

Cervical Esophageal Dysphagia

Indications for and Results of Cricopharyngeal Myotomy

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Twenty patients with cervical esophageal dysphagia were treated by cricopharyngeal myotomy. Of these 20 patients, ten had pharyngoesophageal diverticula, four had a hypertensive upper esophageal sphincter (UES), four had bulbar palsy, and two had miscellaneous forms of cricopharyngeal dysfunction. Preoperative esophageal manometric examination revealed mean UES pressures of $37.2 \text{ mmHg} \pm 4.8 \text{ SEM}$ in patients with diverticula—markedly lower ($p = 0.01$) than in normal patients ($55.9 \text{ mmHg} \pm 5.0 \text{ SEM}$). In patients with hypertensive UES the mean pressure was $166.2 \text{ mmHg} \pm 13.4$, significantly higher ($p < 0.001$) than normal. Incoordination of the deglutitive response of the UES characterized by premature relaxation and contraction was present in all patients with diverticula and in one other patient. Another patient exhibited incomplete sphincteric relaxation (achalasia). A 4–5 cm myotomy of the cricopharyngeus muscle and adjacent esophageal muscle was performed in all patients. Of the patients with diverticula two also had diverticulectomy. No patient with bulbar palsy was benefited. All other patients were relieved of dysphagia by the operation, with the exception of one patient with a diverticulum. A subsequent diverticulectomy was required in this patient. Postoperative manometric examination revealed an average decrease in UES pressure of 63% and an average decrease in length of the high pressure zone of 1.4 cm.

MUCH HAS BEEN LEARNED in the past few decades regarding the normal and abnormal function of the body of the esophagus and its lower sphincter, yet the mechanisms responsible for abnormalities of cricopharyngeal function resulting in cervical esophageal dysphagia remain controversial. The wide variety of names associated with such disorders attest to this fact. Oropharyngeal dysphagia, cricopharyngeal achalasia, cricopharyngeal spasm, hypopharyngeal bar, and globus hystericus are only some of the many terms currently in use. Not only are the underlying mechanisms responsible for these disorders under dispute, but the indications for and results of cricopharyngeal myotomy

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in their management have yet to be defined clearly. Furthermore, general agreement has not been reached on how the operation should be performed. Its use as the primary form of therapy in certain cases of pharyngoesophageal diverticulum was reported by the senior author and associates ¹² years ago. The purpose of this paper is to test the validity of some of those original assumptions regarding the role of cricopharyngeal myotomy in the treatment of this disease and to assess its expanded role in the management of other forms of motor disorders leading to cervical esophageal dysphagia.

Material and Methods

Patients

Twenty patients form the basis of this report. They were equally divided between the sexes, and their ages varied from 41 to 68 years (average: 60 years). All patients had a history of cervical esophageal dysphagia varying in duration from three months to 15 years, with a median duration of one year. The diagnoses are listed in Table 1. Ten of these patients had a pharyngoesophageal diverticulum. In three of these patients dysphagia had persisted after diverticulectomy performed previously elsewhere. Seven of these ten patients also had a diaphragmatic hernia, but only four had subjective or objective evidence of gastroesophageal reflux or both. Four of the other ten patients had a diaphragmatic hernia, but none had reflux. In four patients, the diagnosis of hypertensive upper esophageal sphincter (UES) was made on the basis of criteria to be discussed

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TABLE 1. *Cricopharyngeal Myotomy for Cervical Esophageal Dysphagia*

Diagnosis	Number of Patients
Pharyngoesophageal diverticulum	10
Hypertensive upper esophageal sphincter	4
Bulbar palsy	4
amyotrophic lateral sclerosis	3
cerebrovascular accident	1
Miscellaneous	2
cricopharyngeal "achalasia"	1
cricopharyngeal incoordination	1
Total	20

later. Four patients had bulbar palsy and cervical esophageal dysphagia secondary to central nervous system disorders, three had amyotrophic lateral sclerosis, and one had had a cerebrovascular accident. In one of the two remaining patients, disordered motor function of the UES characterized by incomplete sphincter relaxation was considered to be the cause of cervical esophageal dysphagia, while incoordination of the UES characterized by premature relaxation and contraction of the sphincter was present in the other patient.

