

Experience with 1000 Fibergastroscopic Examinations of the Stomach

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THE DEVELOPMENT of the Fiberscope* has been a major advance in gastrointestinal endoscopy. The principle of the Fiberscope was described by Curtiss *et al.*¹ The instrument consists of a bundle of 150,000 glass fibers arranged in exactly the same relationship to one another at each end of the bundle. Each glass fiber carries a portion of light by internal reflection, and the total transmits a mosaic image. The conventional semiflexible gastroscope utilized a series of lenses mounted in a coiled spring.

From August 1961, to February 1965, we performed 1514 examinations with the Fiberscope. This report is an analysis of 1000 examinations selected from the first 1200 patients, chosen solely on the basis of available records. We wish to stress especially the importance of radiology and endoscopy as complementary examinations since their combined accuracy is greater than that of either alone.

METHOD AND MATERIALS

The patients were 618 ward and 382 private patients, examined in 15 hospitals in the Philadelphia area. There was a follow-up period of 1-4 years. The senior author was present at all of the examinations. Unsatisfactory examinations were not included in the calculations of reliability of diagnosis. The instruments used were the Hirschowitz gastroduodenal Fiberscope* with distal illumination and rubber tip, and a conventional semiflexible gastroscope. The preparation of the patient and technic of passing the instrument have been described by Hirschowitz,² and by Fulton,³ among others.

Our method of examination differs from the classic approach described by Schindler.⁴ Since most of the examinations were performed to delineate radiographic abnormalities further, we feel that it is advisable to examine thoroughly the area in question, before systematically examining the whole stomach. We believe that this method increases the likelihood of excluding disease in a specific area before patient and examiner fatigue and accumulating secretions interfere with the quality of the examination. A difficult examination not infrequently lasted an hour or more; the average was about 20 min.

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*American Cystoscope Makers, Inc., Pelham Manor (Pelham), N. Y.

Eighty-four per cent of the roentgenograms were performed in hospitals having a residency training program in radiology. Thus many of the X-ray examinations were performed by radiologists in training.

RESULTS AND DISCUSSION

Tables 1 and 2 list the major diagnostic categories and unusual diagnoses, respectively. Forty-two examinations were considered unsatisfactory because of retained gastric material, lack of patient cooperation, or inability to enter the stomach because of benign or malignant narrowing of the esophagus. It can be said that if a patient was willing and able to open his mouth and had no organic obstruction of the esophagus, the instrument was passed into the stomach with ease.

BENIGN GASTRIC ULCER

There were 262 patients with benign gastric ulcers in this series. A comparison of the diagnostic accuracy of the methods is shown in Table 3. One hundred twenty-five of these patients had a histopathologic diagnosis. The

TABLE 1. RESULTS OF 1000 FIBERGASTROSCOPIC EXAMINATIONS OF THE STOMACH

<i>Result</i>	<i>Number</i>
Negative examination	381
Benign ulcer	262
Gastritis	225
Gastroenterostomies	109
Carcinoma	79
Hyperrugosity	52
Unsatisfactory examination	42
Polyps	42
Malignant ulcer	29
Marginal ulcer	13

TABLE 2. UNUSUAL LESIONS EXAMINED WITH THE FIBERSCOPE

<i>Lesion</i>	<i>No. of patients</i>
Lymphomas	5
Zollinger-Ellison syndrome	2
Leiomyomas	6
Leiomyosarcoma	1
Gastric varices	3
Diverticulum of stomach	4
Sarcoidosis of the stomach	1
Osler-Weber rondu	2
Bezoars	4
Pancreatic rests	2
Chronic lymphatic leukemia	2
Double pylorus	1
Pseudolymphoma	1

TABLE 3. DIAGNOSTIC ACCURACY OF FIBERGASTROSCOPY AND OF X-RAY EXAMINATION

Lesion	No. of patients	X-ray				Fiberscope			
		Lesion seen		Interpretation correct		Lesion seen		Interpretation correct	
		No.	%	No.	%	No.	%	No.	%
Benign gastric ulcers	262	229	88	204	89	253	97	247	98
Malignant gastric ulcers	29	26	90	21	81	29	100	26	90
Gastric carcinoma*	79	72	91	63	88	74	94	69	93

*Lesion seen by either method, 99%.

rest had a follow-up period of at least 1 year. There were an additional 44 patients in whom the presence or absence of a definite ulcer was never decided because of failure to obtain follow-up studies. In these patients an ulcer was suspected by the radiologist but not seen by the endoscopist, both examinations being considered satisfactory. Thus these cases are mentioned but not listed in Table 3. Certainly, some of these were missed by the examiner and others may have been misinterpreted by the radiologist. The latter possibility is supported by the fact that 6 patients operated upon because of a suspicious radiologic finding and negative fibergastroscopic examination had no demonstrable disease; these 6 were also not included in the results shown in Table 3. Since the diagnosis was in doubt in 44 patients, we feel that the 97% visualization figure is probably too high and should be between 90 and 95%. However, it is more important that a larger number of ulcers were visualized by both methods than by either alone. In interpretation, it is important to note that 6 benign ulcers were called malignant by the endoscopist, whereas 25 were diagnosed as malignant by the radiologist.

