profuse hypersecretion—were abolished in the nasal cavity corresponding to that on which the nerve had been divided, whereas the disturbances continued to recur periodically in the opposite nasal cavity, as before the operation. The sensation experienced when these attacks occurred was described by the patient as a "feeling of the nose being divided in half," one side being clear and the other obstructed. The asthmatic attacks from which the patient suffered also continued to recur at intervals. After section of the nerve on the left side the nasal symptoms entirely disappeared and the attacks of asthma ceased.

The considerations which, in the first instance, suggested that resection of the nerve might be performed with a successful result in severe cases of hay fever and paroxysmal coryza in which other methods had failed, were of course those relating to the functions and distribution of the nerve, &c., which I have already detailed. The following notes of the first case, which was operated upon, will serve to indicate the nature of the procedure and the description of case for which I have felt justified in recommending it:—

The patient, a male, aged 45 years, was first seen in 1907. He complained of asthma and intermittent attacks of nasal obstruction, sneezing and nasal discharge; also, in the summer, of severe attacks of hay fever. He had suffered from hay fever for about 15 years and had had asthma for about the same length of time. The hay fever generally began about the last week in May and continued for about six weeks. During this period he suffered great distress and was quite incapacitated for business. He frequently "wished he was dead." The asthma had gradually become more and more troublesome and he now experienced a bad attack every few weeks with frequent minor attacks in the intervals. In consequence of these he rarely enjoyed a proper night's rest and was often prevented from attending to his occupation. The patient had had treatment from a rhinologist for the hay fever and asthma by galvano-cautery, &c., without benefit to either condition; other methods of treatment had also been tried but no measures whatever had apparently been of any real value. There was a history of rheumatic fever in youth and of expectoration of blood. At the time of examination there was some emphysema, together with cardiac dilatation.

Operation.—Resection of the nasal nerve on the right side was first performed, chloroform anæsthesia being employed. The nerve was reached by an incision at the inner edge of the orbit, commencing just above the inner canthus and extending upwards and slightly outwards for about two-thirds of an inch. The cellular tissue having been cleared from the inner upper wall of the orbit by means of a blunt dissector and the nerve located at the anterior ethmoidal foramen, the latter was separated from the artery and divided close to the foramen, about a quarter of an inch of the nerve being removed. Horse-hair sutures were inserted and the wound was dressed with gauze and collodion. The stitches were removed on the fourth day. Resection of the nerve on the left side was carried out four weeks later.³

As I had been unable definitely to promise the patient a cure, or indeed any improvement, on account of the dearth of previous observations relating to the effects of resecting the nerve, I was much pleased when, two months after the operation, he called on me with the information that there had been an entire absence of the attacks of paroxysmal coryza and sneezing and a complete cessation of the asthma. He stated also that he had experienced much comfort and benefit from the increased freedom of nasal respiration⁴ and owing to the fact that he was able to insure a good night's rest. He had gained over half a stone in weight since the operation and his appearance indicated a manifest improvement in his general health. The minute scars on the skin were barely discernible even on close inspection. On examining the anterior part of the septum with a probe it appeared somewhat less sensitive than normal, but there was no definite anæsthesia either of this region or of the conjunctiva or the skin.

The effects of the operation in this case were such as to encourage me to perform it in other patients suffering from severe conditions of a similar character. Up to the present the results, as already mentioned, have been of a most

encouraging nature, not only with regard to hay fever and paroxysmal coryza but also with regard to the remaining constituent of the triad, which so often afflicts hay fever patients—viz., asthma. The fact that asthma is frequently associated with the foregoing neuroses and is often relieved by similar therapeutic measures suggests that, at least in some instances, there exists a pathogenetic relationship between the conditions, and the existence of this relationship doubtless explains the relief which has been afforded in my cases.

In conclusion, I desire to point out that the present paper merely constitutes a preliminary communication on the subject, as it would be premature, at any rate as yet, to form any final conclusions as to the permanence of the results obtained by this method of treatment or as to the entire absence of unfavourable effects.⁵ Nevertheless, in view of the intractable nature of the maladies for which the operation is suggested I have thought it worth while to publish my observations in their present form for the consideration of those who may be interested in the subject.

Manchester.

THE GASTROSCOPE.

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GASTRO-DUODENOSCOPY AND DIAPHANOSCOPY.

THROUGH the kindness of Professor Thorkild Rovsing of Copenhagen, who was recently on a visit here, I was enabled to see his gastroscope for electric illumination of the stomach by transillumination and gastroscopy, of which he demonstrated the use on a patient in the Royal Victoria Infirmary, Newcastle-on-Tyne.