Study Methods

Preoperative and postoperative esophageal roentgenoscopic examinations were performed on all

patients, but this diagnostic modality was less useful in classifying the underlying motor disorder than was esophageal manometric examination. The technique of esophageal manometric examination was similar to that previously reported.² The procedure was performed in the supine position. A constantly infused method was employed using a triple lumen catheter* with 5 cm spacings between the catheter openings, which were circumferentially oriented to one another at intervals of 120°. A special system† provided the constant infusion of degassed water at 1.00 ml per minute, and pressure changes were recorded on a multichannel recording device‡ using external transducers.§ Pressures were recorded graphically and calibrated to create a 1 cm deflection for each 10 mm of mercury pressure. Resting cervical esophageal pressure was used as a baseline from which UES pressures were measured. Maximal end-expiratory and end-inspiratory pressures were averaged to obtain the mean maximal UES pressure. Of the several values for UES pressure that were obtainable by this technique during each study, the highest value was selected in an effort to minimize inconsistencies of recording due to the asymmetry of

*Arndorfer Medical Specialties, Greendale, WI.

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‡Model 88708, Hewlett Packard, Andover, MA.

§Model 1280C, Hewlett Packard, Andover, MA.

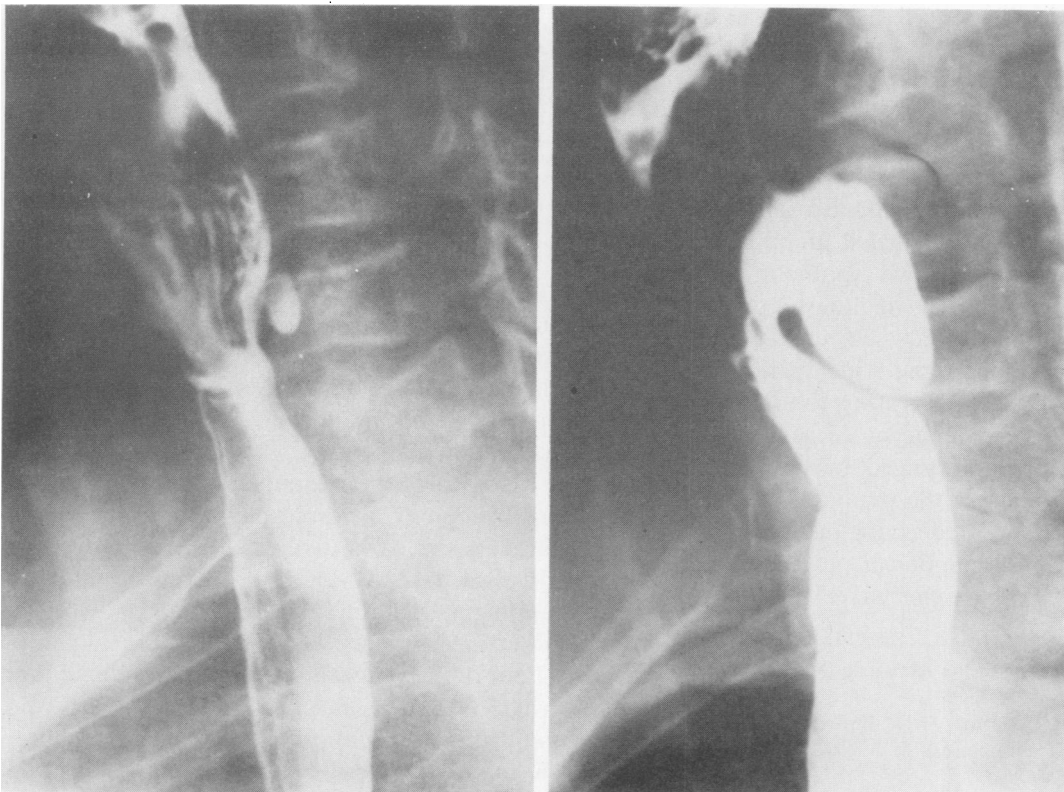


FIG. 1. Roentgenographic appearance of developing pharyngoesophageal diverticulum with a three-year interval between the roentgenograms.

the UES.³ Twenty-six studies were performed on 13 patients, one of whom had no postoperative study. One patient was studied on three occasions after operation. The early postoperative studies were performed between one week and two months after operation; the average postoperative interval was 33 days. For purposes of comparison, the esophageal motility records of 18 patients with no demonstrable esophageal disease and those of 14 patients with subjective and objective evidence of severe gastroesophageal reflux who required surgical correction were also analyzed. Statistical analyses were performed using two-tail t-tests and Wilcoxon rank sum tests.

