GASTROSCOPY *

A REVIEW OF 303 CASES

S. BANK, M.B., M.R.C.P. (LOND.),** I. N. MARKS, B.Sc., M.B., M.R.C.P. (EDIN.),† and L. WERBELOFF, M.B. (CAPE TOWN), D.M.R.E. (CANTAB.)

Gastro-intestinal Service, Groote Schuur Hospital and Departments of Medicine and Radiology, University of Cape Town

Gastroscopy has been accepted, with varying degrees of enthusiasm, since Kussmaul[1] first devised his rigid instrument for visualizing the stomach. Despite improvements designed to minimize the risk of trauma, to reduce the difficulty in introduction, and to diminish the 'blind areas' in the stomach, the procedure remains a trial to the patient, and its interpretation, occasionally, a challenge to the endoscopist. Gastroscopy has thus tended to become confined to special clinics. Its usefulness in these centres, however, has been amply demonstrated, particularly when the procedure has been employed in conjunction with radiology.

In the present paper we have compared the results of gastroscopy with the radiological findings in 303 patients investigated over a period of two years at the Gastro-intestinal Service of Groote Schuur Hospital. Gastroscopy was used in combination with radiology in all cases, and with the augmented histamine test and gastric exfoliative cytology in the vast majority.

TECHNIQUE

The Herman-Taylor gastroscope with a controllable flexible tip was used as a routine. The amount of sedation was assessed individually and depended on body weight, age and condition of the patient. Sodium phenobarbitone, gr. 1½ - 3, 1½ hours before, and 'omnopon', gr. ⅓, and atropine, gr. 1/100, 1 hour before gastroscopy, were found to be adequate in most patients. Two 'nupercaine' lozenges were allowed to dissolve slowly in the mouth to provide local pharyngeal anaesthesia. The left lateral position with knees fully flexed and the supported head extended was adopted. Preliminary intubation with a thick stomach tube was carried out to exclude an obstructive oesophageal lesion, to empty the stomach and to reassure the patient. With adequate inflation of the stomach, with retraction of the controllable flexible tip, and particularly with active peristalsis, little or none of the entire mucosa remained unobserved, apart from the area of the fundus immediately to the left of the cardia. A complete pyloric closure was seen in most patients.

Severe kyphosis precluded examination and patients with oesophageal varices were usually rejected. Outpatients were always observed for 4 hours after completion of the test and instructed to return immediately should they become febrile or should pharyngeal or mediastinal discomfort persist.

Complications

Transient salivary-gland enlargement and pharyngeal discomfort occurred in most patients. Perforation of the stomach occurred once, in a patient with an unsuspected corrosive gastritis from hydrochloric acid. The combination of an empty stomach, sedation, and virtual achlorhydria from mucosal destruction, accounted for a total absence of peritonitic signs. The perforation was diagnosed on the gastroscopic appearance of pulsating omental blood vessels and the absence of liver dullness on percussion. The presence of air under the diaphragm was confirmed by straight X-ray of the abdomen and surgery was carried out within 4 hours of the perforation. The patient made an uneventful recovery. Two patients with persistent pharyngeal discomfort and transient pyrexia responded well to antibiotics and food restriction for 24 hours. There was no mortality.

RESULTS

Tables I and II show that the results of gastroscopy and radiology suggested the presence of a gastric or anastomotic lesion in 184 of the 303 patients investigated by both these procedures; 159 of those suspect were finally assessed as having definite pathology, the remaining 25

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**Ben May Fellow in Gastroenterology.

†Council for Scientific and Industrial Research, Senior Bursar.

