Gastropexy and "Fundoplication"* in Surgical Treatment of Hiatal Hernia†

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THE MOST OBVIOUS MEANS of treating sliding hiatal hernia is application of the method that has proved its worth in the treatment of other abdominal hernias, i.e., opening the hernial sac, restoring the contents to their normal position, performing resection of the sac, and, finally, closing the hernial opening. Yet, even in the case of inguinal hernia in male patients, difficulties are encountered with this classic procedure, it being impossible to close the hernial orifice completely because of the spermatic cord. The percentage of relapses following radical operation for male inguinal hernia (9–20 per cent) clearly illustrates this difficulty, as does the fact that, in the case of elderly men, many surgeons advocate the simultaneous extirpation of the testicle and spermatic cord in order to deal with the hernia more satisfactorily.

In the case of sliding hiatal hernia, the anatomical conditions are if anything still less favorable. Not only is it extremely difficult to effect just the right amount of narrowing of the esophageal hiatus, but there is also a pronounced tendency for sutures to fail to hold no matter what method of suturing is used.

Our experience with the so-called classic procedure for hiatal hernia dates from 1930, when, following investigations by H. H. Berg[3] at the Medical Department of the Charité in Berlin, the method of radiological diagnosis was systematized. At that time in the Surgical Department of the Charité, the transthoracic approach was used. The long-term results were unfavorable; after a few years, during which the failure rate amounted to 50 per cent, we decided to adopt the abdominal incision, which had been popularized by Harrington.[5] Unfortunately, even this method achieved no improvement in long-term results. A third phase began when Allison[2] introduced his own transthoracic method; but this, too, failed to give us satisfactory results, quite apart from the fact that it constitutes a major intervention to which one is loath to submit elderly

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*Wrapping the fundus around the distal portion of the esophagus.

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patients, who constitute a considerable proportion of those treated by us (45 per cent over 60 years old).

The clinical symptomatology of sliding hiatal hernia had been studied more closely. The temporary strangulation of the prolapsed portion of the stomach, on which much emphasis had originally been laid, soon proved a problematical factor, particularly with respect to explaining the appearance of such manifestations as heartburn and hemorrhage. It seems probable that strangulation, in so far as it occurs at all, is responsible at most for pain in the epigastric fossa and for irregularities in the heart beat. This latter phenomenon, incidentally, is encountered extremely rarely in sliding hernias. The dominant factor here would seem to be the reflux esophagitis, though whether this is cause or effect still remains an open question.

In a recent paper[17] we discussed the connection between reflux esophagitis and hiatal hernia in the light of our own experience. The relief from gastroesophageal reflux should constitute the primary objective of surgical intervention. The cardial insufficiency responsible for the regurgitation seems to be mainly due to blunting of the normally sharp angle formed by the esophagus and the cardiac portion of the stomach (angle of His).

A method does exist which enables one to restore the angle of His and to correct the hernia by simultaneous abdominal invagination of the hernial sac (Fig. 1 and 2). This method is a type of gastropexy in which the stomach is fixed to the anterior abdominal wall under traction.

This operation was first performed by us in 1946 as an emergency measure. The patient was a 66-year-old man in very poor general condition, with a history of a large incarcerated paraesophageal hiatal hernia of several days' standing. In view of the critical situation, we contented ourselves with extracting the hernial contents (four-fifths of the stomach) from the hernial sac and, to prevent renewed incarceration, fastening the fundus under traction to the anterior wall of the abdomen. Soon after this, we were obliged to perform a similar operation on a 70-year-old patient. Both patients remained symptom-free, despite the fact that the hernial orifice was not constricted nor the hernial sac removed.

Subsequently, this operation was performed from time to time on elderly patients with hiatal hernias of both types, in the sure knowledge that this minor intervention (requiring only a few minutes to perform) could safely be used even for elderly and poor-risk subjects. This in fact proved to be the case, and the good results were found to be maintained at follow-up. Our somewhat cautious advocacy of gastropexy[9] in 1954 received noteworthy support in a paper by Boerema[4] which appeared

shortly afterward (1955). Boerema had, quite independently, come to the same conclusion as we. He had performed fixation of sliding hiatal hernia along the lesser curvature of the stomach; it is, in fact, possible to reconstruct the angle of His by Boerema's method.

Since 1954, we have performed 73 gastropexies as the sole procedure in cases of hiatal hernia of the sliding type. A report on the first 40 operations was published in 1959.[17a]

Our first gastropexies were performed in cases of paraesophageal hernia; we continued to use this method and, for about 5 years, have

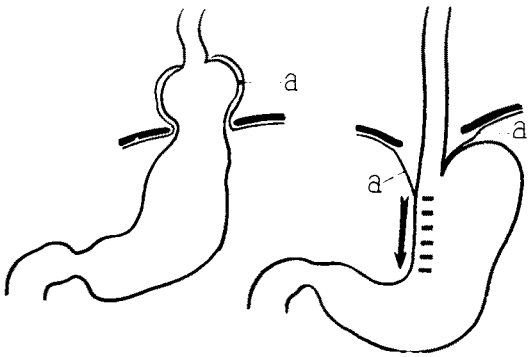

Fig. 1. Correction of sliding hernia by gastropexy, consisting of inversion of the hernial sac (*a*) and restoration of the angle of His by traction along the minor curvature (*arrow*).

