FIBRE-OPTIC GASTROSCOPY: A REVIEW OF 200 CONSECUTIVE CASES*

B. BROM, M.B., CH.B., *Senior Registrar*, SIMMY BANK, M.B., CH.B., M.R.C.P., *Consultant Gastro-enterologist*, I. N. MARKS, M.B., F.R.C.P., *Part-time Head*, AND Z. RUBINSTEIN, M.B., CH.B., F.C.P., M.MED.(RAD.), *Radiologist*; *From the Gastro-enterology Unit, Groote Schuur Hospital, and the Departments of Medicine and Radiology, University of Cape Town*

Fibre-optics[1] were first introduced into gastro-enterology by Hirschowitz[2] in 1958, and the first fully flexible fibre-optic gastroscope—and, more recently, oesophagoscope—became available for general use a few years later. The prototype of the Hirschowitz ACMI fibre-gastroscope was used in this Department in 1963 and some 300 gastroscopies were performed with this instrument at the time. The advantages of these instruments were immediately apparent in that fibro-gastroscopy was easier and safer for both patient and operator than the semi-rig'd gastroscopes with a lens system previously in use. In addition the antrum and the fundus, previously 'blind areas' with conventional gastroscopes, were now visible if special techniques were used. However, disadvantages of the original Hirschowitz fibroscopes were their relative thickness, the imperfection of the image, and the fact that one was unable to move the tip of the instrument.

The momentum of technical advances in these instruments has been rapid over the past few years in both Japan and America. The diameter of the instrument has been considerably reduced, the optical image and system have been improved and the tip has been made adjustable with a flexion angle in two directions (Fig. 1). External still[3] and cine photography[4] can be carried out with ease and fibroscopes for cytology, biopsy and combined with internal gastro-cameras are at present available.

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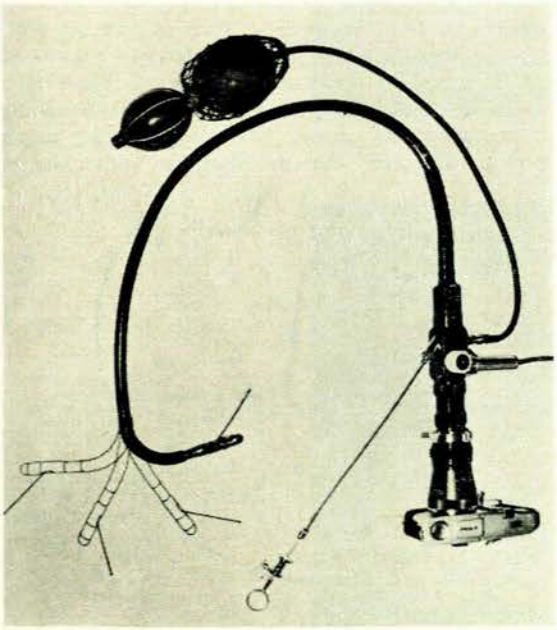

Fig. 1. The Machida biopsy gastroscope with biopsy forceps in position and camera attached at eyepiece. This gastroscope is 2·8 mm. thicker than the Machida type S used in this survey but has the same degree of flexion of the tip as shown.

This paper reviews our experience with one of the newer fibrogastroscopes in 200 consecutive patients, and the results are compared with those of standard barium-meal examinations.

MATERIAL AND METHODS

About one-third of the patients were being followed up in the gastro-intestinal unit. The remainder were referred from the medical and surgical wards of Groote Schuur and related hospitals for gastro-intestinal examination or after a barium-meal report in which the radiologist suggested that a gastroscopy might be useful in confirming or ruling out a suspected but indefinite gastric lesion. Age was no limitation. The youngest patient was 12 years old and the oldest 87. A gastroscopy was not performed if a barium-meal report was not available. The barium meals were performed by both senior consultants and registrars, although all meals performed by the latter were checked by a consultant radiologist.

Technique

The Machida fibrogastroscope, type S with a controllable flexible tip, was used. This has an effective length of 845 mm. with a diameter of 9·2 mm. in its flexible part and 11 mm. of the short rigid tip. It has an angle of vision of 50°.

