A new gastroscope with biopsy and photographic facilities

Some suggestions on how to pass it

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Clear, comprehensive, and unequivocal intra-gastric viewing, especially with accurate biopsy facilities, has been the aim of surgeons since successful cystoscopy was established.

Cystoscopy revolutionized and rationalized diagnosis and treatment in genito-urinary surgery. None the less it was slow to develop and to be brought into regular use largely because, in the male urethra, the passage was tortuous and apparently difficult. There were many instances of iatrogenic troubles such as sepsis and trauma, yet these were overcome. Today it is accepted in daily practice. Cystoscopic biopsy frequently determines the course of treatment. The struggles of such men as Leiter (1880) and Nitze (1889), inspired by Antonin Desormeaux (1865), 'père de l'endoscopie'—as recorded by Chevassu—have led modern urologists to present safe instruments and techniques.

So it has been with gastroscopy.

Oser (1881), Mikulicz (1881), Baratoux (1882a, b), and Schindler (1923) have led contemporary men, such as Hermon Taylor (1937), to stress the value of this important investigation and to improve apparatus and skill.

All have met the apparently fundamental and insuperable difficulty of the curving nature of the foregut and of the cervico-dorsal spine. It is hoped to show that this difficulty can be met with ease, provided it is recognized that, as with all good surgical techniques, the operator is able actually to see throughout the manoeuvre every detail of what he is doing.

Because of the difficulties of curvature, devices such as prismatic systems and the fibre-scope have been employed. All these provide rather uncorrelated and often limited views, and, of course, there is no provision for biopsy, let alone biopsy under direct vision.

These same difficulties led to the development of the gastro camera in Japan. This is regarded

as of major importance, particularly in the early diagnosis of carcinoma of the stomach, for it is reported that the disease is eight times more common there than it is in Australia. In Japan, the mortality from cancer of the stomach in males in 1961 was reported as 50.7% of all cancer patients. The corresponding figure in females was 38.0%. This apparatus, which comprises a miniature intragastric camera, though expensive, is widely used on a mass survey basis in Japan, yet it is little used elsewhere. Bockus (1963) in his textbook stated that it is unlikely that it would be used widely in the United States. The difficulties are expense, lack of correlation of views, and lack of biopsy facilities to confirm a suspected lesion. Kalorkerinos, Hunt, and Pryor (1965) review its use, value, and recent developments.

Let us remember that, as stressed by Bailey and Love (1965), carcinoma of the stomach in this country is one of the 'Captains of the men of Death'. In 1959, in England and Wales alone, 14,076 persons died of this disease.

THE NEW BIOPSY GASTROSCOPE WITH FACILITIES FOR PHOTOGRAPHY

Provided a proper technique for its safe passage is used, this new instrument will furnish intragastric views comparable with those obtainable on cystoscopy. Unlike any other gastroscope, it allows the greater part of the stomach to be seen at one time. This ensures accurate localization of a lesion and also allows the operator to determine loss of gastric motility, as in linitis plastica.

Direct and angled magnifying telescopes, lit by powerful distal lamps, provide accurate close-up assessment.

Good biopsies can easily be obtained while the operator sees exactly what he is doing. The booster lighting is such that a simple camera attachable to the proximal end of the telescopes

by a single screw, takes satisfactory colour pictures on fast film. Work on this continues.

The instrument, which is equally useful as a gastroscope or oesophagoscope, has an outside cylindrical sheath of Negus type, 53 cm. in length and 1.6 cm. in diameter. The present models are made of stainless steel, but fibre-glass could be used if diathermy was contemplated.

The proximal end of the sheath is provided with a direction-finding guide bar on to which can be slid a beamed adjustable and focusing light to illuminate the distal end during passage through the cricoid area (Fig. 1).

Instead of having a separate telescope, distal lighting, and biopsy forceps, these are all incorporated in a single 'operating' unit. The proximal part of this unit is provided with a valve 10 cm. in length which fits accurately into the sheath. An air tube, which is connected to a bellows, passes through it to distend the oesophagus or stomach to any desired degree. In order to let the air out or to use a sucker (which can be up to 1 cm. in diameter) to remove any gastric residue, it is only necessary to withdraw the unit

FIG. 1. The beamed adjustable and focusing removable proximal light which may be used for the passage of the gastroscope behind the cricoid.

from the sheath (Fig. 2). If, when taking a biopsy, the bite does not come away at once, the whole unit can be rotated round and round to twist it off and thus avoid bleeding or a mucosal tear.

The operating unit comprises the following:

1. Interchangeable direct-vision and right-angled telescopes. Fore-oblique and retrograde telescopes are also sometimes useful to examine

FIG. 2. Operating unit being withdrawn for suction. The proximal end of the unit is seen with its sliding valve.

FIG. 3. The distal end of the instrument. The distal light, the direct vision telescope, and the biopsy unit are seen. The last is in the 'straight' position.

FIG. 4. The right-angled telescope now replaces the direct vision telescope, and the biopsy forceps is elevated to obtain the view.

the pylorus or fundus. These have their own sheath so that they can be slipped in or out for cleaning with a detergent without disturbing the unit.

2. A distal light so placed as to be equally effective for all telescopes. It is sufficiently strong to withstand a booster flash for photography and provides intense intragastric illumination.