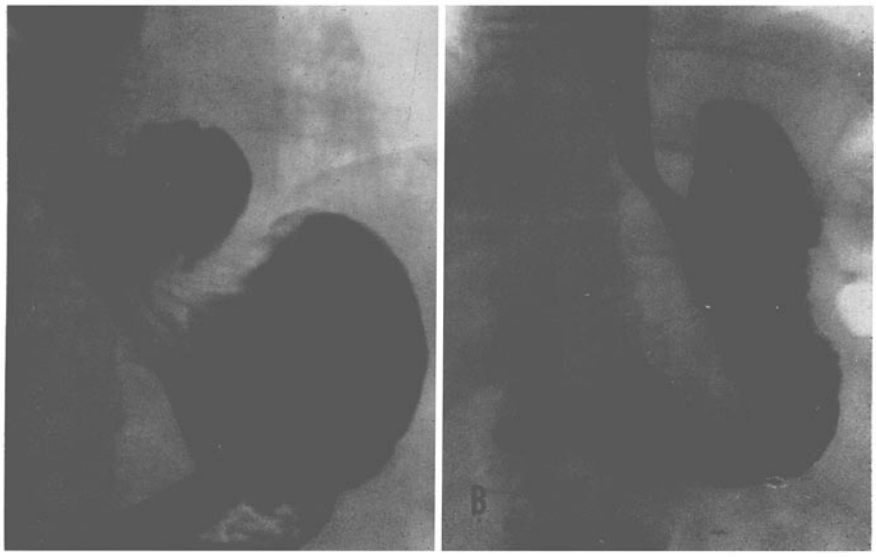

Fig. 2. Large sliding hernia **(A)** before and **(B)** after gastropexy. Note restoration of the acute esophagogastric angle.

applied it as the only procedure in this condition. In these cases, it is necessary to fix both curvatures of the stomach in order to maintain both the cardia and the angle of His in their correct positions while preventing renewed prolapse of the highly mobile greater curvature (Fig. 3 and 4). Closure of the hernial orifice and sac is irrelevant; we leave the sac as a matter of principle, while the orifice is only constricted in cases where it is easily accessible and where the patient's condition allows. Results in 36 cases of paraesophageal hernia have been very encouraging.

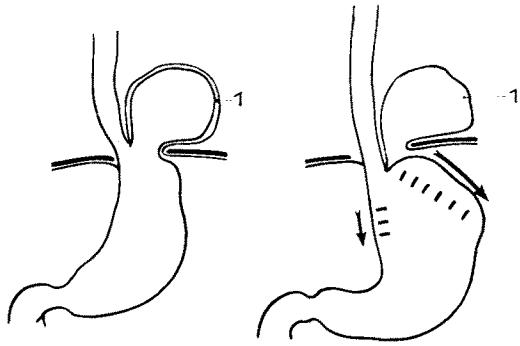

Fig. 3. Correction of paraesophageal hernia by double gastropexy along the minor curvature (cardia) and fundus ventriculi (prolapse). The hernial sac (*1*) remains in the thoracic cavity and undergoes spontaneous obliteration.

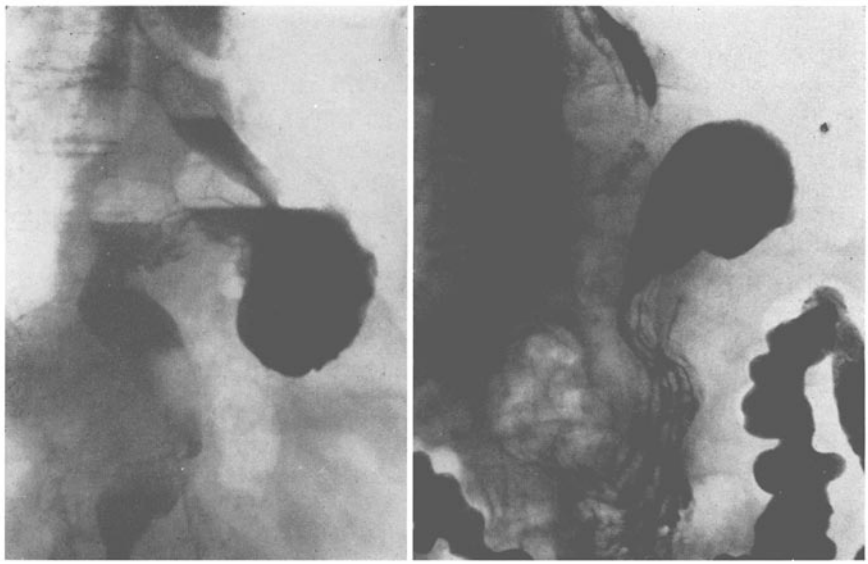

Fig. 4. Correction of large paraesophageal hernia (subtotal gastric prolapse; "upside-down stomach") in an 82-year-old woman. At left, before operation; right, after operation.