All patients were sedated with pethidine, 100 mg., or Valium, 10 mg., given intravenously together with atropine gr. 1/100 about 20 minutes before the procedure. Local pharyngeal anaesthesia was attained by using Xylocaine aerosol 5 minutes before gastroscopy. Preliminary intubation with a gastric tube to exclude an obstructive oesophageal lesion and to empty the stomach was carried out in the majority of patients.

The gastroscope was passed with the patient in the left lateral position, with his knees fully flexed. In this position, and with adequate inflation, most of the cardia and body, pylorus, antrum, greater curve and lesser curve as far as the angulus was easily visualized. Turning the patient slightly on his back was usually sufficient to allow one to see the rest of the lesser curve and posterior wall.

To visualize the cardia and fundus adequately the technique of retroflexion was undertaken. This consisted of withdrawing the fibroscope to an area below the cardia, retroflexing the controllable tip by manipulation of the ratchets to 90° and reinserting the gastroscope with the patient in the supine position. With this manoeuvre the fibroscope could be seen entering the stomach through the cardia and lying along the lesser curve.

Our occasional attempts to enter the duodenum have met with little success apart from patients who have had a pyloroplasty. In the postgastrectomy stomach the fibroscope could usually be introduced through the stoma with little difficulty.

When desired, a reflex camera was attached to the gastroscope and a minimum of 3 pictures were taken of the lesion. A speed of 1/30 or 1/15 sec. was used depending on the distance from the lesions.

Complications

Transient dysphagia occurred in a few patients but this was never severe and required only a few Cepacol lozenges for control of the symptoms. Two patients in the present series sustained severe gastric and oesophageal burns because the external camera was attached at the time of gastroscopy and inadvertently placed upside down so that the flash bulb remained on during the examination. This heated up the terminal end of the fibroscope. Both patients required hospitalization—one for haematemesis and the other for possible mediastinitis and the presence of a constant filling defect on the greater curve of the stomach found on a barium-meal examination performed a few days later. The first patient recovered with conservative treatment but the second patient eventually needed a laparotomy to exclude an intragastric or lesser sac abscess. No lesion was found, however, and the filling defect was attributed to possible scarring resulting from the gastroscopy. Both patients eventually made an uncomplicated recovery.

It should be remembered that although oesophageal perforation is much less of a hazard with fibrogastroscopy than with the semi-rigid gastroscopes, it still remains a potential complication. One such event occurred in our earlier series in 1963 with a fatal outcome. There was no mortality in the present series.

The end of the fibroscope should be straightened before withdrawing the instrument after retroflexion to prevent impaction in the oesophagus. If any difficulty is experienced in withdrawing the instrument, fluoroscopy should be used to ensure that this complication has not occurred.

RESULTS

Table I compares the findings on radiology and fibroscopy in the 200 consecutive cases. In 54% of cases there was complete agreement on the site and nature of the lesion, or the absence of any lesion. Table II shows the findings in these 108 patients. Fifty-six patients with a negative radiological report also had a negative gastroscopy. It is possible that a number of gastric lesions remained undetected by both procedures but in the majority of patients another cause for the symptoms was eventually found. A further 8 cases in which the barium-meal studies were suggestive but the radiologist's reports were inconclusive, had the suspected radiological lesion confirmed by endoscopy.

In 12 cases the fibroscopy was inadequate; this was usually due to intense spasm or an obstructive lesion at the cardia or in the body of the stomach (Table I).

TABLE I. COMPARISON BETWEEN RADIOLOGY AND FIBROSCOPY IN 200 CASES

Radiology/fibroscopy	*No. of cases*
Complete agreement	108
Disagreement	72
Indefinite gastric ulcer or carcinoma confirmed by gastroscopy	8
Failed or inadequate gastroscopy	12
	200

TABLE II. RADIOLOGICAL AND FIBROSCOPIC FINDINGS IN 108 PATIENTS IN WHOM THERE WAS AGREEMENT BETWEEN THE 2 PROCEDURES

Diagnosis	*Radiology+ve/ fibroscopy+ve*	*Radiology−ve/ fibroscopy−ve*
Gastric ulcer	38	
Carcinoma	7	
Polyp	2	
Giant hypertrophic gastritis	4	
Pyloric membrane	1	
No abnormality		56