Clinical evaluation of all surviving patients was possible within a month of preparation of this report and consisted of either direct examination of the patient or information obtained by correspondence with the patient or his or her physician.

Preoperative Findings

Radiologic. The roentgenographic appearance of the pharyngoesophageal diverticulum was typical in seven of the ten patients with this abnormality (Fig. 1), the pouch varying in size from 2.5 to 5 cm in diameter. In the three patients who had undergone prior diverticulectomy, roentgenographic examination of the cervical



FIG. 2. Roentgenographic appearance of cervical esophagus after failed diverticulectomy. Note prominent cricopharyngeus muscle.

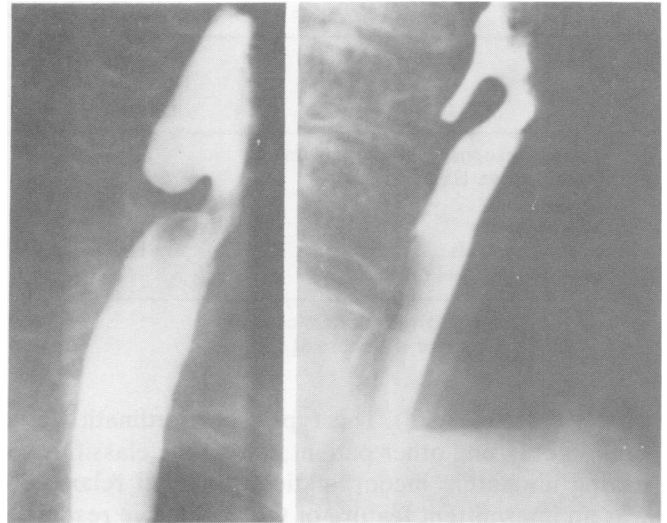


FIG. 3. Roentgenographic appearance of cervical esophagus in two patients with hypertensive UES. Note posterior indentation of barium-filled esophagus by cricopharyngeus muscle.

esophagus suggested incomplete removal of the pouch with an intact cricopharyngeus muscle (Fig. 2). All four patients with hypertensive UES exhibited varying degrees of posterior indentation of the barium column in the cricopharyngeal region presumably representative of the cricopharyngeus muscle (Fig. 3). No roentgenographic abnormalities could be identified in the remaining six patients.

Manometric. The manometric data obtained on these patients are summarized in Table 2. The amplitude of pressure at the UES of patients with pharyngoesophageal diverticula was significantly lower than that in normal subjects ($p = 0.01$). The diagnosis of hypertensive UES was based on the presence of markedly elevated resting pressures (>125 mmHg). When compared with values for normal subjects, the mean values of UES pressures in these patients were significantly higher ($p < 0.001$) (Fig. 4). The data on the remaining patients are too few to warrant conclusions, but it is of interest that the patient with bulbar palsy occurring after a cerebrovascular accident had a hypertensive sphincter. The mean amplitude of pressure at the UES in patients with severe reflux was significantly higher than that in normal subjects ($p = 0.03$). The length of the high pressure zone (HPZ) was approximately the same in all patients.

Analysis of the manometric responses of the UES to deglutition in patients with pharyngoesophageal diverticula revealed incoordination in all patients. The majority of deglutitive responses in these patients were characterized by premature relaxation and contraction of the UES, so that peak pharyngeal contraction occurred when the sphincter was partially or com-

TABLE 2. Manometric Characteristics of Upper Esophageal Sphincter (UES)

Diagnosis	Number of Patients	Amplitude (mmHg)		Length (cm)	
		Range	Mean \pm SEM	Range	Mean
Pharyngoesophageal diverticulum	5	20-50	37.2 \pm 4.8*	2.5-4	3.5
Hypertensive UES	4	140-200	166.2 \pm 13.4†	3-4	3.6
Bulbar palsy	2	38, 200		4	4
Miscellaneous	2	25-50	37.5	3-3.5	3.3
Normal controls	18	25-100	55.9 \pm 5.0	2.5-5	3.7
Gastroesophageal reflux	14	32-112	75.9 \pm 7.2‡	2.5-5.5	3.7

* $p = 0.01$ compared with normal controls.

† $p < 0.001$ compared with normal controls.

