

# Upper Gastro-intestinal Fibre-Optic Endoscopy

## A 3-YEAR STUDY AT GROOTE SCHUUR HOSPITAL

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### SUMMARY

A study of 3 000 upper gastro-intestinal fibre-optic endoscopies over a 3-year period is reported.

The majority of patients were endoscoped after barium meals and in 69% of the cases the endoscopic findings correlated well with the radiological findings. In 28% of the cases the endoscopic findings differed from the radiological findings. Endoscopy is more accurate than radiology in the examination of the postgastrectomy stomach, in acute gastro-intestinal haemorrhage, in the radiologically distorted gastric antrum and in the follow-up of gastric ulcer healing. The localisation, healing rate and incidence of recurrence in gastric ulcers and the accuracy of endoscopic biopsy and cytology are reported.

The value of endoscopic examination of the stomach and duodenum is shown, but it is stressed that endoscopy is complementary to and not exclusive of radiology.

*S. Afr. Med. J.*, 48, 857 (1974).

Fibre-optic gastroscopes have been in use for more than a decade since their introduction in the USA<sup>1</sup> and subsequent development in Japan. At the Gastro-intestinal Clinic at Groote Schuur Hospital they have been used since 1966.<sup>2</sup> The fibre-optic duodenoscope and the forward-viewing 'panendoscope' have been used since January 1972. In the period from 1966 to July 1973 the total experience of upper gastro-intestinal endoscopy at this clinic exceeded 6 000 patient examinations. This paper is a study of 3 000 upper gastro-intestinal fibre-optic endoscopies over a 3-year period, from July 1970 to June 1973.

### MATERIAL AND METHODS

The patients had all been referred to the Gastro-intestinal Clinic. Oesophageal conditions were generally examined in a separate clinic.

For the first 18 months of the study the standard side-viewing Machida FG-SL gastroscope only was used. This gastroscope is very thin, intubation is easy and a good view can be obtained of the whole stomach, with

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Paper presented at the 49th South African Medical Congress (MASA), held in Cape Town on 23-27 July 1973.  
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experience. It unfortunately has no biopsy channel. Since January 1972 the Olympus Oesophagoscope GIF Model EF, the Olympus Gastro-intestinal Fibrescope GIF Type D (the so-called 'panendoscope') and the Olympus Duodenoscope Model JF, type B have been in regular use. The oesophagoscope is only long enough to examine the oesophagus and the upper third of the stomach and has been superseded by the panendoscope—a forward-viewing instrument with a biopsy channel which may be used to examine the oesophagus, stomach and the first and second parts of the duodenum. Its drawbacks are that it is thicker and therefore slightly more difficult for the patient to swallow than the side-viewing instruments. There are also occasional blind spots in the stomach and duodenum with the panendoscope, notably the high lesser curve of the body, the lesser curve of the antrum behind the angulus and the base of the duodenal cap. The latter region may be examined more easily with the side-viewing duodenoscope which can also be used with experience to examine the lower oesophagus, the stomach and the third and fourth parts of the duodenum. The duodenoscope may also be used for intubation of the papilla of Vater to perform retrograde cholangiopancreatography.

In this study the oesophagoscope was used in 380 cases; the panendoscope in 420 cases, and the side-viewing duodenoscope in 220 cases. The Machida gastroscope was also used in 600 of the above cases and as the sole instrument in over 2 000 cases. The duodenum has thus been examined in 600 patients, the oesophagus in 800 and the stomach in 3 000. Direct vision biopsy and cytology, the latter by both direct brushing and by imprints of biopsies have been performed with increasing frequency and lately as a routine in all gastric lesions if an endoscope with a biopsy channel is used.

All patients were examined after premedication with intravenous diazepam 2-10 mg plus 0.6 mg atropine and local pharyngeal anaesthesia with a 4% Xylocaine spray.

### INDICATIONS FOR UPPER GASTRO-INTESTINAL ENDOSCOPY

The vast majority of the patients were endoscoped after a thorough upper gastro-intestinal barium meal series, and therefore most of our indications were based on the radiological findings (Table I). Barium-negative dyspepsia was the indication in 327 cases and abnormal or equivocal radiology in about 1 200.

