SURGICAL TREATMENT OF NON-NEOPLASTIC LESIONS AT THE ESOPHAGO-GASTRIC JUNCTION*

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During the past 15 years, malignant tumors in the region of the esophago-gastric junction have been dealt with by resection and esophago-gastrostomy. Postoperative stenosis at the anastamotic site has occurred in many of these cases. These patients and others with non-neoplastic obstructing lesions near the esophago-gastric junction due to peptic ulcer, hiatus hernia or cardiospasm with severe esophagitis and stenosis, have long presented a difficult problem in management. The multiplicity of proposed therapeutic measures emphasizes the lack of satisfactory response to any one.

Medical management by diet, antacids, belladonna, banthine and similar agents may offer temporary relief but does not remove the obstruction. Mechanical dilatation is dangerous and unsatisfactory.

Operative procedures aimed at reducing gastric acidity and diminishing the effect of regurgitation of gastric contents into the esophagus (e.g. vagus section and/or subtotal gastric resection) do not relieve the stenosis and do not remove the involved segment that may harbor carcinoma. Resection of the stenotic area with esophago-gastrostomy, as popularly done for carcinoma, is followed in many cases by persistence of esophagitis and ulceration due presumably to reflux of gastric contents. Similar changes have occurred following the Heineke-Mikulicz type of cardioplasty or the Finney type of plastic procedure performed at the esophago-gastric junction. Resection of the involved area and most of the stomach with anastomosis of the esophagus to the antrum, as advocated by Wan- gensteen for cases of cardiospasm, may not be technically possible because of involvement of a considerable portion of the distal esophagus, necessitating a high transection of that organ. Total gastrectomy with removal of the distal esophagus and esophago-jejunostomy is a possible solution, but is a formidable procedure and may result in a "gastric cripple" with anemia, failure to gain weight and digestive disturbances attendant upon removal of the entire stomach. Allison mentioned that esophago-jejunostomy had been performed in 15 of 63 patients who had chronic esophageal ulcers and stenosis associated with sliding hiatus hernia. All 15 patients "are alive and well." Details of the operative procedure and follow-up are not recorded.

There is one procedure that will (a) remove the stenotic segment, (b) prevent or minimize regurgitation of gastric contents into the remaining esophagus and (c) preserve a portion of the stomach and so perhaps avoid the possible ill effects of a total gastrectomy, namely, resection of the distal esophagus and proximal portion of the stomach with esophago-jejunostomy in Roux-Y fashion (Fig. 1).

This operation, apparently not widely employed, has been used in six cases at the

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New York Hospital. From the preliminary results, we are encouraged to give it further trial in the surgical management of certain lesions at the esophago-gastric junction (Table 1).

The first patient (N.Y.H., No. 594222) has been followed for one year. His course and the operative procedure are detailed below.

The second patient (N.Y.H. No. 529873), an emotionally unstable woman, had a long history of cardiogastropathy. Resection of the esophagus-gastric junction with esophago-jejunostomy was performed because of the presence of esophagitis. There is now no dysphagia. Failure to gain weight has been her chief concern since operation.

The third patient (N.Y.H. No. 532721) had a lesion of the lower esophagus that was suspect of being carcinoma. Following operation his course was smooth, and he is eating and feeling well.

The fourth patient (N.Y.H. No. 546228) was operated upon using an abdominal approach. In the other cases, a transthoracic or thoraco-abdominal incision had been utilized. This patient still had regurgitation postoperatively and roentgenogram examinations showed a persistent narrowing at the esophago-jejunal anastomosis. It is felt that the esophagus had not been transected at a sufficiently high level. Access to a greater length of esophagus could have been obtained by a transthoracic approach or by the utilization of pneumatic peritoneum preoperatively, as described recently by Maisel.4

The fifth patient (N.Y.H. No. 483521) underwent a Heineke-Mickulicz type of esophago-gastrostomy in 1947 for conspicuous esophageal dilatation with obstruction that resulted from cardiogastropathy of five years' duration. His course was satisfactory, with only occasional episodes of dysphagia until about eight months before the present admission when a tarry stool was noted. Regurgitation of food became increasingly frequent in the four months before esophago-jejunostomy was performed. Following operation, he ate well. Roentgenogram examination 11 days after operation showed a stoma that functioned well, but with persistent dilatation of the esophagus. The mucosal pattern of the jejunal loop of the esophago-jejunostomy appeared normal.