‡ $p < 0.03$ compared with normal controls.

pletely closed (Fig. 5). This type of incoordination was seen in only one other patient, whom we classified as having idiopathic incoordination. Delayed relaxation was an intermittent feature of the deglutitive response of one patient with amyotrophic lateral sclerosis and one with a cerebrovascular accident. Achalasia or absence of relaxation was never observed, though one patient exhibited incomplete relaxation of the UES after swallowing.

Surgical Technique

The technique of cricopharyngeal myotomy is similar to that previously described by us with minor modifications. While some⁴ prefer to perform the operation with the patient under local anesthesia to facilitate identification of functional abnormalities of the cricopharyngeal region, we continue to employ general anes-

thesia. Access to the pharynx and upper esophagus is obtained through a left cervical incision centered on the cricoid cartilage and bordering the anterior edge of the sternocleidomastoid muscle (Fig. 6A). The cervical esophageal region is exposed by retraction of the carotid sheath laterally and the trachea and larynx anteriorly and to the right. The descending hypoglossal nerve and its branches to the strap muscles of the neck are preserved. Exposure is facilitated by dividing the anterior belly of the omohyoid muscle. Injury to the recurrent nerve is minimized by dividing the inferior thyroid artery in the lower part in the incision and, when necessary, one of the veins draining the midportion of the thyroid gland. This allows easy anterior retraction of the trachea and larynx displacing the recurrent laryngeal nerve from the operative area (Fig. 6B).

When a diverticulum is present, it is carefully freed

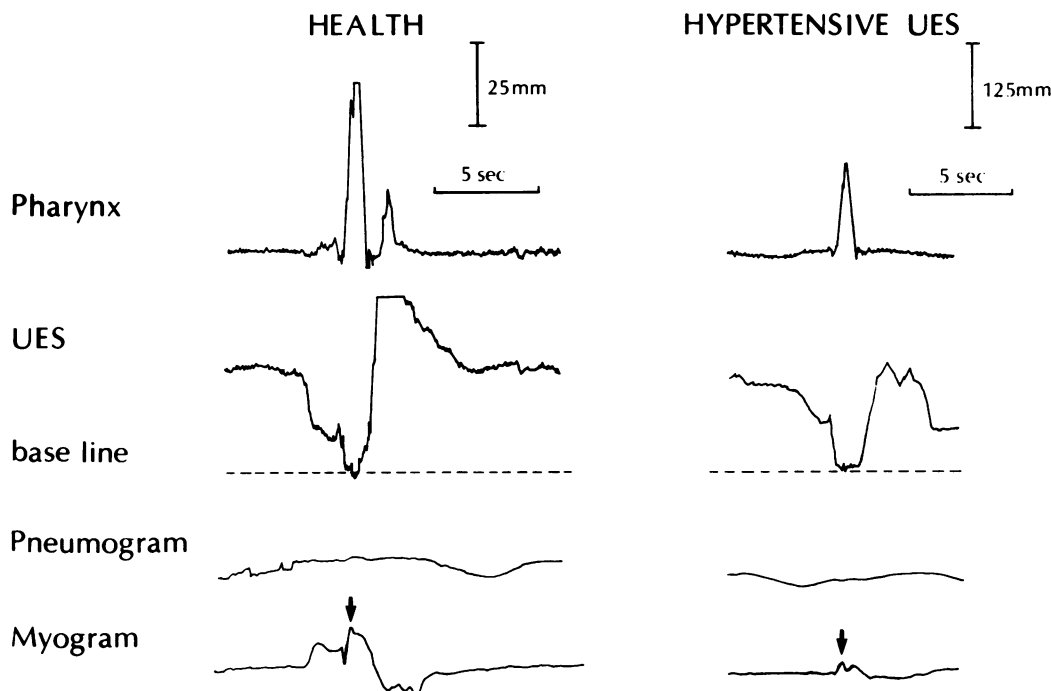


FIG. 4. Deglutitive responses of UES in health (left) and hypertensive UES (right). Resting pressure in latter is more than four times that of normal. Note difference in calibration of the two studies. (\downarrow = Swallow.)

