matous tumour had been removed by Mr Duncan from the left thigh. There were no growths in any organ save the lungs.

4. Mr Caird exhibited a preparation and drawing from a case of infantile hernia. The patient suffered from an irreducible inguinal hernia, complicated with a hydrocele. This having been emptied, the patient desired a radical cure for the removal of a firm mass which lay in the canal. On operation there was found a large tunica vaginalis into which the hernial sac projected. This was opened, and was found to contain a large mass of felted omentum.

IV. Original Communications.

1. STRUCTURE OF THE OESOPHAGUS—GASTROSTOMY.

By John Duncan, LL.D., P.R.C.S. Ed., Senior Surgeon, Royal Infirmary; Lecturer on Clinical Surgery, Edinburgh School of Medicine.

I purpose in this paper directing attention to the operation of gastrostomy as performed for stricture of the oesophagus.

My last case was that of a man of 45, who, when admitted to the Infirmary, had been unable to swallow anything except a little liquid for several days. He had experienced difficulty in swallowing for three months, and was very greatly emaciated. Squamous-celled epithelioma was diagnosed. A few days were spent in endeavouring to improve his condition by rectal feeding, and then gastrostomy was performed. He left the Infirmary a month afterwards, when he was taking large meals by the tube, and had gained nearly a stone in weight. After three months he died at home from extension of the disease to surrounding parts in the thorax.

This is a very typical case of malignant stricture of the oesophagus, and illustrates well the points to which I wish to direct attention.

Naturally the first question with which the surgeon concerns himself in these cases is that of diagnosis. How does one come to the conclusion that such as this is a squamous-celled epithelioma?

In order to decide the question, it is necessary to call to mind the various causes of oesophageal obstruction, and to inquire how they fit into the symptoms exhibited by the patient. Now dysphagia may be produced by extrinsic pressure or by intrinsic disease. We therefore eliminate first, by most careful examination, all possible sources of the former, such as goitre or aneurism, or other swelling, whether of an inflammatory or neoplastic character. So limited, our search is then directed to affections of the oesophagus properly so called.

Stricture may arise in the oesophagus from spasm, inflammation, syphilis, benign tumour, traumatism, and malignant disease—

1. Spasmodic stricture is intermittent, sudden, accompanied by some form of dyspepsia, or associated with neurotic disturbance. It is necessary to bear in mind that as in other strictured canals
there is sometimes an element of spasm in organic disease. This for a time may obscure the diagnosis, and, at all events, it is necessary in every case to obtain all the information which can be got from the passage of bougies. There are one or two points in connexion with this little operation to which it may be well, therefore, to direct attention.

Especially in neurotic patients, but to a greater or less extent in all, difficulty may be experienced in entering the oesophagus. This may be overcome by directing the patient to swallow at the moment when the bougie reaches the orifice of the gullet. Now the movements of swallowing are normally preceded by closure of the mouth and pressing of the tongue against the palate, and to enable the patient to swallow with open mouth he must receive the assistance of the surgeon. The head should be thrown back, and the surgeon’s forefinger should be used to fix the jaw and afford a fulcrum especially to the anterior part of the tongue. The muscles which elevate the larynx thus gain a fixed point, and when brought into action cause the air passage to glide upwards and forwards over the bougie.

I have mentioned this point merely as an incident, and not as likely to lead to error in diagnosis. I have seen the error made, but there is little practical difficulty in distinguishing between this form of obstruction and stricture. The latter, in fact, very rarely occurs in this situation unless by extension from the air passage, and is within reach of the finger when it does.

This little difficulty overcome, the bougie normally glides easily into the stomach. I have, however, known doubt in determining whether the bougie has reached the stomach or not, and this matter is important, because not infrequently the stricture is situated at the very end of the oesophagus. On entering the stomach, the sensation of having reached a cavity is experienced, the bougie passes onwards with a diminished resistance and to a length which cannot be accounted for by supposing that the diseased part is pushed on in front of it.

This last must indeed be accompanied by a feeling of increased resistance; and I believe it may be said that if you are in doubt as to whether or not the bougie has reached the stomach, you may take it for granted that it has not reached it.

Resistance, then, implies abnormality, but very little further. You cannot even thereby determine the presence or absence of a diverticulum. My own experience of spasmodic stricture is that a bougie of moderate size can always be passed with gentle pressure. I have been rather astonished in these cases by the absence of any grasping of the instrument after it has passed or on withdrawal. Such grasping is very marked in traumatic stricture, but not in spasmodic.