Endoscopy was performed for postgastrectomy or vagotomy problems in 245 cases and in the routine investigation

TABLE I. INDICATIONS FOR UPPER GASTRO-INTESTINAL  
ENDOSCOPY (JULY 1970 - JUNE 1973)

Barium-negative dyspepsia	327
Abnormal or equivocal radiology	1 190
Oesophageal stricture	14
Hiatal hernia	27
Gastric ulcer	483
Distortion of gastric body	155
Distortion of gastric antrum	180
Gastric carcinoma	94
Deformity of duodenal cap	117
Duodenal ulcer	120
No recent radiology	93
Operated stomach	245
Postgastro-intestinal haemorrhage	477
Anaemia	63
1 repeat examination	181
2 or more repeat examinations	469
Other (perforated ulcers, polyps, Virchow-Troisier nodes, etc.)	66
<b>Total</b>	<b>3 111</b>

of 477 cases admitted for gastro-intestinal haemorrhage. Of the latter, 70 were performed as an emergency procedure when bleeding from varices was seriously considered. Anaemia, usually with a positive occult blood test, was an indication in 63 cases. Other indications included 93 cases of dyspepsia where no recent radiology had been performed and 66 cases for a miscellany of conditions, such as following the suturing of a perforated ulcer, polyps, a palpable Virchow-Troisier node, etc. The rest of the examinations consisted of repeat endoscopies in cases where a benign condition had initially been found.

## RESULTS

The endoscopic findings correlated well with the barium studies in 69% of the investigations. In 3% of the cases it was felt that endoscopic visualisation was not good enough to confirm or refute the barium study findings. However, in 28% of the cases the endoscopic findings differed from the radiological findings or a more definitive diagnosis was established. In Table II the positive endoscopic findings in patients with reportedly normal barium studies are detailed. When severe gastritis and stomatitis (which are of dubious clinical significance and hardly amenable to radiological detection) were excluded, an abnormality was found in 30% of patients with barium-negative dyspepsia or anaemia.

TABLE II. POSITIVE ENDOSCOPIC FINDINGS IN 390  
PATIENTS WITH A NORMAL BARIUM MEAL

Oesophagitis*	12
Oesophageal carcinoma	1
Gastric ulcer of body	17
Gastric ulcer of antrum	25
Stomatal or jejunal ulcers	10
Gastric ulcer scar	21
Carcinoma	4
Polyp	13
Lymphoma	1
Duodenal scar	13
Duodenal ulcer	13
Severe gastritis* or stomatitis*	53
Varices	6
<b>Total</b>	<b>189</b>

(30% excluding \*)

TABLE III. ENDOSCOPIC FINDINGS IN 1 378 PATIENTS WITH AN ABNORMAL BARIUM MEAL

Radiological report	No. of patients	Carcinoma	Benign			Severe gastritis		Normal	Failed
			gastric ulcer	Duodenal ulcer	Scar	Extrinsic pressure	and/or other		
Distortion of gastric body—malignant	100	75	—	—	—	2	13	5	5
Dist. gastric body—prob. benign	96	5	8	—	10	12	23	36	2
Dist. gastric antrum—prob. malignant	64	45	2	—	1	2	8	6	—
Dist. gastric antrum—prob. benign	206	7	38	2	28	10	66	46	9
Gastric ulcer—prob. malignant	47	29	10	—	2	—	6	—	—
Gastric ulcer—prob. benign	550	18	345	1	73	—	42	61	11
Dist. of duodenal cap w/out ulceration	157	2	4	33	66	3	23	19	7
Dist. of cap with ulceration	132	—	3	57	35	1	16	10	10
Other	22	—	—	1	—	2	6	6	7
<b>Total</b>	<b>1 374</b>	<b>181</b>	<b>410</b>	<b>94</b>	<b>215</b>	<b>32</b>	<b>203</b>	<b>189</b>	<b>51</b>

A detailed breakdown of the endoscopic findings in patients with a reportedly abnormal barium study is shown in Table III. The two investigations showed the same lesion in the vast majority of cases, particularly when the diagnosis was that of gastric ulceration.