All surgeons must have realised the difficulty in making an exact diagnosis of diseases of the stomach, and these may not be cleared up when the stomach is exposed by operation for thorough examination by ordinary inspection and palpation. Doubt frequently exists as to the pathological conditions that are present—e.g., cases occur where the differential diagnosis between carcinoma and simple inflammatory exudation around an ulcer is not easy—or hæmorrhage from a small mucous erosion may be very difficult to trace to its source; or in cases of multiple ulcers one or more may be overlooked. In such cases Rovsing's gastroscope will be of immense service to supplement other known means of diagnosis.

Rovsing made his first observation on Nov. 7th, 1907. The patient, a woman, aged 50 years, had been ill for three years and was on admission frequently vomiting and in a very wretched and emaciated condition. No tumour could be felt, there was no retention 12 hours after a Bourget test meal, and after a Ewald test meal there was brought up 170 cubic centimetres of lumpy, somewhat slimy stomach contents with free hydrochloric acid 31 and a total acidity of 58. By Roentgen illumination after a pint of bismuth porridge the stomach was found to be much depressed, the small curvature being five centimetres and the greater 11 centimetres below the umbilicus. At the operation the diaphragm was found to be depressed, the edge of the liver reached to the umbilicus, and the stomach was as described. The stomach and six centimetres of duodenum were easily drawn outside of the abdomen; the pylorus admitted the forefinger, and no definite infiltration or thickening of the stomach wall was to be felt. Only on the boundary between the cardiac end of the stomach and the small curvature could a suspicious thickening be palpated. It was impossible to say whether this were only due to a normal fold the stomach wall forms here or to an ulcer. Through a small incision one centimetre long made in the anterior wall of the stomach Rovsing inserted a ureter-cystoscope, to the catheter canal of which he fitted a ball bellows, and making the opening in the stomach air-tight by passing a purse-string suture round the cystoscope he inflated the stomach with air until all the folds of the mucous membrane were smoothed out. As soon as the cystoscope lamp was lighted the whole of the stomach was illuminated like a faintly rose-coloured cupola. All the details in the walls of the stomach could be seen, the muscular fibres, the fine network of veins, &c. A slight

³ In all subsequent cases I have resected the nerve on both sides at the same operation.

⁴ Permanent increased freedom of nasal respiration (apart from the immunity from periodical or seasonal attacks of nasal obstruction) has been noted in several of the cases in which this operation has been done.

⁵ In a recent case, in which there was some myopia, this appeared to be slightly increased after the operation.

bleeding point close to the incision appeared as a dark red spot from which a small stream of blood was seen to be oozing down the inner wall. No shadows or thinned portions were seen. The mucous membrane was then systematically examined through the cystoscope from the cardiac orifice to the pylorus but no abnormality was found. The cystoscope was next passed through the pylorus into the duodenum, and the posterior wall of the stomach was illuminated by lifting up the omentum and transverse colon. The gastroscopy opening was closed and gastropexy was performed. All the patient's symptoms disappeared. She can now eat any kind of food, has increased in weight by 22 pounds, and is capable of doing her ordinary work.

This case demonstrated clearly that in direct diaphanoscopy and gastro-duodenoscopy a new method of examination had been found which would prove of great value in doubtful cases of stomach and duodenal disease. With the cystoscope which Rovsing first used for this purpose systematic examination of the whole mucosa of the stomach occupied too long a time not only in the interests of the patient but also because it was very fatiguing to the surgeon. He accordingly had made an instrument very much larger than the cystoscope which he calls the gastroscope, and this increases both the strength of the illuminating power and the area of vision which it is possible to see at once. The gastroscope in shape and construction resembles an enlarged Nitze cystoscope, the tube being about four centimetres in circumference, is fitted with a flattened tube along its anterior surface (*a* to *b*, Fig. 1), with a stopcock at *a* connected

FIG. 1.

Gastroscope for diaphanoscopy and gastroscopy. A, Bellows for inflating stomach. B, Gastroscope. a, Stopcock. b, Opening of inflating tube.

with a bellows (A). With this instrument even an unskilled observer is able to examine the whole of the gastric mucous membrane systematically in a few minutes. The method of use is as follows: (1) diaphanoscopy, and (2) gastroscopy proper—i.e., the inspection of the mucous membrane of the stomach and duodenum.