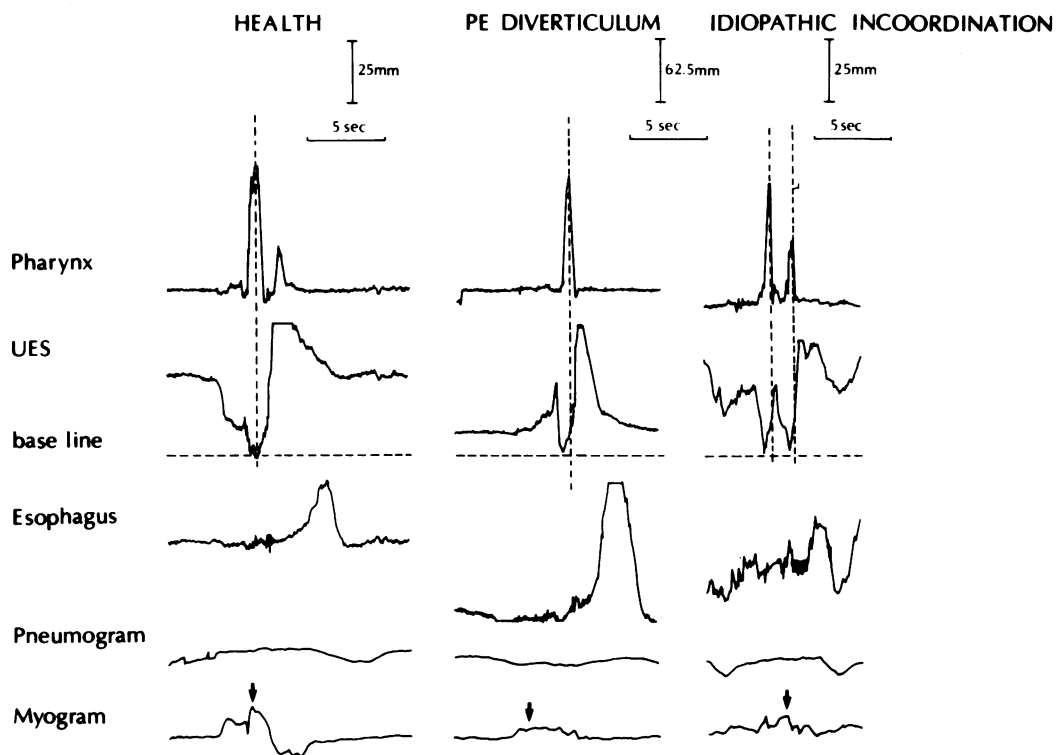


FIG. 5. Deglutitive responses of UES in health (left), pharyngoesophageal diverticulum (middle), and idiopathic incoordination (right). Vertical dotted line is drawn through point of peak pharyngeal contraction. Only in health (left) does it coincide with maximal point of relaxation of UES. (↓ = Swallow.)

to its neck, thus exposing the transverse fibers of the cricopharyngeus muscle that borders the inferior neck of the diverticulum. When unusually large (>4 cm in diameter), the diverticulum should be excised using the stapler, as described by Hoehn and Payne.⁵ This was done in two of the ten patients in this series with diverticula, in one patient because of excessive reaction surrounding the diverticulum, and in another because of the large size of the pouch. In a third patient a large pouch was sutured to the prevertebral fascia at a high level as a diverticulopexy. Thus, a cricopharyngeal myotomy alone was performed in seven of the ten patients.

Once the transverse fibers of the cricopharyngeus muscle are identified, they are incised longitudinally, and the incision is extended caudad onto the cervical esophagus (Fig. 6C). The length of the incision should exceed 4 cm to encompass the extent of the HPZ. After completion of the myotomy, the esophageal and cricopharyngeus muscles are dissected from the underlying mucosa for about half the circumference of the mucosal tube to allow it to protrude through the incision. In the absence of a diverticulum, the incision is carried cephalad onto the inferior constrictor muscle of the pharynx so as to ensure complete division of the muscles responsible for the HPZ, which exceeds in length that which can be explained solely by the width of the cricopharyngeal band. On those occasions when previous operative procedures have obscured the usual

cleavage planes, we have found that intraluminal placement of a 40 F Maloney dilator in the pharynx and upper esophagus facilitates safe performance of the described maneuvers. The cervical wound is then closed with interrupted sutures, usually without drainage. Oral alimentation is permitted the following day, and the patient can usually be discharged from the hospital within a few days.

Results

Clinical

The postoperative recovery of all patients was uneventful, and no complications occurred. Neither temporary nor permanent injury to the left recurrent nerve was identified. Follow-up clinical evaluation was available in all patients until death or the time of this report. The follow-up period varied from three months to 11 years, averaging three years and two months. None of the patients with cervical esophageal dysphagia secondary to bulbar palsy were improved, and all three with amyotrophic lateral sclerosis are now dead. All of the other patients, with one exception, had relief of dysphagia. One patient, with a 3 cm diverticulum, was found at operation to have considerable inflammation around the sac, which was left in place, and a cricopharyngeal myotomy was performed. Dysphagia persisted requiring a diverticulectomy two months later.