TABLE III. RADIOLOGICAL AND FIBROSCOPIC FINDINGS IN 72 PATIENTS IN WHOM THERE WAS DISAGREEMENT BETWEEN THE 2 PROCEDURES

Diagnosis	*Radiology+ve/ fibroscopy −ve*	*Radiology−ve/ fibroscopy +ve*	*Total*
Gastric ulcer	26*	13	39
Carcinoma	9†	2	11
Erosions		2	2
Gastritis (erosions)		7	7
Stomatitis after gastrectomy		3	3
Polyps	1	1	2
Antral membrane	1		1
Noncommittal barium-meal report (? lesion)	5		5
Gastro-colic fistula	2		2
	44	28	72

*Of these 26 cases another cause for the symptoms was found in 7, the gastric ulcer was construed to have healed by the time gastroscopy was undertaken in 5, a further 3 were disproved by a normal laparotomy and in the remaining 11 the diagnosis was not established.
†Of the 9 cases, 5 were disproved by laparotomy and the remainder by follow-up of the patients.

Table III reflects the findings in 72 cases in which the two investigations were at variance with each other, and Fig. 2 shows the site of the lesion in the stomachs of 13 patients with chronic gastric ulcers and the 2 carcinomas completely missed by radiology. It is of interest that the majority of these lesions were situated on the posterior wall of the body of the stomach (Fig. 2). Table III also shows the outcome in the 26 patients with a radiological carcinoma in whom careful fibroscopy of the suspected report of gastric ulcer and the 9 patients with a suspected

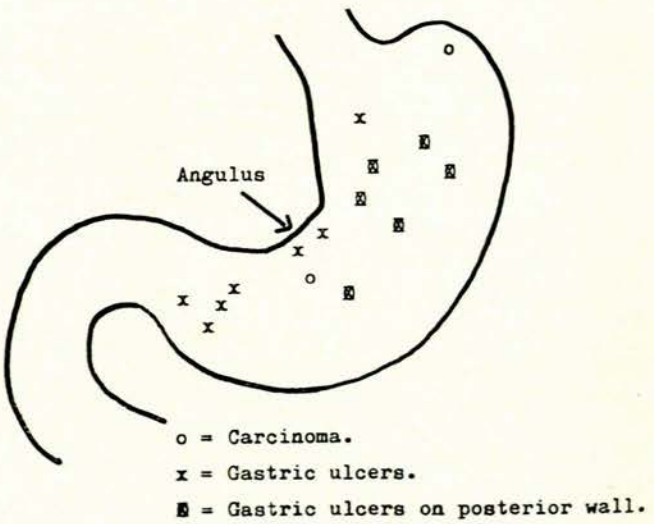

Fig. 2. Position of gastric ulcers or carcinoma missed on radiology.

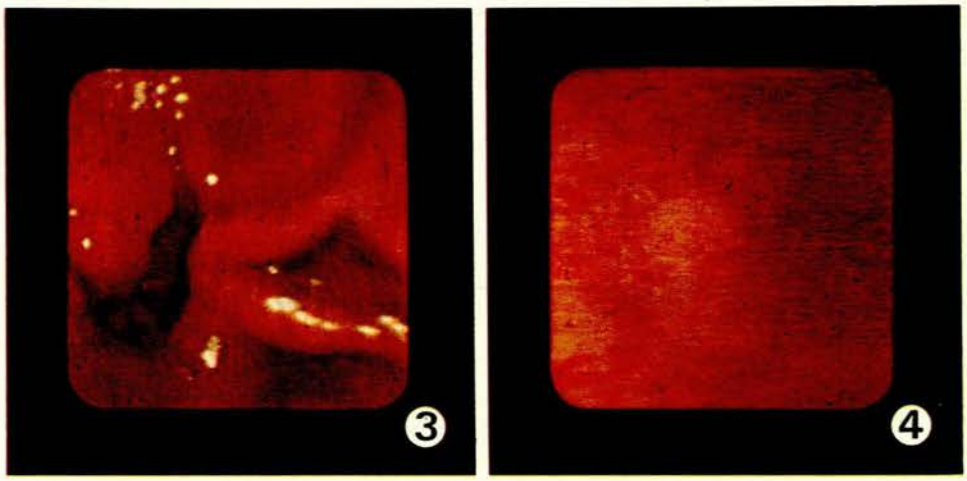

Fig. 3. A large penetrating gastric ulcer with a necrotic base and fold radiation. Patient refused surgery.