In addition to the five cases with non-neoplastic obstruction at the esophago-gastric junction, this procedure has been utilized in one patient (N.Y.H. No. 576553), an 18-year-old girl, with bleeding esophageal varices in whom a porto-caval shunt could not be performed and in whom a spleno-renal shunt failed to reduce the portal pressure. It was felt that prevention of regurgitation of gastric contents into the esophagus might diminish the possibility of erosion and hemorrhage from the varices. This patient has had no further episodes of hemorrhage in the ten months since operation.2

CASE REPORT

(N. Y. H. No. 594222). A 44-year-old clerk, referred by Dr. George L. Kauer, first entered the New York Hospital on May 7, 1951, with the chief complaint of dysphagia of one year's duration. For 3 years he had complained of "heartburn" and occasional regurgitation of food with substernal distress. For one year there had been difficulty swallowing solid food, with a sensation of food sticking at the level of the xiphoid. Vomiting became frequent and was often self-induced to relieve a "heavy feeling in the chest." "Heartburn" that was relieved by alkali became worse on reclining, so that for the 6 months before admission to the hospital, the patient slept supported by 3 pillows. His family and past histories and review of systems revealed no significant data.

Physical examination showed a well-developed moderately thin male (68.1 Kg.) in whom no significant pathological changes were noted. Blood pressure was 130/84.

Laboratory studies included a normal urine. The erythrocytes numbered 5.1 million per cu. mm. with hemoglobin of 16.7 Gm. The leukocytes were 8,300 per cu. mm. with a normal differential count. Roentgenogram examinations of the upper intestinal tract on March 2, 1951, showed a hiatus hernia of the "sliding type" approximately 5 cm. in length, with the remaining stomach and duode-
num apparently normal. Re-examination on May 2, 1951, showed the previously described hiatus hernia, and in addition there was an increase in the narrowing at the lower end of the esophagus at its junction with the hiatus hernia. There was a semilunar defect (2 cm. in length) in the wall of the lower esophagus that suggested an intramural neoplasm.

Esophagoscopy revealed no abnormalities in the upper esophagus. At 33 cm. from the upper incisors there was an abrupt change to red, friable, easily bleeding irregu-larly protruding tissue on the right anterolateral wall. There was moderate fixation and a #18F bougie could be introduced distally for several cm., but no attempt was made to advance the esophagoscope further. Biopsy of this tissue was made and material was aspirated for microscopic examination.

Microscopic examination of the tissue showed pseudostratified columnar epithelium that was replaced in several areas by stratified squamous epithelium which was in no way unusual. The deeper tissue was edematous and densely infiltrated by inflammatory cells, including plasma cells, histocytes and polymorphonuclear leukocytes. In some areas deep to the superficial epithelium were small groups of mucus-producing glands.

Doctor Papnicolau's report of the examination of the aspirated material was Class III (a few suspicious cell clusters).

The patient was discharged to be readmitted on August 25, 1951. In the interval, dysphagia had increased and regurgitation occurred after almost every meal. Physical examination and rou-}

nerve was crushed and, with the lung retracted, the herniated portion of the stomach was visualized. In the lower esophagus was a rubbery mass corresponding to the area of narrowing seen on the esophogram. The diaphragm was divided and the stomach was transected between Payr clamps just below the esophagogastric junction. The stomach was closed, using a continuous suture of #00 chronic catgut that was buried beneath interrupted sutures of #000 silk. The esophagus was then freed from surrounding structures proximally almost to the arch of the aorta.