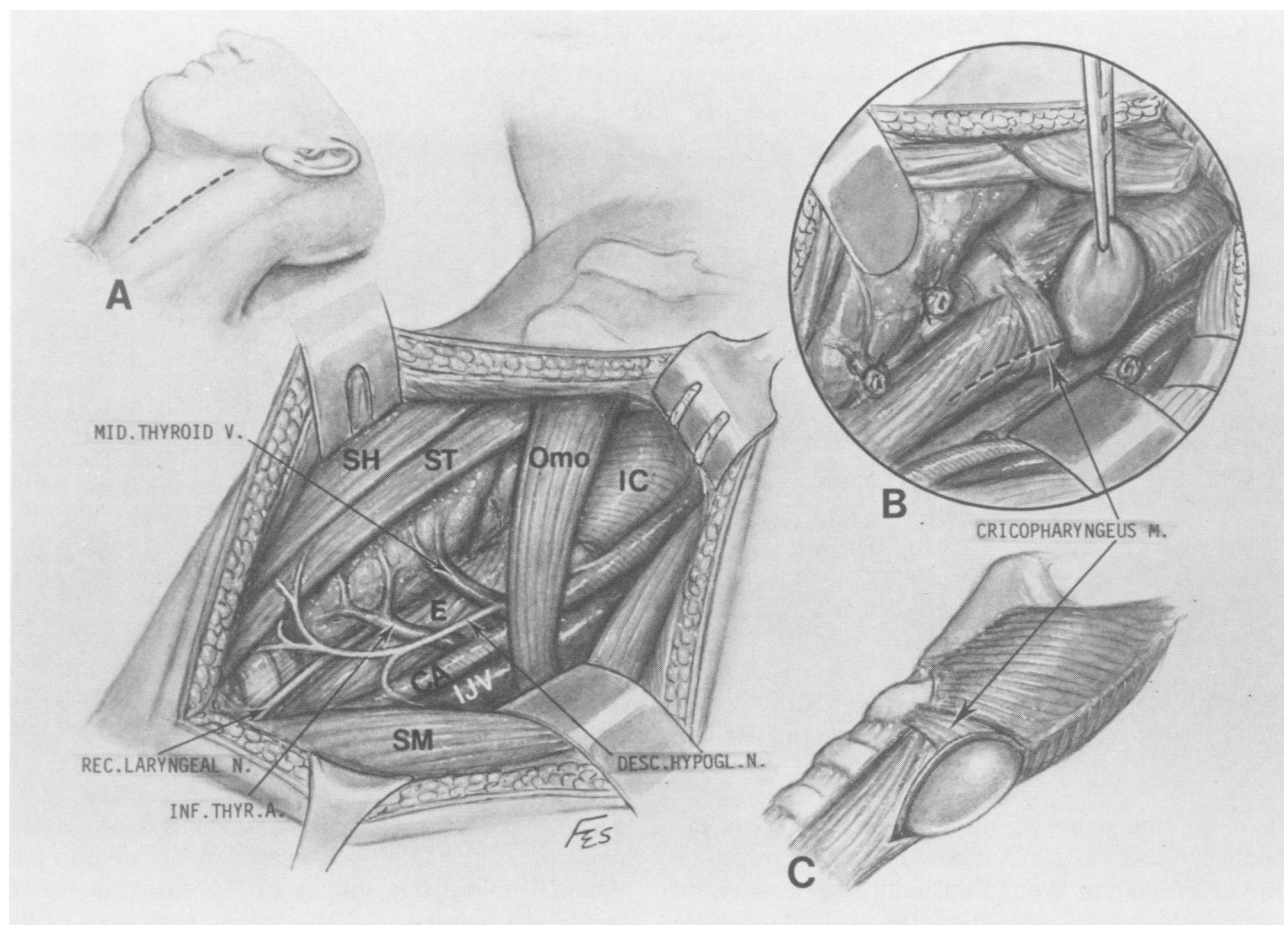


FIG. 6. Operative field for performance of cricopharyngeal myotomy is displayed in middle of drawing. (A) Incision. (B) Omohyoid, middle-thyroid vein, and inferior thyroid artery have been divided, thyroid and trachea retracted, and diverticulum freed. Dotted line indicates site of proposed myotomy. (C) Appearance of completed myotomy. SH = sternohyoid, ST = sternothyroid, Omo = omohyoid, IC = inferior pharyngeal constrictor muscle, E = esophagus, CA = carotid artery, SM = sternocleidomastoid muscle, IJV = internal jugular vein.