Favorable results with gastropexy in both types of hernia, particularly the sliding form, have been reported by Uebermuth,[24] Hess,[6] and Kaiser.[7]

At first, unaware of the connection between reflux esophagitis and hiatal hernia, we used a method employed for patients with idiopathic regurgitation and based on experience gained in transpleural resection of the cardia. The first successful operation of this kind outside Japan was performed in 1937 on a man with a perforating ulcer of the cardia. To reinforce the sutures connecting the esophageal stump and the stomach, the latter was mobilized and the distal segment of the esophagus implanted in it in much the same manner as the rubber tube in Witzel's gastrostomy. Sixteen years later, we were able to re-examine the patient. In contrast to our usual experience following esophagogastrostomy, there was no history of gastric reflux.

In an attempt to counteract reflux esophagitis, the following method was tried in 2 cases reported in 1956.[11] From an abdominal incision, the distal part of the esophagus was mobilized and drawn down 6 cm. into the abdominal cavity; the fundus ventriculi was then wrapped round the latter and the folds fixed with sutures. This procedure was termed fundoplication (Fig. 5 and 6). When it was found that the favorable clinical and radiological results were maintained, we adopted this procedure in combination with gastropexy in those cases of sliding hiatal hernia which involved severe reflux manifestations. As a rule, these were small hernias.

This operation has been performed in 122 cases (partly as the only procedure, partly in combination with gastropexy). One patient died from peritonitis due to iatrogenic perforation of the cardia, probably resulting from forcible mobilization of the distal esophagus, which was surrounded by adhesions. In 2 cases, relapse was directly attributable to separation of the folding sutures. Temporary postoperative stenosis of the cardia was observed in some cases. The results of the first series of operations are reported at the end of this paper.

In certain cases, it was found advisable to perform fundoplication through a transpleural incision—e.g., in cases of hernial relapse preceded by direct plastic surgery of the hernia. In such cases, adhesions in the region of the cardia and the hernial sac impede the abdominal approach. The same applies in cases of brachyesophagus, where reposition of the cardia and restoration of the angle of His by invagination of the distal esophagus into the fundus wall are possible only where the transthoracic and transhiatal approach remain unimpeded. Finally, we have performed the same intervention for epiphrenic diverticulum of the esophagus, particularly when this is associated with reflux dis-

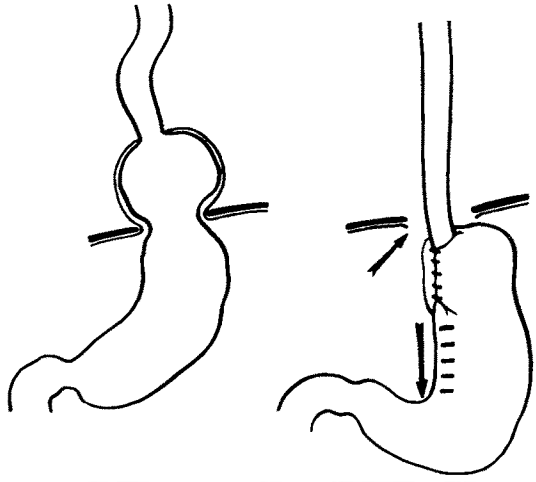

Fig. 5. Elimination of sliding hernia with reflux esophagitis by gastropexy plus fundoplication. The distal segment of the esophagus is invaginated in the fundus wall in a manner similar to that used in Witzel's gastrostomy.

Fig. 6. Elimination of sliding hernia with cardial insufficiency and severe reflux esophagitis by means of fundoplication plus gastropexy. At left, the hernia, with reflux; right, the invaginated distal segment of the esophagus, showing sphincter-like function restored.

orders (rather than the usual accompanying cardiospasm). In such cases, fundoplication has two objects—restoration of cardial function and protection of the esophageal wound following resection of the diverticulum. This transthoracic operation, performed in 9 cases for the indications mentioned, has also proved satisfactory.[16]

Two years after our first report, and independent of it, Adler *et al.*[1] advocated the same procedure in animal experiments, finding it superior to other mechanical methods of combatting reflux disorders. Similar experiments have been carried out by Scalfati and Cancrini.[23] Favorable clinical results have recently been reported by Weiss.[25]

The results of our first series have been given in detail in a monograph.[17a] To summarize the overall results of fundoplication plus gastropexy in the various forms of cardiohiatal disease, the clinical and radiological healing rate is 88 per cent (85 cases out of 96) over an observation period ranging from 3 months to 3½ years (over 4 years in 2 cases). In 7 other cases, X-ray examination showed relapse of the hernia, but the patients remained symptom-free. It is therefore fair to say that the specific disorders were eliminated in a total of 92 patients, 96 per cent of cases.

SUMMARY

The rationale and indications for gastropexy plus fundoplication in the surgical treatment of esophageal hiatal hernia are discussed. This intervention—considerably simpler than any method used hitherto—also appears to produce satisfactory long-term results.

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