A rent was made in the transverse mesocolon, through which a loop of jejunum, approximately 25 cm. from the ligament of Treitz, was drawn. At this point the jejunum was divided between Kocher clamps and its mesentery divided for several centimeters so that the distal limb of the jejunum could reach high on the esophagus. Interrupted sutures of #000 silk were used to approximate the posterior surface of the esophagus and jejunum, and the esophagus was transected close to this suture line. The tissue was extremely tough. The

<table>
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<td>Partial stenosis of the distal esophagus with friable, easily bleeding tissue.</td>
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<td>Moderate infiltration with lymphocytes and plasma cells at esophago-gastric junction.</td>
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<td>M40</td>
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<td>Post-operative stenosis at the esophago-gastric junction with dilatation of the esophagus and retention of food in the esophagus.</td>
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Kocher clamp was removed from the jejunum and a second posterior line of interrupted silk sutures was placed and tied. A Levin tube was passed from the proximal esophagus distally into the jejunum. The anastomosis was completed with two anterior suture lines of interrupted silk sutures. An end-to-side anastomosis was then effected between the proximal, previously divided segment of jejunum and the jejunum, approximately 20 cm. from the esophago-jejunal anastomosis.

As the abdominal contents were returned to the abdominal cavity, it was noted that the jejunum, near its attachment to the esophagus, was dusky, but appeared viable. The opening in the diaphragm was closed about the jejunum and a large rubber tube was placed in the chest through the tenth interspace. The wound was closed with interrupted sutures of #00 silk.

The pathologist described narrowing of the esophagus with a penetrating ulcer (1 cm. in diameter and 1.5 cm. deep) at the esophago-gastric junction. There was conspicuous infiltration by inflammatory cells, chiefly lymphocytes and plasma cells.

For the first two days after operation the patient's course was satisfactory. On the third day, the chest tube was removed. He became dyspneic and cyanotic, and had many coarse, moist rales in both lungs. His temperature rose to 39.6°C. (rectally) on the evening of the third day. Aspiration of the left pleural space produced no blood, fluid or air, although a roentgenogram of the chest showed left pleural effusion as well as broncho-pneumonia on the right. On the morning of the fourth day, dyspnea increased and he developed severe upper abdominal pain. There was spasm in the upper quadrants of the abdomen with conspicuous tenderness and rebound tenderness. Because of this, the abdominal cavity was explored through an upper midline incision on the fourth day after
operation. There was no evidence of peritonitis. The proximal limb of the Roux-Y anastomosis was somewhat boggy and slightly reddish, with areas of bluish discoloration. There was no gangrene.

The site of anastomosis of this limb with the descending portion of the Roux-Y appeared intact. The portion of jejunum that entered the chest appeared normal in the portion that could be visualized. The stomach was dilated and contained over 600 cc. of bile. In order to decompress that organ and to make certain that feedings could be given, a gastrostomy (Stamm type) was performed.

Following this, the patient gradually improved. Although the first roentgenogram examinations of the upper intestinal tract showed delay in passage of barium through the proximal jejunum, examination on September 28, 1951, (28th postoperative day) showed the wall of the esophagus to be flexible and the mucosal pattern normal. The site of anastomosis between the esophagus and jejunum was patent and barium passed freely through this area. The upper loops of jejunum just below the anastomotic site were moderately widened, with some widening of the mucosal folds (Fig. 3). A film, 30 minutes after the ingestion of barium, showed the meal to have proceeded without delay to the lower ileum.

The patient was discharged on October 1, 1951, 31 days after the first operation; the gastrostomy tube was removed five weeks after operation and the gastrostomy closed spontaneously.

One year after operation he feels entirely well and eats a general diet. His weight remains steady at 61 Kg. Erythrocytes number 4.65 million per cu. mm. and the hemoglobin is 12.5 Gm.