Of 550 cases diagnosed as having a benign gastric ulcer on radiological examination 375 were confirmed by endoscopy, while 73 showed scars, reflecting the delay between radiology and endoscopy. Eighteen of the ulcers looked malignant endoscopically and 14 of these were proved to be malignant on histology of the resected stomach.

As indicated in Table III, of the 270 cases in which radiological benign or malignant distortion of the gastric antrum was reported, endoscopy confirmed the radiological impression in 148 cases, but in 122 cases a more definitive or a different diagnosis was made possible by the endoscopic examination.

In the 18-month period during which 600 duodenoscopies were performed, there was generally good agreement between the endoscopic and radiological findings. However, in 142 cases endoscopy provided a more definitive diagnosis or differed from the radiological diagnosis (Table III). The number of active duodenal ulcers missed at endoscopy is difficult to assess, since only a small proportion of these cases come to surgery.

TABLE IV. TOTAL ENDOSCOPIC DIAGNOSES

Oesophageal varices	41
Oesophagitis	21
Oesophageal carcinoma	6
Oesophageal tear	7
Hiatal hernia	62
Gastric ulcer	467
Cardia	7
Body —post. wall	52
—ant. wall	11
—lesser curve	175
—greater curve	9
Antrum—post. wall	9
—ant. wall	18
—lesser curve	118
—greater curve	23
Pyloric canal	25
Stomatal or jejunal ulcer	20
Gastric carcinoma	188
Cardia fundus	19
Body	71
Antrum	43
Diffuse	42
Gastric lymphoma	7
Gastric ulcer scar	150
Duodenal cap scarred	106
Duodenal ulcer	118
Severe gastritis/stomatitis	256
Other	18
Extrinsic pressure	32
Bezoars	5

## Localisation of Gastric Lesions

Of the 447 gastric ulcers seen endoscopically, 7 (1.5%) were in the gastric cardia, 247 (56%) were in the gastric body; 168 (38%) in the antrum and 25 (4.5%) in the pyloric canal. The anatomical situations are indicated in Table IV.

Of 245 postgastrectomy stomachs examined, 20 stomatal or jejunal ulcers were seen, and in about 100 cases there was a moderate to severe degree of 'stomatitis' on the gastric side of the anastomosis.

Of 188 gastric malignancies in the study, 4 were early gastric carcinomas localised to the mucosa or submucosa. Gastric lymphoma was diagnosed at endoscopy on 7 occasions. In 4 cases this diagnosis was confirmed at histology of the resected stomach, in 2 cases a benign ulcer with benign lymphoid hyperplasia was found on histology and in 1 case the endoscopic abnormality, thought to be compatible with a lymphoma, was due to gross oedema of the gastric wall caused by contiguous pancreatitis. In 5 cases diagnosed endoscopically as malignant lesions, laparotomy and histology showed benign lesions, giving a false positive diagnosis of 7% at endoscopy.

## Follow-up of Endoscopically Benign Lesions

Of the 447 patients with gastric ulcers seen at endoscopy, 209 were gastroscopied at monthly intervals until their ulcers had healed or until they were referred for gastrectomy. The results are detailed in Table V.

TABLE V. ENDOSCOPIC HEALING OF 209 GASTRIC ULCERS

Healed within 1 month	74
Healed within 2 months	47
Healed after more than 2 months	20
Not healed and sent for surgery	68
Remained healed 3/12—2 yrs	50
Recurred within 3/12—2 yrs	43

} 93

Ninety-three patients in whom the gastric ulcer healed initially had repeat gastroscopies from 3 months to 2 years later, either for recurrent dyspepsia or, lately, as a routine follow-up investigation. In 50 cases (54%) the ulcer remained healed and in 43 cases (46%), the ulcer recurred in the same area or another site.

## Gastric Biopsy and Cytology

A gastric biopsy (usually 3-4 biopsy specimens of each lesion) was done in 286 patients. In 251 the endoscopic diagnosis was confirmed by the biopsy (Table VI). In 26 endoscopically malignant lesions (subsequently proved to be malignant on surgical histology) the biopsy was reported as showing no evidence of malignancy. In only 4 cases where a lesion was thought to be endoscopically benign was a carcinoma found on histology and in 1 of these the histology of the resected area was eventually reported as benign.