3. A strong biopsy forceps operated by proximal scissor action. This biopsy unit can be hinged to different positions according to the telescope in use. The movement is controlled by a proximal lever (Fig. 2).

When the direct telescope is in use, the biopsy forceps is maintained in the 'straight' position (Fig. 3) but the telescope must be withdrawn 1 cm. in order to see it. It is raised within the stomach when the right-angled and other telescopes are in use, as when examining the fundus or pylorus. It will travel through 45° (Fig. 4). The biopsy forceps is in full view but must, of course, be returned to the 'straight' position before the operating unit is withdrawn or rotated.

For taking intragastric photographs, a simple reflex type of camera is fitted to the proximal end

FIG. 5. *The camera in position.*

of the telescopes by a single screw. The shutter control operates a booster flash (Fig. 5).

PRINCIPLES INVOLVED IN PASSAGE OF THIS STRAIGHT, RIGID INSTRUMENT

The Charrière size of the instrument, *i.e.*, 1.6 cm., has been kept as small as possible consistent with its several functions.

In the past, in spite of the success of the rigid cystoscope, the earlier rigid gastroscopes were abandoned because of frequent reports of trauma and perforation of the soft oesophageal wall, which had dire results.

None the less, the advantages of the use of a straight tube are manifest because:

1. It is possible to use simple optic systems, thus enlarging the visual field.
2. Telescopes giving various angles and magnifying to any degree can be slid in and out to examine, in turn, all parts of the stomach.
3. Biopsy under direct vision is a simple matter.
4. The stomach can be distended with air.
5. A really large and effective suction tube can be used.
6. The distal light source for photography is not diminished by prisms, and a reflex type of camera enabling the operator to look right through the camera into the stomach, so that he sees what he is photographing, is a straightforward process.

The whole instrument is based on the principle that *the operator sees what he is doing throughout the procedure*. This applies particularly in its safe passage through the oesophagus.

With certain exceptions listed below and using a proper technique, a rigid tube can be passed down the oesophagus and into the stomach safely. The writer has in fact done this without accident in a very large number of patients of all ages and sizes from the very young to the aged, and from the fat to the emaciated.

The operation can be done under local anaesthesia with the patient sitting upright in a chair and the surgeon standing on a stool behind him, but usually it is best done under general anaesthesia with an intratracheal tube. It is important to request the anaesthetist not to blow up the balloon on his tube, because this would obstruct the oesophagus.

The patient's stomach has been prepared beforehand by restriction to a fluid diet for the previous 24 hours. Preliminary gastric lavage is rarely required as there is good facility for aspiration.

With the patient supine on a table tipped slightly foot down, an assistant flexes the head fully on the chest to *eliminate the forward convexity of the cervico-dorsal spine*. The fingers of the surgeon's left hand are placed firmly on the hard palate with a swab to protect them from the teeth. The gastroscope is cradled in the crutch of the

FIG. 6. Diagrammatic representation of the three essential steps in the safe passage of the instrument. For safety, look all the time. (A) Flexion of the cervical spine eliminates its natural convex curve. The pharyngo-oesophagus is now a straight line. (B) Still with the neck flexed and the cervical curve eliminated, the head is acutely hyper-extended at the atlanto-occipital joint. This is done by literally lifting the patient's head by the fingers of the left hand firmly on the hard palate. (C) With the instrument cradled in the crutch of the left hand with its fingers lifting the palate, the cricoid is lifted directly away from the vertebral column by the distal end of the gastroscope sheath. The post-cricoid lumen is seen to open at once and the instrument will slide down.

FIG. 7. The table is tipped foot down 30°.

thumb as it is slid down the posterior pharyngeal wall to the post-cricoid level. Now *with the neck still flexed*, the fingers on the palate literally *lift the head away from the table* in a strong movement. This hyper-extends the head at the atlanto-occipital joint. The stylo-hyoid ligaments and stylo-pharyngeal muscles are relaxed. By literally *lifting the cricoid cartilage away from the vertebral column* with the distal end of the instrument, the difficult post-cricoid passage is seen to open wide and the gastroscope slides past this point. This lift is effected by the thumb crutch, and whilst doing it it is essential not to angulate the gullet but to keep the instrument parallel with the vertebral column. Figure 6 attempts to illustrate these points.

The table is then inclined still further foot-down to an angle of 30° (Fig. 7). The rest of the progress distally is best seen with the straight telescope. When the cardia is reached, it helps a good deal if the patient's head is turned fully to the right and an assistant's hand is ready to lift the lower thorax off the table a little.

Once the end of the gastroscope is within the stomach, it is a simple matter temporarily to remove the operating unit from the Negus sheath to introduce the large sucker. When the operating unit is replaced, the bellows is used to introduce a small quantity of air. A comprehensive intra-gastric view is obtained.

CONTRAINDICATIONS

In patients with the following conditions it is impossible, or at least unwise, to attempt to introduce this type of gastroscope: ankylosing spondylitis; gross kyphosis; actual or suspected spinal metastases; fixation or gross limitation of movements of the temporo-mandibular joints; grossly underslung jaw; aneurysm; enlarged heart, especially with valvular disease; and cardiac or respiratory failure.

For those who wish to see it, a film of the gastroscope and the art of passing it is available on request.

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