2. Having eliminated the spastic stricture, we have next to consider the possibility of the obstruction being inflammatory. So
far I have seen this condition only in the alcoholic. Two cases have come under my observation in which habitual drunkards became afflicted with extreme dysphagia. One died of cirrhosis of the liver, the other of delirium tremens. In both, efforts to pass a tube for purposes of alimentation had been repeatedly and unsuccessfully made, and it was thought that organic stricture existed. On post-mortem examination, it was found (I was present at the sectio in only one case) that the lumen of the oesophagus was not diminished, but that throughout its length its wall was much thickened and oedematous, and its mucous membrane covered by many small ulcerations. The difficulty in passing an instrument had been due to the absence of pliability and of peristaltic action. You will find it difficult to pass an instrument into the stomach on the cadaver. The absence, then, of any history of alcoholism and of the pain which was present—especially on trying to pass an instrument—in these cases I regard as valuable points in their diagnosis.

3. Syphilis, in its tertiary form, may attack the oesophagus as it may any portion of the body, and plainly, if so, may cause dysphagia either as a gumma or cicatrix. But it is very rare. I remember only one case. In it the history and concomitants of the disease were very clear, and the man recovered under mercury, iodide of potassium, and the use of the bougie.

4. Benign tumours of the oesophagus (polypoid generally) are also exceedingly rare, and do not usually give rise to dysphagia. Most commonly they have not been diagnosed during life.

5. Traumatic stricture arises from swallowing caustic substances, or possibly from wounds, it being, of course, essential that the traumatism of whatever kind be circumferential in extension. The history should therefore enable us to eliminate this form. I have met with one example of concealment of the cause, due to the fact that the swallowing of the caustic was with suicidal intent, and it is not impossible that intoxication may interfere with the reliability of the information. But, as a rule, the history, as given either by the patient or his friends, is clear and decisive.

You will see, then, that we arrive at the diagnosis of malignant stricture largely by a process of exclusion. One may almost safely say that, if a stricture of the oesophagus be idiopathic, gradually increasing, and of comparatively recent origin, it is malignant. Blood and discharge, and microscopic evidence of destruction of tissue in the matter vomited, may confirm the diagnosis.

Of malignant tumours of the oesophagus, by far the largest number are squamous-celled carcinomata. Sarcoma as a primary affection is almost unknown. It may occur by extension of the disease from neighbouring parts, and I was once present at a sectio in which we found an oesophageal stricture, small, annular, and tight, in a patient who had been repeatedly operated on during
a period of thirty years for what was then called "recurrent fibroid" of the thoracic wall. I have at present under my care a case of stricture of the oesophagus, sent me by Dr E. Carmichael, in whom there is also an undoubted sarcoma of the scapula. The immense probability is, then, that if malignant, we have to deal with a case of epithelioma.

The diagnosis established, we turn next to the question of treatment, and the first proposition which I would submit is, that if the disease be incapable of free removal (and most are so), the first consideration is to put it at rest, and that local interference is only to be justified when it is the lesser evil. I have not had an opportunity of removing a malignant affection of the oesophagus. It has been done once or twice with not very fortunate result, but I believe the operation to be justifiable if the tumour be within reach.

But while we interfere with the growth as little as may be, it is plain that we cannot allow the patient to die of starvation; some means of alimentation must be employed. There are several. First, there is rectal feeding, and much may thus be done. By in this way giving the oesophagus a complete rest it is not infrequently found that temporarily the passage becomes again patent, and by mouth and rectum the patient may be fairly sustained. But if we be reduced to feeding by the rectum only, the patient starves slowly, but still surely, while in certain cases the rectum proves refractory to nourishment.

Attempts have therefore been made to dilate or divide the stricture, or to lodge a tube in its lumen. In those, especially if they be aged, in whom the occasional passage of a soft tube is easy, maintains the patency, and affords a fair opportunity for nourishment, life will probably be prolonged as much as by any other means. But, on the other hand, it has been abundantly proved that the discomforts, disadvantages, and dangers of internal division, permanent lodgments, or frequent passages of instruments, simply hasten the inevitable end.

The operation of oesophagostomy, or opening the oesophagus below the stricture point, is plainly applicable to only a limited number of cases. Malignant stricture is usually too low in the tube. There are, moreover, certain disadvantages inherent in the operation. It involves the possibility of being ineffective, because there is a second stricture on a lower level, and it possesses a high rate of mortality.