TABLE I. FINDINGS IN 303* GASTROSCOPIC EXAMINATIONS

Condition	Correct diagnosis	Failed	Not seen	Error	Total	Suspect but negative
Gastric ulcer:						
Chronic	56	6	6	—	68	—
Acute	18	—	—	—	18	—
Carcinoma	35	5	4	2	46	3
Postoperative lesions:						
Chronic gastric ulcer	6	—	—	—		—
Acute gastric ulcer..	5	—	—	—		—
Carcinoma ..	2	—	—	—	21	—
Duodenal ulcer ..	1	—	—	—		—
Jejunal ulcer ..	2	—	4	—		—
Stitch ulcer ..	1	—	—	—		1
Polyps	2	—	—	—	2	—
Telangiectasis	2	—	—	—	2	—
Corrosive gastritis ..	1	—	—	—	1	—
Giant hypertrophic gastritis	1	—	—	—	1	—
Total	132	11	14	2	159	4
Gastric atrophy only ..	25	—	—	—	25	
Hypertrophic rugae associated with duodenal ulcer	8	—	—	—	8	
Grand total ..					192	

* No abnormalities were found by gastroscopy, radiology or surgery in 111 patients. Altogether there were 29 'failed' gastroscopic examinations in this series, including the 11 listed in this table.

(21 on X-ray — Table II, column 5 — and 4 on gastroscopy — Table I, column 6) were suspected of having pathology, but were later proved negative. A correct diagnosis was made on gastroscopy in 132 patients. These included 23 patients with acute gastric ulcers and 2 with telangiectasis in whom radiology was negative and surgery was not carried out, but the diagnosis was confirmed in the remaining 107 patients with chronic gastric, anastomotic and stitch ulceration, carcinoma, polyps, corrosive gastritis and giant hypertrophic gastritis; histological evidence was obtained in 103 and radiology and the subsequent clinical course confirmed the diagnosis in the remaining 4.

TABLE II. FINDINGS IN 303* RADIOLOGICAL EXAMINATIONS

Condition	Correct diagnosis	Not shown	Error	Total	Suspect but negative
Gastric ulcer—chronic ..	61	6	1	68	10
Carcinoma	35	3	8	46	7
Postoperative lesions:					
Chronic gastric ulcer ..	3	2	1		1
Carcinoma	2	—	—		2
Duodenal ulcer	1	—	—	16	—
Jejunal ulcer	4	2	—		—
Stitch ulcer	—	1	—		—
Polyps	1	1	—	2	1
Telangiectasis	—	2	—	2	—
Corrosive gastritis ..	—	—	1	1	—
Giant hypertrophic gastritis ..	—	—	1	1	—
Total	107	17	12	136	21
Acute gastric lesions	—	23	—	23	
Total				159	
Gastric atrophy only	—	25	—	25	
Hypertrophic rugae associated with duodenal ulcer	—	8	—	8	
Grand total ..				192	

* No abnormalities were found by radiology, gastroscopy or surgery in 111 patients.

Gastroscopy revealed atrophic or hypertrophic mucosal changes unassociated with evidence of other organic disease in a further 33 patients. Although these findings proved useful in the assessment of the patient, they were excluded from the subsequent analysis of results.

Gastroscopy was regarded as unsuccessful in 29 of the 303 patients investigated. These 29 'failed' gastroscopies were due to difficulty in the introduction of the instrument and, in the majority, to a virtual blackout encountered after entry into the stomach. This group included 11 patients known to have a gastric lesion (Table I, column 2). The lesions in a further 10 patients with subsequently proved gastric disease could not be visualized despite a fairly good, but obviously incomplete, view of the stomach. Jejunal ulceration was missed in 4 patients (Table I, column 3).

An error in interpretation of the gastroscopy findings occurred in 6 patients, 4 of whom were suspected of having lesions that were not found at laparotomy (Table I, column 6). Two malignant ulcers were passed as benign on gastroscopic examination; both were prepyloric ulcers (Table I, column 4).

On the other hand, gastroscopy correctly refuted an incorrect radiological diagnosis of gastric ulcer or carcinoma in 21 patients free from gastric disease (Table II, column 5), and suggested the true nature of the lesion in a further 8 patients with a positive, but incorrect, radiological label. Most important was the finding of chronic gastric lesions and jejunal ulceration in no fewer than 14 patients in whom the barium meal was reported as normal; this group comprised 8 patients with gastric ulceration (including 2 postgastrectomy subjects), 3 with carcinoma, 2 with jejunal ulceration and 1 with stitch ulceration in a gastric remnant.