TABLE VI. BIOPSY AND UPPER GASTRO-INTESTINAL ENDOSCOPY\*

Endoscopic malignant disease with biopsy showing malignancy	63
Endoscopic benign disease with biopsy showing benign appearance	188
Endoscopic benign disease but biopsy showed malignancy	3
Endoscopic and surgical malignant disease but biopsy showed benign appearance	26
Doubtful histological appearance	6
<b>Total</b>	<b>286</b>

\* Includes biopsies done in last 15 months of the study only.

TABLE VII. CYTOLOGY AND UPPER GASTRO-INTESTINAL ENDOSCOPY\*

Endoscopic benign disease and cytologically benign features	108
Endoscopic malignant and cytological malignancy	33
Endoscopic benign but cytological malignancy	2
Endoscopic malignant but cytologically benign features	16
Endoscopic benign with atypical cytology	6
Endoscopic malignant with atypical cytology	8
Preparation unsuitable for cytology	18
<b>Total</b>	<b>191</b>

\*Includes cytology done in last 12 months of study only.

Gastric cytology, done by brushing a lesion with a special cytology brush and by imprinting a biopsy specimen on a glass slide and fixing immediately, was carried out at gastroscopy in 191 cases (Table VII). In 141 cases the endoscopic and cytological diagnoses agreed. In 57 endoscopically malignant lesions, 33 were positive on cytology, 16 were reported to show no malignant features on cytology, and 8 showed atypical cytology. Three of the former and 2 of the latter were subsequently shown to be benign after surgical resection; the rest were malignant. In only 2 cases with an endoscopically benign-looking lesion did the cytology show malignant features, and in 6 cases atypical cells. One in each of the latter groups was subsequently shown to be malignant; 5 of the atypical cytologies were shown to be benign lesions and 1 patient with cytologically malignant features has refused surgery.

## DISCUSSION

Upper gastro-intestinal fibre-optic endoscopy is now well accepted as an accurate means of examining the oesophagus, stomach and duodenum.<sup>2-5</sup> The accuracy of endoscopy is in the region of 90%. There are certain clinical situations where endoscopy is undoubtedly more accurate than radiology, viz. examination of the postgastrectomy and postvagotomy stomach, in acute gastro-intestinal haemorrhage, in the radiologically distorted gastric antrum, in the assessment of the nature of a gastric ulcer and in the follow-up of the latter until complete healing has taken place. With gastric ulcers, a small, healing ulcer is frequently seen at endoscopy when the ulcer has been reported to have healed radiologically. We still believe, however,

that an initial radiological examination is of the utmost importance and that endoscopy complements, and does not exclude, radiology. This point is underlined by our indications for endoscopy, an abnormal or equivocal radiological examination being the indication for endoscopy in over one-third of the cases. Although in this study endoscopy was more accurate than radiology, it must be remembered that the endoscopies were all performed by a consultant gastro-enterologist or senior registrar under strict supervision, while most of the radiological examinations were performed by registrars, with only the X-ray films being checked by a consultant radiologist. Also, the finding of a scar in the stomach and duodenum at endoscopy after a radiological finding of an ulcer often reflected the delay between the two examinations.

A particularly interesting result of this study was the information obtained about the localisation, healing rate and incidence of recurrence of gastric ulcers. The findings in this study are very similar to those of the Veterans Administration study in the USA.<sup>6</sup> The majority (56%) of benign ulcers occurred in the body of the stomach, followed by those in the antrum (38%). Lesser curve ulcers were the commonest in both the body and the antrum, 70% in both. True posterior wall and greater curve ulcers were much less frequent.

In this study 67% of benign gastric ulcers which were followed-up were found to have healed completely at some stage on medical therapy, usually antacids and anticholinergics with, occasionally, the addition of one of the newer anti-ulcer drugs. Thirty-five per cent had healed within 1 month, a further 22% by the end of 2 months, and another 10% after 3 months or more. However, it is not the policy to treat gastric ulcers medically for such long periods, and cases are usually referred for surgery after 4-8 weeks of therapy if there is not at least 50% endoscopic healing in 4 weeks or 100% healing in 8 weeks. Only in exceptional cases was treatment continued for a longer period. The recurrence rate of gastric ulcers in patients who had repeat gastroscopies in this study was 46% over a period varying from 3 to 24 months after initial healing, and the rate may well be higher when all cases are followed up for a full 2-year period.