Fig. 4. Erosive gastritis.

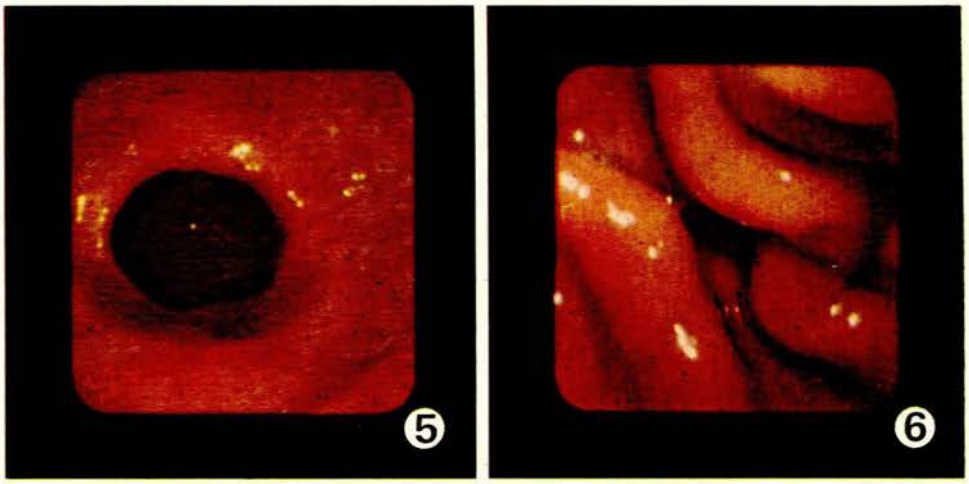

Fig. 5. Small benign gastric ulcer on greater curve of antrum.

Fig. 6. Large folds in a patient with duodenal ulcer.

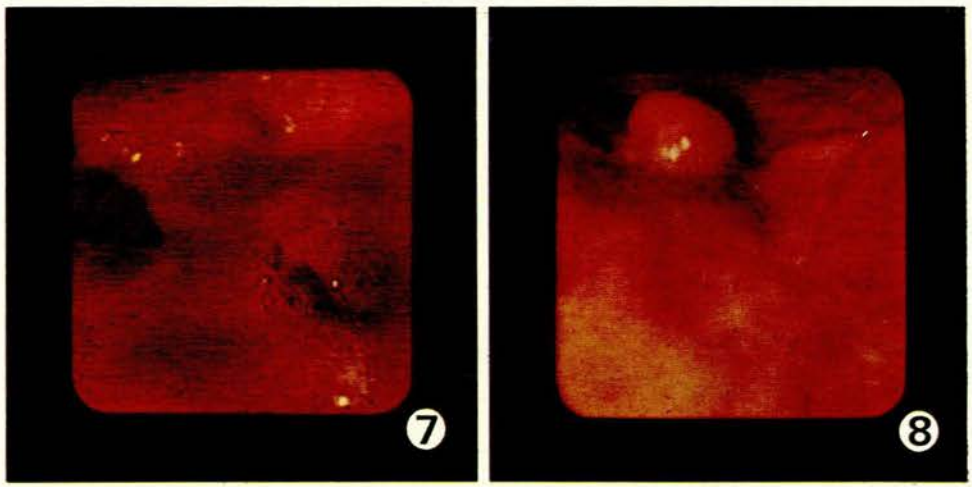

Fig. 7. Gastro-enterostomy with a bleeding polyp, the result of previous surgery.

Fig. 8. Gastric polyp on the posterior wall. The stalk is not well defined in this picture.

area in the stomach was negative. There were 11 patients with a radiological report of gastric ulceration in whom fibroscopy was negative and in whom no diagnosis could be established.