Radiologic

With the exception of the patient with a poor initial result, postoperative roentgenographic examinations revealed disappearance of the pouch after operation in all patients (Fig. 7). Those with a prior diverticulectomy and those with a hypertensive UES no longer displayed roentgenographic evidence of a prominent cricopharyngeus muscle after operation (Fig. 8).

Manometric

Postoperative esophageal manometry was characterized by a reduction in amplitude and length of the UES in all patients (Table 3). Patients with a hypertensive UES exhibited the most marked drop in pressure amounting to a 75% reduction (Fig. 9) to normal levels. The pressure reduction in the remaining patients studied was about 55%. The average overall reduction was 63%. The length of the UES was reduced by a little more than one-third, for an average reduction in length of 1.4 cm.

Discussion

Cricopharyngeal myotomy is not a new procedure; originally it was performed by peroral diathermy division of the "septum" between the pouch and esophagus in patients with pharyngoesophageal diverticula, a technique still preferred by some European otorhinolaryngologists.⁷ Direct surgical myotomy has become the accepted technique since first used by Kaplan,⁸ in 1951, in a patient with cervical esophageal dysphagia, the result of poliomyelitis. Since then, the usefulness of the technique has been reported in a variety of conditions resulting in cervical esophageal dysphagia. We report here a small number of patients with a limited number of disorders. Notably absent from our series are patients with dysphagia after radical oropharyngeal surgery,⁹ oropharyngeal muscular dystrophy,¹⁰ and a variety of neuromuscular disorders,¹¹ conditions in which dysphagia has been relieved successfully by cricopharyngeal myotomy. Though somewhat limited in scope, this report provides information that can form

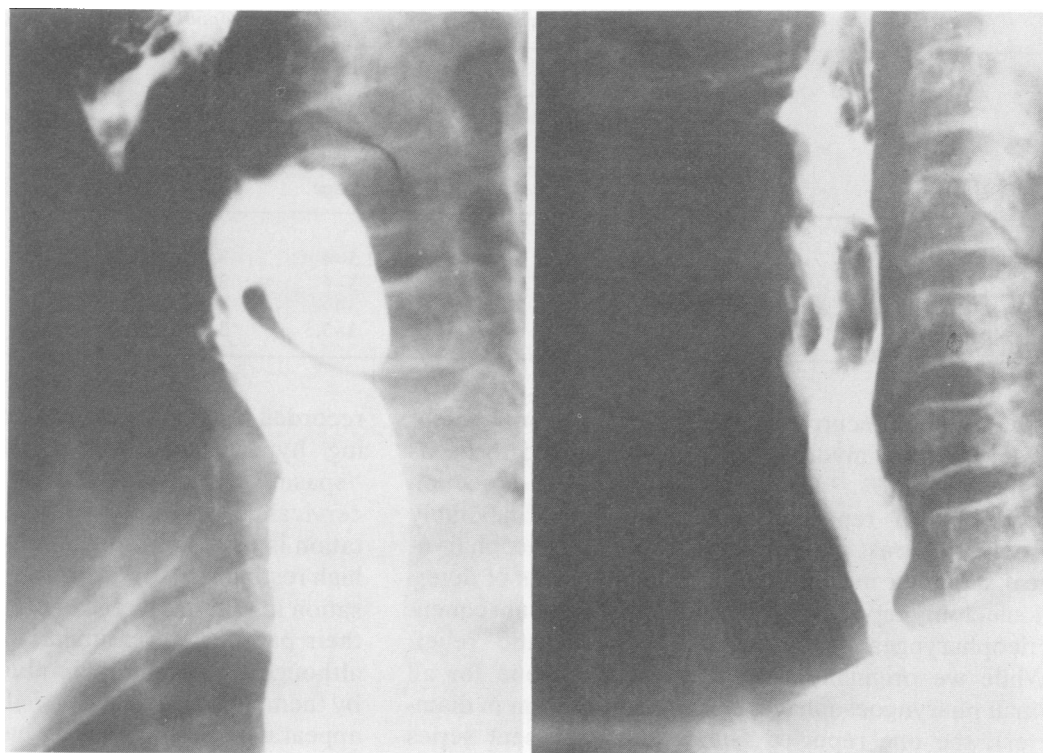


FIG. 7. Preoperative (left) and postoperative (right) esophageal roentgenograms in patient with pharyngoesophageal diverticulum pictured in Figure 1.

the basis on which certain clinical decisions can be made.