Chronic Ulceration

Table III shows the radiological and gastroscopic findings in 68 patients with chronic gastric ulceration. In 51 the lesion was detected by both methods. Radiology failed to demonstrate the ulcer in 6 patients, but in these the lesion (above the angulus in every case) was clearly seen on gastroscopy in 5. The sixth patient with a high posterior-wall ulcer constituted the only *known* case in the series

TABLE III. RADIOLOGICAL AND GASTROSCOPIC FINDINGS IN 68 PATIENTS WITH CHRONIC GASTRIC ULCER

	X-ray	Gastroscopy
Demonstrated in both	51	51
Demonstrated in one only	10	5
Incorrect diagnosis in both	1	1**
Incorrect diagnosis in one only ..	6*	5** +6 (F)
Total	68	68
Suspect, but proved negative	**10**	**0**
Acute gastric ulcers	0	18

* One malignant but benign; 5 lesions not shown.
** Six lesions not seen.
(F) = failed gastroscopy.

missed by both procedures. On the other hand, gastroscopy failed to demonstrate the ulcer in 12 patients; 6 of these were in the 'failed' gastroscopy group, but in the remaining 6 visualization of the stomach was considered adequate despite technical difficulties in 3 cases. The ulcer was situated in the prepyloric area or antrum in 4, on the lesser curve in 1, and high on the posterior wall in 1.

Carcinoma and Polyps

Table IV shows the value of gastroscopy used in conjunction with radiology in the 46 patients with gastric carcinoma and 2 with gastric polyps. The lesion was correctly and decisively diagnosed by both methods of

TABLE IV. RADIOLOGICAL AND GASTROSCOPIC FINDINGS IN 48 PATIENTS WITH GASTRIC CARCINOMA AND POLYPS

	X-ray	*Gastroscopy*
Demonstrated in both	34	34
Demonstrated in one only	2	3
Incorrect diagnosis in both	3*	3**
Incorrect diagnosis in one only ..	9*	3** +5 (F)
Total	48	48
Suspect, but proved negative	**8**	**3**

* Four lesions not shown; 8 ?benign but malignant.
** Four lesions not shown; 2 ?benign but malignant.
(F) = failed gastroscopy.

investigation in 34. Three not demonstrated radiologically were diagnosed on gastroscopy alone. In addition 3 of 8 thought to be benign radiologically were correctly designated malignant on gastroscopy. Conversely, gastroscopy failed completely in 5 cases, did not visualize the carcinoma in a further 4 and returned a mistaken diagnosis of benignity in 2.

The 3 lesions incorrectly diagnosed by both procedures were of special interest. The first, an ulcerating prepyloric carcinoma in a Bantu male, was associated with acid hypersecretion and was considered benign on gastroscopy, on radiology and at surgery. The second, a mucosal surface carcinoma in a patient with achlorhydria was discovered by exfoliative cytology and proved by histology, but could not be defined radiologically, gastroscopically or surgically. The third was a large ulcer-cancer on the lesser curvature — again associated with acid hypersecretion and radiological and macroscopic appearances of benignity; this lesion could not be visualized gastroscopically. It should be stressed that the lesion was not seen on gastroscopy in 2 of these 3 patients.

Postoperative Findings

There were 16 chronic and 5 acute gastrojejunal lesions in a group of 42 patients with postoperative dyspepsia and haemorrhage (Table V). The critical figure in this group is the low incidence of concurring diagnosis. The lesion was demonstrated by both methods of investigation in only 6 patients. Although radiology proved superior to gastroscopy in demonstrating jejunal ulceration in 4 patients, there were 2 in whom jejunal ulceration was visualized gastroscopically after negative or indefinite barium studies. Difficulty in entering the stoma accounted for the gastroscopic failures. Two chronic gastric ulcers and 1 stitch ulcer were diagnosed by gastroscopy alone. The limitations of barium studies in the postgastrectomy subject are well known; polypoid folds or deep sulci in the region of the