Fibroscopy was the only means of diagnosing acute gastric erosions or more diffuse erosive gastritis or stomatitis in 12 patients.

Figs. 3 - 8 show the gastrophotographic appearances of a number of the lesions found at gastroscopy, and Figs. 9 - 11 show the corresponding barium-meal appearances.

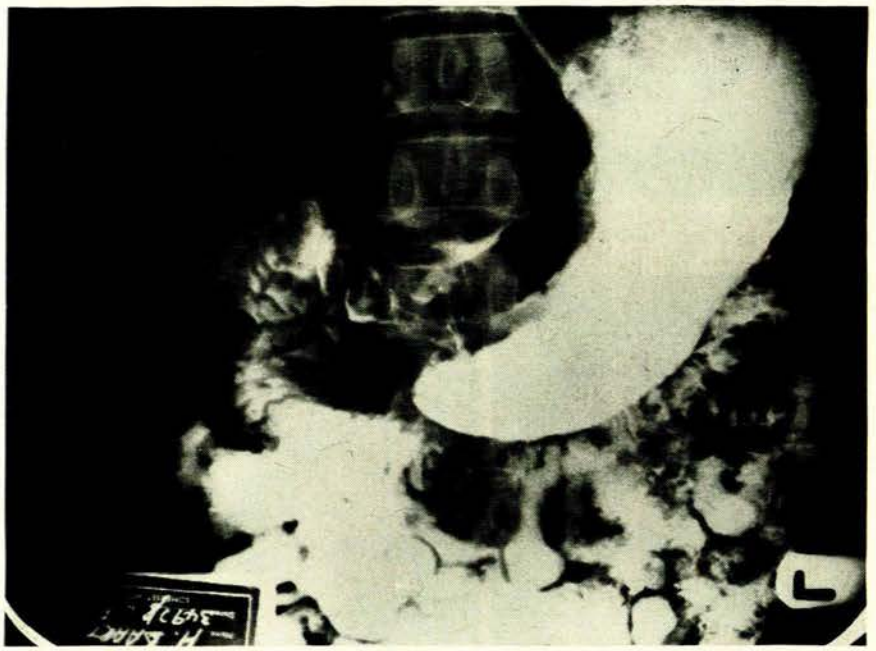

Fig. 9. The radiological presentation of the large gastric ulcer presented in Fig. 3.

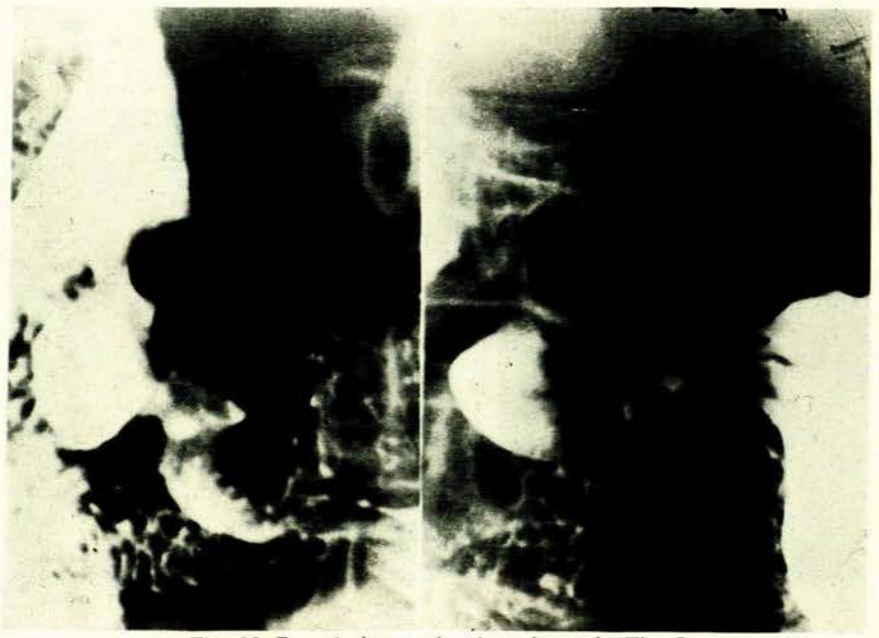

Fig. 10. Prepyloric gastric ulcer shown in Fig. 5.