Fluoroscopic and radiographic examination of the upper gastro-intestinal tract, including a small intestinal series, was made on September 12, 1952, one year after operation. The esophagus canalized normally without evidence of constriction, spasm, extrinsic pressure, diverticula, ulceration or neoplasm. The barium passed readily through the anastomosis of the esophagus and jejunum, and it also passed without hesitation into the proximal portion of the jejunum. There was relatively slow passage of the barium through the midpoint of the jejunum and at 2½ hours, the head of the barium column was still in the distal portion of the jejunum. At two hours, there was still a small amount of barium in the jejunum just below the anastomosis. None of the barium entered the stomach, but a small amount entered the duodenal bulb in a retrograde fashion. A film taken eight hours after the ingestion of barium showed the
head of the barium column to be in the descending colon. Nearly all of the barium was seen along the course of the colon. About 10 per cent remained in the terminal ileum. The proximal loops of the jejunum were slightly larger than seen in the average patient, but there was no evidence of significant dilatation or other signs of obstruction. The impression was: normally functioning esophagojejunostomy with exclusion of the stomach and decreased motility of the small intestine without evidence of obstruction.

It is of interest that although the esophagus had been sectioned through a thickened area that showed severe esophagitis, there was no evidence of esophagitis by roentgenogram examination one year after operation. This suggested that regurgitation of unaltered gastric contents into the esophagus had been prevented.

**DISCUSSION**

The patients subjected to this operation had symptoms of obstruction of the esophagus and evidence of esophagitis and/or stenosis. These changes may result from several pathogenetic factors (e.g. esophageal hiatus hernia, operative procedures that result in an incompetent esophago-gastric mechanism, cardiospasm) but the end-result, esophageal obstruction, is the same. Correlation may be poor between the findings on roentgenogram examination and the findings at operation or on examination of the specimen by the pathologist (Table I).

The differential diagnosis between carcinoma and other obstructing lesions at or near the esophago-gastric junction may not be possible before, and even at, operation. For this reason, resection of the involved segment is advisable.

When this is accomplished and continuity of the gastro-intestinal tract is re-established by esophago-gastrostomy, the likelihood of the occurrence or persistence, or even the extension of esophagitis is great. Ripley et al. have recently called attention to the frequent occurrence of esophagitis following esophago-gastric anastomosis for conditions both malignant and benign.

From their experimental studies in cats and dogs, Ferguson et al. conclude that "the prevention and treatment of nonspecific esophagitis should be primarily aimed at keeping gastric juice out of the esophagus." Regurgitation of gastric contents into the remaining esophagus may be minimized or prevented by esophagojejunostomy performed in Roux-Y fashion. Even should there be regurgitation of mixed gastric and intestinal contents into the esophagus, the likelihood of the development of esophagitis is small. When bile and pancreatic juice are added to gastric juice that is being applied to the esophageal mucosa of experimental animals, little or no damage occurs.3

With resection of the distal esophagus and proximal stomach, the vagus nerves are severed. This may be followed by retention of secretions (gastric contents and bile) in the remaining gastric pouch, particularly if but a small segment of stomach is resected (as occurred in the first case [N.Y.H. No. 594222]). This complication can be avoided by (a) performing a pyloroplasty, or (b) by resecting the proximal three quarters or more of stomach. Many cases must be done before the preferable method can be ascertained. It is believed that retention of even a small segment of the distal end of the stomach may prevent the undesirable effects that often follow total gastrectomy.

Diarrhea occurred in three patients. This began usually early in the postoperative period but was not a serious problem. There was apparently no correlation between the amount of stomach that remained and the occurrence of diarrhea, since it was present in one patient (N.Y.H. No. 576553) in whom almost the entire stomach was preserved.

Morphologic and functional changes may occur in the segment of stomach that remains following this procedure. Experimental studies in dogs are in progress to clarify these and other points related to this operation.

Wider experience with this procedure
may result in its adoption as the procedure of choice in the surgical management of neoplastic as well as certain non-neoplastic lesions at the esophago-gastric junction.

**SUMMARY AND CONCLUSIONS**

Six cases are presented (one in detail) illustrating a method for the surgical correction of non-neoplastic stenosing lesions at the esophago-gastric junction by resection of the lower esophagus and upper stomach with esophago-jejunostomy in Roux-Y fashion. With this procedure, unsuspected carcinoma is not left *in situ*. It is believed that reflux of gastric contents into the esophagus may be avoided, and that the segment of stomach that remains may prevent the adverse effects that often follow total gastrectomy.

**BIBLIOGRAPHY**