughout, but there was a temporary fall of blood pressure from 170/110 to 122/60. An E.C.G. was normal. The patient was retained in the ward and given chlortetracycline in view of the possibility of a perforation of the hypopharynx. There was less pain the next day, but 44 hours after the attempt to pass the tube the patient suddenly became breathless, wheezy, and cyanosed. Intravenous aminophylline gave immediate and almost complete relief. Half an hour later she collapsed and died suddenly. *Necropsy* revealed a perforation ¼ in. (3 mm.) in diameter on the right side of the upper oesophagus at the level of the lower border of the cricoid cartilage. The appearances indicated that the tip of the instrument had damaged the oesophageal wall sufficiently to cause a small leak. The mediastinum on the same side was oedematous and partly infiltrated with pus for about 8 in. (20 cm.) downwards, constituting a moderately severe degree of mediastinitis. The reason for the particular mode of death was not apparent. No cause for the dyspepsia was discovered.

Discussion

In their series of "over 200 biopsies" Rubin *et al.* (1953) describe two cases of haemorrhage. One had pernicious anaemia and the other an atrophic mucosa. In 737 attempted biopsies on 486 patients Doig and Wood (1952) had seven cases of haemorrhage (1.4%). Details of these patients are not given but two required transfusion. Haemorrhage occurred in 1.4% of a series of 702 biopsies reported by Desneux (1954), two being severe and six requiring transfusion. It is noteworthy that our Cases 8 and 10 suffered from pernicious anaemia with a thin gastric mucosa, and one other patient, suffering from dyspepsia, who lost half a pint (280 ml.) of blood, had a thin atrophic mucosa. Case 10 also suffered from myeloid leukaemia.

The patient (Case 11) who unfortunately died after a very small perforation of the upper oesophagus was a woman of 72. This distressing complication, which sometimes follows the passage of instruments through the oesophagus, has not previously been reported with this tube. However, Avery Jones *et al.* (1951) have drawn attention to the increased risk of gastroscopy in women over 50, and some of the factors concerned may operate with the gastric biopsy tube. Seven of our patients who bled were women, and four of these were aged 60 or over.

Gastric biopsy should not be performed in patients suffering from a haemorrhagic disorder, congestive heart failure, or portal hypertension. It is probably dangerous in severe anaemia (in case of haemorrhage) and in old age (especially in women). It is possible that atrophy of the gastric mucosa increases the risk of bleeding from the stomach.

After gastric biopsy it has been our practice to keep outpatients under observation for about six hours on a bed in the ward. If complications are suspected the patient may then be detained in hospital. Only in Case 10, in which bleeding began some time after the biopsy, did this system break down.

Summary

A modified Australian biopsy instrument has been used to elucidate gastric histology in patients with types of dyspepsia and anaemia in which ordinary methods of investigation fail to reveal pathological changes.

The modifications made to the original instrument are briefly described.

Our experience with the instrument is discussed and examples are given of results obtained in 776 biopsies on 437 patients.

There were serious complications in two patients. In one, a woman of 72, the upper oesophagus suffered a small perforation which led to mediastinitis, the patient dying shortly afterwards for reasons which were not entirely clear. In the other patient severe haemorrhage occurred. There was haemorrhage in nine patients (2.1%), three of whom had an atrophic mucosa. Grounds for caution in performing gastric biopsy are suggested.

The Australian type of biopsy instrument is reasonably safe provided there is some selection of patients and the patient is observed for some hours after its use. Our results with it so far indicate that it is useful in the diagnosis of some types of gastric lesion. Possible clinical uses to which the histological findings may be put are mentioned.

The Australian biopsy tube is made by D.H.A. (Victoria) Pty., Ltd., 21, Alfred Place, Melbourne, C.1, Australia (formerly Messrs. Felton, Grimwade and Duerdins Pty., Ltd., of the same address). It can be imported through Drug Houses of Australia Export Ltd., 2/3, Norfolk Street, Strand, London, W.C.2.

The main modifications to the Australian instrument were worked out with the Genito-Urinary Manufacturing Co. They and Messrs. T. H. Spicer and Son have altered the original instruments for us. The hand pump was obtained from Messrs. A. Gallenkamp and Co., Ltd.