The Fiberscope was especially useful in follow-up to confirm healing. Not infrequently, the roentgenograms would show "no ulcer," whereas on fibergastroscopic examination, the ulcer could still be seen; in others, the roentgenogram would show a persistent crater, while fibergastroscopic examination showed the crater to be epithelialized.

MALIGNANT GASTRIC ULCERS

There were 29 patients with malignant ulcers. All the lesions were visualized by fibergastroscopic examination; 3 were not demonstrated by X-ray (Table 3). Five were diagnosed as benign by the radiologist and 3 by the endoscopist. It will be difficult to improve the diagnostic accuracy of 90% for malignant ulcers on a single endoscopic visualization, because even on gross inspection some of the specimens removed at operation cannot be identified correctly. It remains for a combined diagnostic approach including X-ray, endoscopy, cytology, gastric analysis, and—last but most important—a closely supervised

trial of medical therapy as described by Bockus⁵ to evaluate properly any ulcerating lesion of the stomach.

Of the 291 benign and malignant ulcers, 282 were seen with the Fiberscope. Only 9 cases were diagnosed incorrectly, resulting in an accuracy of 97%. Of the 255 ulcers demonstrated by the radiologist, 30 were incorrectly interpreted, an accuracy of 88%.

An attempt was made to use an infrared "sniper-scope" to differentiate between benign and malignant lesions, but we were not able to detect a consistent difference between the two.

GASTRIC CARCINOMA

Of the 79 patients with carcinoma of the stomach, 91 and 94% of the lesions were visualized by X-ray and fibergastrosopic examinations, respectively. The lesion was visualized by one or the other method in 99%. Of those visualized by roentgenograms, 88% were correctly interpreted whereas 93% accuracy was obtained with the Fiberscope. This series includes 2 patients with gastric polyps which contained carcinoma in situ on microscopic examination. These were misinterpreted by both technics.

GASTRITIS

There were 225 cases of gastritis of varying types: 35 cases were diagnosed as atrophic gastritis, and 122 as antral gastritis. The others were of the superficial variety.

An additional group of 52 patients had very prominent rugae and these are reported under the descriptive term *hyperrugosity*. The latter were characterized by rugae which were easily effaced with increased air pressure.

POLYPS

There were 42 patients in whom polyps were seen, 4 of which were malignant. Two of these showed carcinoma in situ. Eight were not demonstrated and an additional 7 were incorrectly interpreted by the radiologist.

GASTROENTEROSTOMIES

There were 109 patients with gastroenterostomies examined and 13 marginal ulcers were visualized. Two of these ulcers were missed by the X-ray examination. It was the tendency of the radiologist to overinterpret the films of postgastrostomy patients. Twenty-four additional patients were reported to have marginal ulcers on X-ray examination, and an important function of endoscopy was to rule out disease in these patients.

A not uncommon phenomenon was the production of pseudopolyp formation at the stomal site. This formation is frequently confused with recurrent neoplasm by the radiologist when the primary operation had been performed for carcinoma.

The instrument was usually easily passed into the afferent and efferent loops except in patients with very narrow stomas. On one occasion the examiner was unable to orient himself as to the position of the Fiberscope, the tip of which was located by fluoroscopy in a loop of small bowel below the pelvic brim.

Postoperatively, the stomach is well suited to endoscopic examination. The surgeon, in his endeavor to remove anatomical defects, creates a diagnostic nightmare for the radiologist in the gastric pouch and/or gastroenterostomy, outpouchings and puckering often being quite difficult to differentiate from evidence of recurrent disease.⁶ Here the fibergastroscopic examination is especially helpful.