But we have yet another method at command—the operation of gastrostomy—which I desire to commend to your consideration. Some surgeons have recently condemned the operation, as I think somewhat hastily, for I feel sure that if cases be properly selected and the operation carefully done, it greatly prolongs life, and adds enormously to the comfort of the patient. There can be no doubt that gastrostomy cannot be performed without liability to a con-
sizable amount of shock. The nervous arrangements of these parts, it has long been recognised, react strongly upon injury, and the patients on whom gastrostomy is performed are necessarily of advanced age and already enfeebled by imperfect alimentation. I performed it in a man of 75, hale for his years, but who had, before entering the Infirmary, been almost absolutely without food for a week. We endeavoured for some days to bring up his strength by feeding him per rectum, but without much effect, and rather than see him die of starvation I operated. His temperature and pulse fell quickly, and I opened the stomach next day and fed him thereby. He did not rally, and died from cardiac collapse fifty-four hours after the operation. I should hesitate, certainly, to refuse gastrostomy on account of exhaustion unless it were very extreme. There are people old and apparently worn-out who yet suffer little from what we call shock. I have successfully operated in a man not certainly so old as the one I have mentioned, but older in appearance and more emaciated. In him there was no shock whatever. But I should recommend that the operation be not too long delayed. When the passage has become so far closed that it is impossible to administer sufficient food to supply the natural waste of the body, the stomach should be opened. Shock is really the only unavoidable danger. The mortality which has attended the operation from other causes our modern surgery is capable of overcoming,—the results, I mean, of septicity, whether local or general.

It is of immense importance, then, that the operation should be so performed that the patient shall be carried through the inevitable shock, and, of course, protected at the same time against septic infection of the peritoneum.

An incision is made in the wall of the abdomen, with the usual precautions, preferably parallel to the rib edge. I then pass my finger along the viscus, which I take to be the stomach, until I ascertain that it is so by feeling its passage through the diaphragm. In some cases you are then able also to feel the disease, and from its size to form a probable forecast of its future progress. I then fix the stomach to the wall of the abdomen by four encircling sutures, which penetrate the whole thickness of that wall, and by many radiating, which penetrate only skin and peritoneum. In both cases the stitches include the serous and muscular coats of the stomach. I then make a small opening in the stomach and introduce a soft rubber tube of the size of No. 8 catheter. This immediate opening I believe to be of great moment. At first I allowed several days to elapse before opening the stomach, but I have gradually shortened the period, until now I open at once, and proceed immediately with small but frequent doses of liquid food. In order to diminish, as much as may be, the chance of septic infection of the peritoneum, I take care that the tube shall closely fit the opening in the stomach, I secure its orifice by a clamp, and
By Dr. John Duncan.

Surround it with powdered boracic acid. There is, in truth, no tendency to the egress of fluid from the stomach, and in no case have we seen the slightest inflammatory reaction. The result has been most satisfactory in lessening the amount of shock. There is yet in most cases a slight depression of pulse and temperature for two or three days, but immediately after the patient rallies, and begins to increase in strength and put on flesh.

Under these circumstances the only point that remains is to determine the advantage which the patient may derive from the operation.

I have had two deaths from it. To one I have already referred, in whom the exhaustion before and the collapse after operation were so great that I was induced to open the stomach the next day. I believe that this farther interference rather increased the shock, but it proved to me the safety of early incision, and led to the adoption of immediate opening, which has at once the effect of diminishing the chance of shock from manipulation, and allowing nourishment and stimulation to be immediately administered.

The other death was that of a man at 57, in whom I delayed opening till the fifth day. He was excessively weak and emaciated at the time, and I believe the second interference was injurious, and was certainly too long postponed. He died on the sixth day. There was no peritonitis. He died simply of exhaustion; and at the post-mortem examination the disease was found to be very extensive, and to have reached down so far as to occupy a considerable area of the cardiac end of the stomach.

My other cases have been five in number, and they lived respectively for eleven, ten, five, four, and three months after operation. In every case the patient rapidly increased in weight during his residence in the Infirmary. One, a patient of Dr. Pope, travelled from South Shields five months afterwards simply to show himself. He had been able, after leaving the Infirmary, to feed largely on pappy substances by the mouth, as the rest which the operation had given to the oesophagus had, as often happens, allowed the swelling somewhat to subside and the lumen to expand. All died ultimately of extension of the disease except one, a patient of Dr. Robert Moir, who succumbed, I believe, to an intercurrent attack of bronchitis.