Table IV shows the radiological findings in 15 patients referred because of gastro-intestinal symptoms after gastric surgery. When the stoma was seen, fibroscopy was clearly more successful than radiology in diagnosing the lesion.

DISCUSSION

The value of gastroscopy with the fully flexible fibre-optic gastroscope was clearly evident in this, as in other, series. Using the semi-rigid gastroscope we previously reported[5] that 8% of chronic gastric lesions were diagnosed in patients with a negative barium-meal report, and other workers have found a similar incidence in large series of patients. More recently[6] we have reviewed the results in some 3,000 gastroscopies using the Herman-Taylor semi-rigid gastroscope and 250 gastroscopies using the Hirschowitz ACMI fibre-optic gastroscope without the controllable distal end and found a 10% and 12% incidence of chronic gastric lesions not reported on barium-meal examination.

In the present series of 72 chronic gastric lesions, no less than 16 (13 gastric ulcers, 2 carcinomas and 1 large polyp) were visualized at fibroscopy in patients with a negative barium-meal report, an incidence of 22%. The above 72 patients included 8 in whom fibroscopy confirmed an indefinite or suggestive barium-meal report. If to this is added a further 12 patients with acute gastric lesions (Table III) visualized only on fibroscopy, then it can be seen that the fibroscope examination was indispensible to the diagnosis of 36 of the 200 cases (18%). Fibroscopy was clearly the only method of establishing acute erosions, acute gastritis or superficial ulceration occurring on a polypoid stoma after gastrectomy.

A negative fibroscopy, although less reliable than a positive one, is of importance provided (*a*) a complete view of the whole stomach has been attained where the radiological report is normal, and (*b*) adequate visualization of a radiologically suspect area is assured. In the present series, 35 patients with radiologically suspect areas were disproved gastroscopically. On the other hand, it should be stressed that gastric ulcers may heal with remarkable rapidity and leave very little evidence of their existence; and also what appears to be an adequate gastroscopy may overlook a small lesion. Thus the fibroscopy should be carried out as soon as possible after radiology. Repeat gastro-

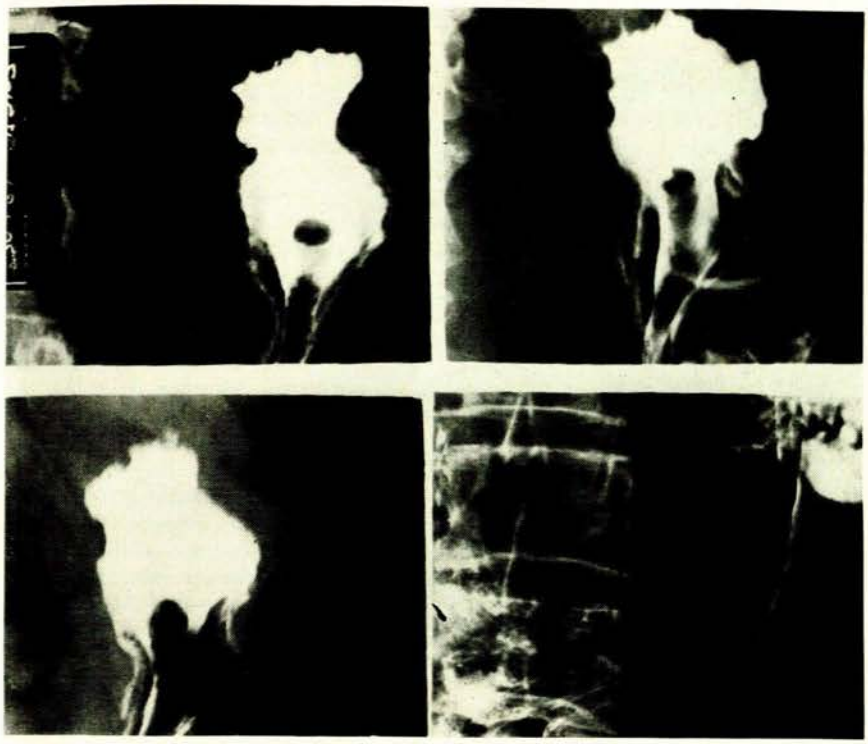

Fig. 11. Gastric polyp as shown in Fig. 8.