TABLE V. POSITIVE RADIOLOGICAL AND GASTROSCOPIC FINDINGS AMONG 42 POSTOPERATIVE PATIENTS

	X-ray	*Gastroscopy*
Demonstrated in both	6	6
Demonstrated in one only	4	6
Incorrect diagnosis in both	0	0
Incorrect diagnosis in one only ..	6*	4**
Total	16	16
Suspect, but proved negative	**3**	**1**
Acute gastric ulcers	0	5

* Two gastric ulcers not shown; 2 jejunal ulcers not shown; 1 suture-line ulcer diagnosed as a jejunal ulcer; and 1 stitch ulcer not shown.
** Four jejunal ulcers not seen.

stoma were incorrectly labelled as ulceration or infiltration in 3 patients in our series. The problem is best solved by direct inspection through the gastroscope.

The stitch ulcer was in a patient of 26 years of age in whom a Billroth I gastrectomy had been carried out 2 years previously. The occurrence of severe haematemesis and melaena about 15 months later prompted a barium-meal examination which showed a hiatus hernia, but no evidence of gastroduodenal ulceration. The hiatus hernia was repaired, but was followed 4 months later by a further episode of brisk bleeding. The patient was found to be achlorhydric, and a repeat barium meal was again negative for gastrojejunal ulceration. Gastroscopy, however, showed the presence of a black stitch firmly anchored to a small mucosal area which had become nipped in the knot of the stitch. At laparotomy, the gastric remnant appeared normal on inspection and palpation, and the stitch was found only after direct inspection of the mucosal surface.

Haemorrhage

Table VI is included to demonstrate the importance of gastroscopy in patients with gastro-intestinal haemorrhage in whom no lesion was detectable radiologically. Of 48 patients (including the postoperative group) no fewer than

TABLE VI. POSITIVE GASTROSCOPIC FINDINGS AMONG 48 PATIENTS WITH X-RAY-NEGATIVE BLEEDING

Condition	*No.*	
Acute erosions	19	
Gastric ulcers	2	
Telangiectasis	2	
Mallory-Weiss syndrome	1	
Stitch ulcer	1	
Total	25	(52%)

19 showed discrete or multiple acute erosions. Alcohol and aspirin were frequently precipitating factors. It is of interest that in all 6 patients in whom a definite relationship between aspirin ingestion and severe bleeding could be ascertained, gross gastric atrophy and marked hyposecretion of acid was present. The number of cases is too small to draw any conclusions, but suggests that the corroding effect of aspirin may be more marked where the natural protective barriers are reduced.

DISCUSSION

The value of gastroscopy in patients with chronic dyspepsia and haematemesis or melaena, in whom barium studies were normal, was clearly evident in this, as in other series. Of 159 definite lesions no less than 14 (8%) chronic gastric

and anastomotic lesions were visualized in 8 patients with gastric ulceration, 3 with carcinoma, 2 with jejunal ulceration and 1 with a stitch ulcer, in all of whom no lesion had been demonstrated radiologically. In 7 of these the lesion was demonstrated radiologically, either in retrospect or by a further barium series with special reference to the diseased area. Nine of the 14 patients were labelled as psychoneurotic or functional before gastroscopic demonstration of the lesion; indeed, 2 were already undergoing psychiatric therapy. Klotz *et al.*,[2] in an evaluation of 1,051 gastroscopies, found a 4·7% incidence of positive examinations in patients with normal radiological reports. Renshaw,[3] in a comparable study, demonstrated 10 chronic gastric ulcers in 150 such patients, an incidence of 6·6%. It would appear, then, that gastroscopy alone will provide a decisive diagnosis in 4 - 8% of patients with chronic gastrojejunal disease previously undetected radiologically.