It is a pleasure to record our thanks to the following people who have helped us: to Dr. Avery Jones for his interest, and the loan of an instrument at the start of the work; to Professor J. S. Young for his help and advice; to Dr. A. C. Counsell for so generously providing facilities in his laboratory for the preparation and staining of the biopsy specimens; to Mr. W. J. Ferguson for allowing us to include details of Case 6; to Drs. T. H. C. Lewis, W. B. Hennessy, and Felicity Edwards, who have obtained many of the specimens; to Mr. C. N. King, of the West Middlesex Hospital Pharmaceutical Department, for much help with the instruments; to Sisters C. K. Chambers, I. E. S. Seaney, and H. Hendey, and particularly Staff Nurse J. H. MacDonald, for help in the care of the patients; to Mr. R. Drummond for the photomicrographs; to Mr. D. A. Vinton for Fig. 7; and to Miss Susan Robinson for the drawing.

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In his annual report for the year 1954 Dr. I. GORDON, medical officer of health for the borough of Ilford, has these remarks to make about voluntary work in the Health Service: "Many people have complained of the division of the National Health Service into three parts—hospitals, general practitioners, and local authorities—each of which is concerned with the welfare of old people and often working independently of each other. There is actually, of course, a fourth part, the voluntary services. We are fortunate in this town in having a committee run by a section of the fourth part, the Ilford Social Service Association, which concerns itself with the aged. . . . I have heard the Minister of Health state that it was often said that the strange thing about the National Health Service is that, while theoretically it should not work, nevertheless in practice it does. May I suggest here that the reason why it does work is that local people, who know local needs, and feel strongly on the matter, join together to patch up its defects, by arrangements that do not appear in the National Health Service Act, 1946?"

HEALED DISSECTING ANEURYSM OF THE AORTA

BY

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Dissecting aneurysms of the aorta usually have a short clinical course. In Shennan's (1934) series of 143 recent dissecting aneurysms with clinical data 84 (58%) of the patients died within the first 24 hours and 38 (26%) within the first week. This short duration is also emphasized by the fact that dissecting aneurysms are commoner in deaths reported to coroners than in routine hospital necropsies (Mote and Carr, 1942). Crowell (1921) estimated that 20% of patients survived the initial episode, and a smaller number recover completely. The following two cases are reported in order to emphasize that there is a characteristic clinical and pathological picture in healed cases of dissecting aneurysm of the aorta. Syphilitic aneurysms are now uncommon, and it is believed that healed dissecting aneurysms assume a relatively more important place in the incidence of chronic aortic aneurysm.

Case 1

A Spanish dental mechanic aged 49 had an attack of severe pain in his chest and back in 1949; this was associated with hoarseness of voice. After 10 days in bed he made a good recovery and was subsequently perfectly well except for occasional pains in the left shoulder and left arm; these were not related to exercise.

In May, 1953, he had another similar sudden attack of thoracic pain, mainly on the left side and radiating to the back and down to the left groin. He was admitted at once to hospital, where he was found to be cold and sweating; pulse 84, regular; B.P. 90/30. The radial and femoral pulses were equal; the heart was slightly enlarged and there were no abnormal heart sounds. A few rales were heard at both bases. The epigastrium was tender and the abdominal wall rigid. The remainder of the physical examination was normal. The E.C.G. showed left ventricular preponderance only. A small left pleural effusion was seen in the chest x-ray film and the left mediastinal shadow was enlarged. The patient improved with sedation, and the pain disappeared; the blood pressure rose to 130/70. After eight hours a large pleural effusion was detected; this was confirmed by a second chest x-ray film, in which the mediastinal shadow was found to be posterior, projecting anteriorly. Twelve hours later the pain returned, the blood pressure fell, and the patient was more shocked. Pure blood was aspirated from the left pleural cavity, and the diagnosis of ruptured dissecting aneurysm of the aorta was made. There was no further improvement, and the patient died four days after admission.

At necropsy 2 litres of blood was found in the left pleural cavity. This had originated from a ruptured dissecting aneurysm of the aorta, which involved the descending thoracic aorta and the upper part of the abdominal aorta.

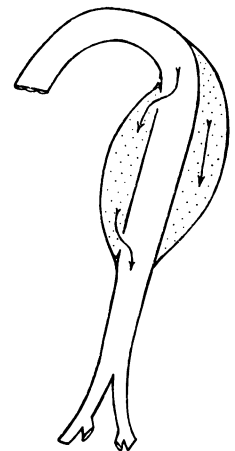


FIG. 1.—Diagram of circulation through healed dissecting aneurysm (Case 1) before terminal rupture.