TABLE IV. RADIOLOGICAL AND FIBROSCOPIC FINDINGS AFTER GASTRIC SURGERY

Case	*Clinical manifestations*	*Operation*	*Barium meal*	*Gastroscopies*
1	Pain and raised ESR	Billroth II	? gastritis	Carcinoma of stoma
2	Pain	Billroth II	No abnormality	Stomatitis
3	Nausea and vomiting	Billroth I	No abnormality	NAD, stoma not seen
4	Pain and loss of appetite	Billroth II	No abnormality	Erosive gastritis
5	Vomiting and distension	Billroth I	Retention	Retention
6	Anaemia	Billroth II	? gastric ulcer and deformity at anastomotic site	Polypoid formation at site, bleeding actively
7	Anaemia	Vagotomy and pyloroplasty	NAD	NAD
8	Pain and loss of weight	Billroth II	Gastric ulcer	NAD, stoma not seen
9	Vomiting	Vagotomy and pyloroplasty	Distorted pylorus, obstruction present	Distorted pylorus ++, very small opening
10	Dyspepsia	Billroth II	NAD	Stomatitis
11	Haematemesis and melaena	Hemigastrectomy	Jejunal ulcer	No active bleeding in stomach
12	Haematemesis and melaena	Vagotomy and pyloroplasty	? gastric ulcer in pyloric canal	Heaped up mucosa due to pyloroplasty—no lesion
13	Pain and vomiting	Billroth II	No abnormality	No abnormality
14	Dyspepsia	Vagotomy and pyloroplasty	No abnormality	Distorted pylorus only
15	Dyspepsia	Billroth II	No abnormality	Small haemorrhagic areas around stoma

scopy and repeat radiology and careful follow-up is required in patients with a negative endoscopic examination but highly suspicious barium-meal findings.

The reasons for this increased accuracy with the modern fibroscopes are (*a*) the smaller number of failed gastroscopies due to their thinness (the Machida type S is only 9·2 mm. in diameter), and complete flexibility resulting in an easy transpharyngeal and oesophageal passage, and (*b*) the controllable, flexible tip which allows the gastroscopist to 'steer' the gastroscope into the antrum (or through the stoma), retract the tip from the lesser curve and posterior wall and to retroflex the fibroscope to visualize the fundus and the cardia. These areas were previously well-known 'blind spots' by conventional gastroscopy.

The above factors coupled with the relative ease of the procedure for the patient have enhanced the value of gastroscopy in the emergency investigation of acute upper gastro-intestinal bleeding[7,8] and the endoscopic follow-up of gastric ulcer healing to determine the duration of ulcer treatment.[9]

Inability to advance the gastroscope beyond the cardia or more distally has, in this series, usually reflected an organic obstructive lesion such as a carcinoma of the cardia, para-oesophageal hernia or intense spasm occurring opposite a gastric ulcer. The ability to see the duodenal cap varies in different series[2] and our experience is in accordance with those[10] who found this manoeuvre virtually impossible with the exception of the stomach after pyloroplasty. It is possible that longer and thinner fibroscopes are required to achieve duodenoscopy.

SUMMARY

The combination of modern fibre-optic gastroscopy and radiology resulted in a high degree of diagnostic accuracy in patients with chronic gastrojejunal disease. Fibroscopy positively determined the nature of the gastric lesion in 22% of patients with chronic gastric disease in whom radiology was negative.

Fibroscopy was of particular value in patients with acute pre- and postoperative gastric lesions in whom radiology could not be expected to determine the source of gastro-intestinal bleeding.

The reasons for the increased diagnostic yield with the more recent fibre-optic gastroscopes are presented and it is stressed that despite the ease of the examination the potential hazards of conventional gastroscopy, although greatly reduced, still remain.

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