1. *Diaphanoscopy*.—The stomach is drawn out of the abdomen and a small incision fitting tightly round the instrument is made into it through which the gastroscope is passed. If the stomach wall does not fit tightly round the gastroscope a purse-string suture round the incision will make it do so. The stomach is then distended with air by the bellows attached to the gastroscope. The lamp is lighted and (especially if the operating room is darkened) the stomach is seen as a brilliantly lighted cupola. All the anatomical details stand out clearly—the pinkish-coloured wall with the vessels plainly defined, the various layers of the muscular fibres, while the crypts become visible as small

white spots on the pink ground. Abnormalities are readily detected—e.g., in gastritis the wall of the stomach becomes a deep pink or a bluish red colour, and the blood-vessels are seen as a close network owing to the dilatation of the smaller vessels. Tumours or growths appear as dark diffused shadows on the otherwise clear wall. The deep chronic ulcer with much surrounding inflammatory exudation and thickening shows as a central excavated or cicatrised portion of porcelain-like whiteness and with but few vessels, and this contrasts strongly with the surrounding pink wall. A small superficial ulcer of the mucous membrane is not easy to discover by diaphanoscopy, but it is easily seen by examination by gastroscopy. A bleeding ulcer, however, can be seen either covered by blood clot as a dark spot in the pink wall, or if actually bleeding a dark streak can be observed trickling towards the larger curvature. It is in cases of this description where even at a post-mortem examination the bleeding mucous ulcer is with difficulty localised that the chief use of diaphanoscopy will be found. Rovsing quotes the following as an instance. On Feb. 17th a woman, aged 38 years, was admitted into the Frederiksberg Hospital. For a month previously she had been suffering from slight dyspeptic attacks, but on the day of her admission she fainted suddenly and showed all the symptoms of profound anæmia. Shortly after she vomited a large quantity of dark blood. On examination in hospital the hæmoglobin was found to be 55 per cent., and in spite of most careful dieting the anæmia and faintings increased. There was constant melæna and on the 29th the hæmoglobin had diminished to 28 per cent. and she was very ill. She was then removed to the surgical wards under Mr. Kraft and two hours later he performed laparotomy. On opening the peritoneum the thin, flabby stomach was pulled out. Neither by inspection nor by palpation was it possible to discover any ulcer. Diaphanoscopy with Rovsing's gastroscope showed upon the otherwise clear and transparent anterior wall of the stomach a small dark spot to which a fairly large-sized artery was seen to pass and suddenly stop. Corresponding to this spot, examination of the mucosa through the gastroscope showed a very small superficial ulceration partly covered by blood clot. Examination of the rest of the mucous membrane of the stomach and of the first portion of the duodenum showed nothing abnormal. The gastroscopy incision was now carried up to where the dark spot had been observed and a superficial ulcer of the size of a pin's head was at once found and when touched began to bleed. Four pairs of catch forceps were then placed outside the ulcer to raise it from the surrounding wall, a ligature was tied round it, and bleeding was stopped. The patient's recovery was tedious but uninterrupted.

It is in most cases impossible to decide by illumination whether a tumour-like infiltration round an ulcer is inflammatory or cancerous, although a dark shadow indicates tumour and a fainter or lighter shadow inflammatory thickening. To inspect the posterior wall of the stomach efficiently by diaphanoscopy the omentum and transverse colon must be lifted up. When the stomach has been thoroughly examined the gastroscope is carried through the pylorus into the duodenum. If there is any difficulty in passing it through it is a sign that the orifice is contracted. The duodenum can be more effectually illuminated than the stomach on account of its thinner walls and smaller size and an ulcer or tumour is easily discernible.

2. *Gastroscopy*.—Simple illumination of the stomach gives a great deal of information; in many cases it allows of a definite diagnosis—gastritis, ulcer, or tumour; in most cases it is an excellent guide for the subsequent gastroscopy, because one immediately makes for the point where abnormal conditions have been shown by diaphanoscopy, and if there is any doubt as to the nature of the disease direct observation through the gastroscope will, as a rule, clear up the difficulty. The picture obtained through the gastroscope is much sharper, better defined, and more certain than that obtained by the naked eye only, for not only is it considerably enlarged and the illumination exceedingly brilliant but the inflation of the stomach causes all the folds of the mucosa to be smoothed out and more accessible to the eye of the observer. It is therefore possible to make a systematic inspection of the entire stomach and the upper portion of the duodenum in a few minutes.

The normal mucous membrane of the stomach appears by gastroscopy as a smooth rose-coloured surface which at the pyloric and cardiac orifices changes into folds of mucous membrane converging as radii towards the circular opening. Any abnormality of these two openings shows itself in a

very characteristic manner: if the pylorus is ring-shaped, infiltrated, and contracted a stiff gaping ring through which a glimpse into the duodenum is obtained is observable; should half of the pyloric ring be infiltrated it assumes the shape of a half moon, the soft mucous membrane of the healthy portion curving into the stiff half of the ring. Any ulcers at the pylorus itself are easily discernible but the folds of the mucous membrane round the pylorus require a closer observation. In the one case where Rovsing had an opportunity of examining an abnormal cardiac orifice the gastroscope gave an exceedingly fine and clear picture of the tap-shaped ulcer projecting into the stomach and the adjoining portion of the mucosa ulcerated.