VISUALIZATION OF THE DUODENUM

Although the instrument is called a gastroduodenal Fiberscope, to the best of our knowledge diligent attempts to place the scope in the duodenal bulb (with fluoroscopic guidance, repositioning of the patient, increased sedation, external manipulation, cholinergic block, and local anesthesia) at no time succeeded in an unoperated patient. In fact, the true opening to the pyloric canal was visualized in only 88% of the patients examined and in some of them, it was achieved with difficulty. It seems unlikely to us that the instrument as now made is suitable for examination of the duodenum. In this respect, our experience differs from that of Hirschowitz⁷ and Burnett.⁸

VISUALIZATION OF THE PYLORUS

The opening to the pyloric canal is a very important landmark and one about which much confusion has been generated. Not uncommonly, the pseudopylorus is thought to be the true pylorus and an important area of the stomach is erroneously thought to have been visualized. The true pyloric opening appears as a punched-out hole with little or no rosette or rugae leading to it, as is commonly seen with the pseudopylorus—which is in reality the result of a peristaltic contraction. For 234 patients in whom both instruments were passed during the same examining period, the true pyloric opening was visualized in 88% with the Fiberscope as opposed to 36% with the conventional gastroscope. This demonstrates an additional advantage of the Fiberscope in more than one-half of the patients, when compared with the conventional gastroscope.

FIBERSCOPE VS. GASTROSCOPE

When we compare the relative merits of the Fiberscope with those of the conventional gastroscope, we find the following advantages for the conventional gastroscope:

1. Because of the wider field and easier positioning, the examination takes less time.

2. The optical acuity is greater.

The disadvantages are: (1) the existence of blind areas, (2) greater discomfort to the patient, (3) greater difficulty in moving the patient during the examination, and (4) greater difficulty in photographing lesions (i.e., there is less light, and more equipment is needed.)

The advantages of the Fiberscope are as follows: (1) absence of regularly occurring blind areas; (2) ease of passage; (3) ready acceptance as an outpatient or office procedure; (4) greater comfort to the patient; (5) greater usefulness in teaching; (6) usefulness in patients with kyphoscoliosis, anterior spines, or organoaxial rotation of the stomach; (7) ease of photography²—black-and-white, color, Polaroid (both), infrared, and motion-picture;⁹ (8) possibility of washing the lesions with water through the air conduit, thus visualizing an area that may be covered with debris or blood; and (9) increased successful visualization of the antrum and especially the prepyloric area.

COMPLICATIONS

Every diagnostic procedure has an inherent risk in its performance, and the fibergastroscopic examination is no exception. Of the total 1514 examinations performed, there were 3 perforations, 1 at the cardioesophageal junction, and 2 immediately distal to it. All 3 patients had hiatal hernias. This is a major complication rate of 0.19%. Others have also reported similar complications.^{3, 10-12} Minor complications were bleeding of varying degrees, necessitating blood transfusion for 1 patient. Another problem was due primarily to the scope's flexibility, the instrument curling back on itself and the tip becoming trapped in a hernia sac. It was successfully extracted with the aid of external pressure under fluoroscopic guidance.¹³

It is likely that, as the Fiberscope is improved mechanically and the endoscopist is able to profit by the growing experience of himself and his colleagues, the complication rate will be further reduced.

Although no tabulation of upper GI bleeding is presented here, it is our impression that the vigorous diagnostic approach utilizing esophagoscopy, gastroscopy, and X-ray during the first 24-48 hr. of admission, as proposed by Hirschowitz,² Palmer,¹⁴ and Katz *et al.*,¹⁵ results in higher diagnostic accuracy and more intelligently directed therapy than that experienced with the conventional method.

In this presentation, no attempt was made to evaluate the over-all usefulness of endoscopy. The not uncommon situation of the patient with equivocal roentgenographic findings who can be reassured by a negative fibergastroscopic examination without the necessity of an exploratory laparotomy is certainly important. No less so is the confirmation of equivocal roentgenographic findings by fibergastroscopic examination and the ability to make a definite diagnosis followed by appropriate treatment.

We cannot stress too strongly the reliance of the fibergastroscopic examination on the radiologic examination. The roentgenograms showed us where to concentrate our efforts in making sure that all of the suspected area was adequately visualized. For this reason and for safety considerations, all fibergastroscopic examinations, except those of emergency nature (such as for the diagnosis of upper gastrointestinal hemorrhage), were preceded by radiologic examination of the esophagus and stomach. We feel that the fibergastroscopic examination does not replace the radiologic examination of the stomach, but rather complements and extends it.

SUMMARY

1. One thousand patients had examinations of the stomach by Fiberscope and by X-ray and conventional gastroscop.
2. Of 282 gastric ulcers visualized with the Fiberscope, 9 were diagnosed incorrectly; 6 benign ulcers were called malignant and 3 malignant ulcers were called benign, for an over-all accuracy of 97%.
3. All but one of the 79 carcinomas of the stomach were visualized by X-ray examination and/or the Fiberscope.
4. The Fiberscope was also of particular value in the examination of the stomach and the prepyloric area postoperatively.
5. The duodenum was not entered with certainty in any examination.
6. There was a major complication rate of 0.19%—3 perforations in 1514 examinations.
7. More lesions were correctly identified by using both procedures than with either alone; we feel that the fibergastroscopic examination of the stomach complements and extends the radiologic examination.

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