In addition, gastroscopy was the only method of establishing a positive clinical diagnosis in patients with acute erosions or stitch ulceration. In a review of 1,021 patients with gastro-intestinal haemorrhage at this hospital from 1954 to 1960, the source of bleeding was in doubt in more than 40%.[4] Reference to Table VI shows that a positive diagnosis could be made in half the 48 patients with unexplained bleeding in this series and that acute ulceration, whether discrete or widespread, accounted for 40% of the lesions. Gastroscopy thus forms an essential part of the investigation of both chronic dyspepsia and acute haematemesis or melaena in which radiology fails to reveal the lesion.

A negative gastroscopy, although less reliable than a positive one, is of importance provided that: (*a*) a complete view of the entire stomach from pylorus to cardia has been obtained where the radiological report is normal, and (*b*) adequate visualization of a radiologically 'suspect' area is assured. Twenty-one patients with suspicious radiological findings were disproved gastroscopically. The high lesser-curve pocket of barium produced by a fold of mucosa was a frequent source of radiological error. On the other hand, 10 proved chronic gastric lesions were not visualized where the examination was considered adequate. This excludes 4 cases of jejunal ulceration where the stoma could not be entered. The lesion in 6 of the 10 cases was situated in the antrum or prepyloric region, and this emphasizes the diagnostic difficulties in this site. One patient with a mucosal carcinoma was diagnosed on exfoliative cytology alone and of the remaining 3, in whom gastroscopy was technically difficult, 2 had chronic gastric ulcers on the lesser curve and posterior wall respectively, and 1 had an ulcer-cancer above the angulus. Gastroscopy was helpful in ascertaining the presence or nature of doubtful prepyloric lesions in a number of cases.

A suggestive gastroscopic finding, subsequently proved to be normal, occurs infrequently. Of 4 such cases in this series, 3 showed nodular areas in the mucosa and one a presumed stitch ulcer. Although laparotomy proved negative in 3, and subsequent radiology negated the remaining 1, it is of interest that all the patients still have progressive symptoms. Since histological sections of the suspected areas were not taken, the final evaluation of these patients must await further follow-up.

The pre-operative differentiation between benign and malignant gastric ulceration has assumed less importance in recent years, since it has been proved repeatedly that histology is the only decisive method of establishing the diagnosis beyond doubt. The occasional finding of a malignant ulcer indistinguishable from a benign one by all methods of investigation other than histology underlines the importance of regarding chronic gastric ulceration as a surgical disease. This has resulted in an increasing tendency to dispense with a trial of medical therapy. There are, however, a few circumstances where a 3-week medical trial under strict supervision and gastroscopic control is justified in patients where acid secretion is not unduly low and exfoliative cytology is negative. These include the young patient with a recent dyspeptic history, patients on long-term aspirin, steroid or phenylbutazone therapy,[5] and the increasing population of patients with cardiovascular or cerebrovascular disease.

Dodd and Nelson[6] found an accuracy of 95% in the differentiation between benign and malignant gastric ulceration by the use of radiology and gastroscopy combined, compared with 81% and 83% respectively for the individual examinations. Our experience compares well with this. Only 1 lesion was incorrectly diagnosed as benign by both among 101 patients with gastric ulceration or carcinoma in whom the lesion was *clearly* seen on gastroscopy; the exception was the Bantu male with hypersecretion and a prepyloric ulcerating neoplasm referred to earlier. However, there were a further 21 patients with gastric ulcer or carcinoma in whom gastroscopy failed to provide an adequate view of the lesion. It should be noted that Dodd and Nelson's[6] series refers only to those patients in whom the lesion was clearly seen on gastroscopy.

SUMMARY

The combination of gastroscopy and radiology resulted in a high degree of diagnostic accuracy in patients with proved chronic gastrojejunal disease. An individual error of 21% for each of the 2 examinations was reduced to 3% by their combined use.

Gastroscopy was found to be especially useful in the investigation of chronic dyspepsia, acute gastro-intestinal haemorrhage and postgastrectomy symptoms in which radiology was negative. It was the only method of establishing a positive diagnosis of acute erosion.

Gastroscopy was also of value in refuting a suspect but indefinite radiological finding in patients free from gastric disease.

Adequate visualization of gastric ulceration provided a most useful method of establishing the benign or malignant nature of the lesions in this series.

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