In cases of ulcer and carcinoma where the diagnosis is clear gastroscopy is of importance because it shows accurately the limits of the disease. It is also useful in clearing up conditions which diaphanoscopy could not—e.g., in several of Rovsing's cases what after other examination was thought to be a simple ulcer, by gastroscopy showed knotty tumour formation in the mucous membrane, and no doubt was then entertained as to the malignant nature of the infiltration. But very important also is the fact that gastroscopy is able to show the presence of mucous ulcers which are not discernible by any other method.

FIG. 2.

Gastroscope for introduction of oesophageal bougie or catheter through the cardiac orifice of the stomach. S, Screw. T, Tongue. C. O., Catheter opening.

The instrument shown in Fig. 2 is oval in contour and in addition to the air-inflating tube contains a tube for the insertion of an oesophageal catheter or bougie. It is fitted like the Albarran ureter-cystoscope with a tongue which by means of a screw can be raised or lowered to direct the bougie or catheter into the cardiac orifice. By means of this instrument a retrograde insertion of a bougie can be made with the greatest ease and under ocular control for the dilatation of oesophageal strictures which are impermeable from above. Being oval, this oesophagus gastroscope requires a purse-string suture round it so that the edges of the stomach incision are air-tight.

Rovsing relates 26 cases in which he has been able to

examine the stomach by diaphanoscopy and gastroscopy and afterwards proceed with the operation he then found to be necessary. The use of "cold" lamps in the gastroscope excludes any risk of burning the mucous membrane and a careful inflation of the stomach appears to be harmless. The risk of infection of the wound is overcome by sterilising the whole instrument—gastroscope, wires, tube, bellows—for 36 hours in a formalin steriliser.

Having had an opportunity of seeing the instrument in use it appears to me that Rovsing has placed in the hands of surgeons an instrument of the greatest diagnostic utility and for this reason I am sending these notes to THE LANCET.

Sunderland.

A CASE IN WHICH OCCLUSION OF THE ABDOMINAL AORTA TOOK PLACE.

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COMPLETE occlusion of the abdominal aorta, whether caused by embolus or thrombus, is an event of sufficiently rare occurrence to make the following case worthy of record.

The patient was a man, aged 39 years, who was admitted to the Nottingham General Hospital on May 6th, 1907, complaining of palpitation, shortness of breath, and pain in the region of the heart. These symptoms had been present for 11 weeks. There was no history of rheumatic fever. The patient had had influenza three years ago. His work was very heavy, in an iron-foundry. He was a moderate beer-drinker, and he smoked four ounces of tobacco a week. When he came to the hospital he was of fairly healthy appearance, without obvious cyanosis; the mucous membranes were of good colour, the tongue was clean, and the pulse was 80 and irregular in force and rhythm. The heart's apex was in the fifth interspace, half an inch beyond the nipple line; the impulse was slapping in character. To the right the cardiac dullness corresponded with the right border of the sternum. There was a well-marked presystolic murmur, limited to the region of the heart's impulse, followed by a short first sound. The pulmonary second sound was accentuated. Nothing abnormal was heard in the lungs. The liver and kidneys were normal. There was no oedema of the legs or of other parts.

The patient was kept in bed and he continued to be at absolute rest during the whole of his stay in hospital. A mixture was given containing digitalis and strychnine but the pulse still remained very irregular. The patient complained of some cardiac pain for which a belladonna plaster was applied. His condition was fairly satisfactory until June 17th, when he complained of pain and tenderness in the right iliac region. The temperature rose to 101° F. No swelling could be felt at the seat of pain and in about three days the symptoms had all subsided. On the 23rd the patient complained of pain in the lumbar spine, which during the following night became so intense as to require a hypodermic injection of morphine. Soon after the onset of the pain the patient found that he could not move either leg. When seen on the 24th both lower limbs were found to be completely paralysed in their whole extent. There were absolute anæsthesia and analgesia in front from the lower third of the thighs downwards and behind below the fold of the nates. The knee-jerks were absent. The cremasteric reflex was present. There were scattered patches of dusky mottling on the inner aspect of the thighs, the rest of the limbs being strikingly pale and cold. There was complete absence of pulsation in the femorals, the posterior tibials, and the dorsalis pedis. A trace of albumin was found in the urine. The bladder acted normally. On the 25th the mottled lividity of the skin had increased and the anæsthetic area had extended. The urine was dark-red, containing a large quantity of blood, showing interference with the renal circulation. On the 26th there were constant hiccough and profuse sweating, death occurring at about 6 P.M. No post-mortem examination was obtained.

The diagnosis of so little-expected an accident as occlusion of the abdominal aorta rested on the absence of pulsation in the arteries of the lower limbs and on their condition of coldness and anæmia with patches of livid mottling. Unfortunately, there was no post-mortem examination but I think there can be no doubt that the diagnosis was correct. Occlusion of the abdominal aorta is fortunately an event which very rarely happens. The author of the article on the