Gastric biopsy and cytology under direct vision are useful in confirming the endoscopic appearance of a benign or malignant lesion. Disappointingly, only 3 cases of carcinoma were picked up by biopsy and 2 cases by cytology, where the endoscopic appearance of the lesion was thought to be benign. Nevertheless, 29% of lesions

which were endoscopically malignant and which later proved to be malignant were negative on biopsy and 28% were negative on cytology. There were 15 cases with lesions thought to be malignant at endoscopy with negative biopsies, that were later proved to be benign. There was also 1 false positive endoscopic biopsy in this study. The finding of a lesion which appears malignant at endoscopy but where biopsy or cytology, or both, does not confirm this, must still be regarded as malignant and requires surgery. The results of biopsy and cytology were not as good as those reported in a number of Japanese centres,<sup>7</sup> probably because of our reluctance to take 6 or 7 biopsy specimens from lesions obviously malignant. It should be stressed that in a busy endoscopy service it is preferable to take many biopsy specimens from doubtful lesions or even benign ulcers, rather than from obviously malignant lesions requiring surgery in any case.

The endoscopic findings in cases of postgastrectomy and acute gastro-intestinal haemorrhage in our study have not as yet been analysed.

Gastro-intestinal endoscopy is a well-tolerated and reasonably safe procedure. Serious complications are uncommon, but pharyngeal, oesophageal and gastric perforations and cardiovascular collapse can occur, and aspiration pneumonia occurs—perhaps more frequently than is realised—especially after emergency endoscopies. The over-all incidence of serious complications quoted in the literature<sup>2</sup> is 1 in 300, with 1 death in 4 000. In the present series 2 serious complications occurred—1 patient had a haematemesis which required 2 units of blood and 1 patient died with torrential bleeding from oesophageal varices. There were 6 cases of aspiration pneumonia. In a previous study 3 serious complications were reported.<sup>2</sup>

## CONCLUSION

This study has again shown the value of upper gastro-intestinal endoscopy, particularly of the pre- and post-operative stomach. The value of duodenoscopy in evaluating the presence of a duodenal ulcer is also obvious. However, we feel that routine endoscopy in patients with a good clinical story and a distorted duodenal cap is not indicated and that duodenoscopy should be reserved for difficult cases in which a pre-operative diagnosis is

essential, or where the absence or presence of an active ulcer is important for the general management of the patient.

What is the future of endoscopy? At Grootse Schuur Hospital about 6 000 barium meals are performed each year and about 1 500 upper gastro-intestinal endoscopies. It would be impossible to endoscope all cases with negative or equivocal radiology. We believe that endoscopy is indicated after careful consideration of the radiological findings by both the clinician and the radiologist, who must then consider that endoscopy would be in the best interests of the particular patient, related to the facilities and experience of the endoscopists available.

One of the major problems is that the facilities are limited and the number of well-trained endoscopists in South Africa small. In addition, technical assistance and repair of fibrescopes are slow, and therefore to provide a good service to a vast number of patients requires many costly fibrescopes. Radiology is, however, well established throughout the country and a barium meal is a quick and safe procedure which will detect about 80% of all lesions. If all patients having barium meals were to be endoscoped, the available facilities would be flooded and it is also doubtful if endoscopy performed by an untrained endoscopist would have any advantage over a good barium meal study; in fact, if endoscopy is performed by an inexperienced operator, and without a recent barium meal, it may even be of disadvantage to the patient. Overseas it is generally thought that an endoscopist should perform at least 300 endoscopies under supervision before being experienced enough to give a reasonably satisfactory opinion on any gastro-intestinal endoscopic examination. As with all other procedures in medicine, fibre-optic endoscopy is a technique that requires special training, experience and great care.

This study was supported by the South African Medical Research Council.

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