When it is considered that in none of these seven had the patient more than a few weeks of life before him had he been left alone, that the two who died were on the extremest verge of absolute starvation, that those who lived had in every case months of comfort, and in some of apparently perfect health, and that in them one effect undoubtedly was to diminish by rest the rapidity with which the disease was spreading,—when these things are considered, it is difficult to avoid the conclusion that, when the patient has
begun to suffer from insufficient nutrition, the operation ought to be performed, and that it need not even be denied when the marasmus is far advanced.

If, again, the operation be justifiable in malignant disease as a euthanasia, a fortiori it is to be advised in traumatic or cicatricial stricture. Whether or not Loreta's method of stretching be combined with it, it holds out to such patients a quite indefinite prospect of longevity. I have not had an opportunity of performing it myself. Only three such cases have ever come under my care. One of them was the syphilitic gumma already referred to, which I think was more largely inflammatory than cicatricial. The others, a man and woman, were both successfully treated by dilatation. The man had a stricture, the result of swallowing caustic potash solution, so tight that only a bougie of urethral size No. 4 could be passed. With immense patience it was ultimately overcome, and he left the Infirmary able to pass a large-sized bougie for himself. Parenthetically I may observe that I found in his case that the only way to advance in the early stage of his treatment was by the daily passage of the instrument.

I have been able, then, to avoid operation in traumatic stricture, but I have no hesitation in saying that, in cases which resist dilatation (and dilatation means an infinite amount of delicacy and care), gastrostomy ought to be performed.

The President expressed the pleasure with which they had all listened to Mr Duncan's account of his experience in the performance of gastrostomy, and was sure that they anticipated with delight the prospect of having further communications from him in relation to the surgery of the abdomen. As one who had frequent occasion to open the abdomen for pelvic disease, he (the President) had been specially interested in hearing what such a master in surgery as Mr Duncan had to say of the conditions of safety in opening into the abdomen in its higher planes. He thought Mr Duncan had arrived at a correct conclusion in deciding that, where the stomach had to be opened, it was better to open it at the time that the incision was made through the abdominal wall. First to stitch the stomach to the abdominal parietes, and at a later date to cut through the stomach wall was simply to subject the patient to a double risk, and retard the benefit which could be obtained by the immediate introduction of aliment into the system.

Mr Caird joined the President in thanking Dr Duncan for his paper, which should do much to rescue gastrostomy from the position which it was so apt to occupy with its former high mortality. He thought oesophagostomy need not be so uniformly fatal as represented, and referred to a successful case shown by Mr Chiene a few years ago. He believed that much of the shock
was due to the general anaesthetic, and had himself attempted the operation under cocaine. At the conclusion of the operation the patient exhibited less collapse and shock than he had ever before seen after a gastrostomy, but the patient ultimately sank.

Prof. Greenfield, under whose care the patient mentioned by Mr Caird had been, could not concur in the view that the case was in favour of the avoidance of a general anaesthetic. The risks of shock in such operations were great; but unless some more perfect local anaesthetic were found, the strain upon the patient was probably greater than if a general anaesthetic were given.

Dr Troup mentioned that twenty-three years ago he performed gastrostomy, and opened the stomach at once and commenced to feed the patient. Dr Troup had only seen gastrostomy performed once since then, and told the operator that he made too much ceremony, and should open at once, and Dr Troup was glad that Dr Duncan approved of the immediate opening. Dr Troup's case is related in the Edinburgh Medical Journal of 1872, and was the first in Scotland.

Dr W. Russell thanked Mr Duncan for the information in his paper. As a pathologist it seemed to him that the mortality in cases of abdominal section for various diseased conditions was great, and he was glad to have the other side presented, for, as a physician, the question to him was whether it was an operation to be recommended to one's patients. Statistics of Mr Duncan's kind would do much to settle the advisability of recommending operation in various abdominal conditions.

Mr Duncan said that he was by no means prepared to hold that the comparative value of the various operations for alimentation in oesophageal stricture was finally decided. Prof. Gross, however, had shown statistically that the mortality of oesophagostomy was distinctly greater than that of gastrostomy, and it was evident that the largest cause of mortality in the latter, the septic, could be obviated by modern methods, while it must necessarily remain in the former. Moreover, oesophagostomy was applicable to comparatively few cases—to not one of his own, for example. On theoretical grounds, and from examination of published reports, he must provisionally come to the conclusion that the lodgment of a permanent tube was not likely to become an established mode of procedure. While quite admitting that the anaesthetic added temporarily to the shock, he was not inclined to think its effect on the mortality was large, but to attribute it chiefly to the age and exhaustion of the patient.