The manometric data on patients with pharyngoesophageal diverticula confirm our previous concepts regarding its cause, for deglutitive incoordination characterized by premature relaxation and contraction of the UES was a characteristic finding in these patients. This concept has also been confirmed by others.¹²⁻¹⁵ Furthermore, no evidence exists that UES pressures in patients with upper esophageal pouches are hypertensive or fail to relax (achalasia). While the concept proposed by Hunt and associates¹⁶ and Smiley and his co-workers¹⁷ that gastroesophageal reflux leads to cricopharyngeal spasm resulting in a pharyngoesophageal diverticulum is attractive, neither our data nor that of others^{18,19} support it. This concept is based on the reported high incidence of hiatus hernia, reaching 97% in one series,²⁰ occurring in association with this disease, an association not found by us, for in only four of ten patients was there objective evidence of reflux even though seven of the ten did have a hiatus hernia. However, in contrast to other reports, our data show a significantly higher UES pressure in patients with severely symptomatic gastroesophageal reflux. Nonetheless, none of these patients had either cervical esophageal dysphagia or an upper esophageal pouch. Nor have we encountered patients with gastroesophageal reflux who required cricopharyngeal myotomy for relief of symptoms, in contrast to the report of Henderson and Marrayatt.²¹

The data further support the importance of cricopharyngeal myotomy in the surgical treatment of symptomatic upper esophageal pouches. While diverticulectomy, alone, has proved successful in the hands of



FIG. 8. Preoperative (left) and postoperative (right) esophageal roentgenograms in patient with hypertensive UES.

TABLE 3. Effect of Cricopharyngeal Myotomy on Upper Esophageal Sphincter (UES)

Diagnosis	Number of Patients	Preoperative				Postoperative			
		Amplitude (mm Hg)		Length (cm)		Amplitude (mm Hg)		Length (cm)	
		Range	Mean	Range	Mean	Range	Mean	Range	Mean
Pharyngoesophageal diverticulum	5	20-50	37.2	2.5-4	3.5	10-20	15.2	2-2.5	2.2
Hypertensive UES	4	140-200	166.2	3-4	3.6	25-75	41.7	2-3	2.5
Bulbar palsy	2	38, 200		4	4	15, 75		2	2
Miscellaneous	2	25-50	37.5	3-3.5	3.3	15-25	20	2-2.5	2.3

experts,²² the recurrence rate without performance of a concomitant myotomy has been reported to be as high as 15-20%.²³ Presumably, the radical dissection employed in reported successful series inevitably involves at least partial disruption of the cricopharyngeal sphincter mechanism. The three failures of diverticulectomy reported in this series required subsequent cricopharyngeal myotomy for symptomatic relief. While we originally advised myotomy alone for all small pharyngoesophageal diverticula (<4 cm in diameter), the one reported failure in the present series suggests that diverticulectomy be performed not only in the presence of a large pouch but also when marked inflammatory reaction involves the pouch and surrounding tissue.

While resting pressures at the UES were found to be subnormal in patients with diverticula and only moderately elevated in patients with gastroesophageal reflux, marked elevations of UES pressure were

recorded in the four patients we have classified as having hypertensive UES. Although cricopharyngeal "spasm" has frequently been postulated as a cause of cervical esophageal dysphagia, manometric documentation is usually lacking. Watson and Sullivan²⁴ found high resting UES pressures in patients with globus sensation in the throat. Mean pressures of 175.6 mmHg in their patients were similar to those recorded by us, although no radiographic abnormalities were noticed by them, in contrast to the findings presented here. The appearance of the esophageal roentgenogram in our patients was that of a horizontal indentation on the posterior wall of the pharyngoesophageal region, presumably caused by the cricopharyngeus muscle. The term "hypopharyngeal bar" has been applied to this condition and is usually considered to be an abnormal finding, although it has been reported to be present in about 5% of studies of the normal pharyngoesophageal area.¹¹ On the basis of cases of this condition presented

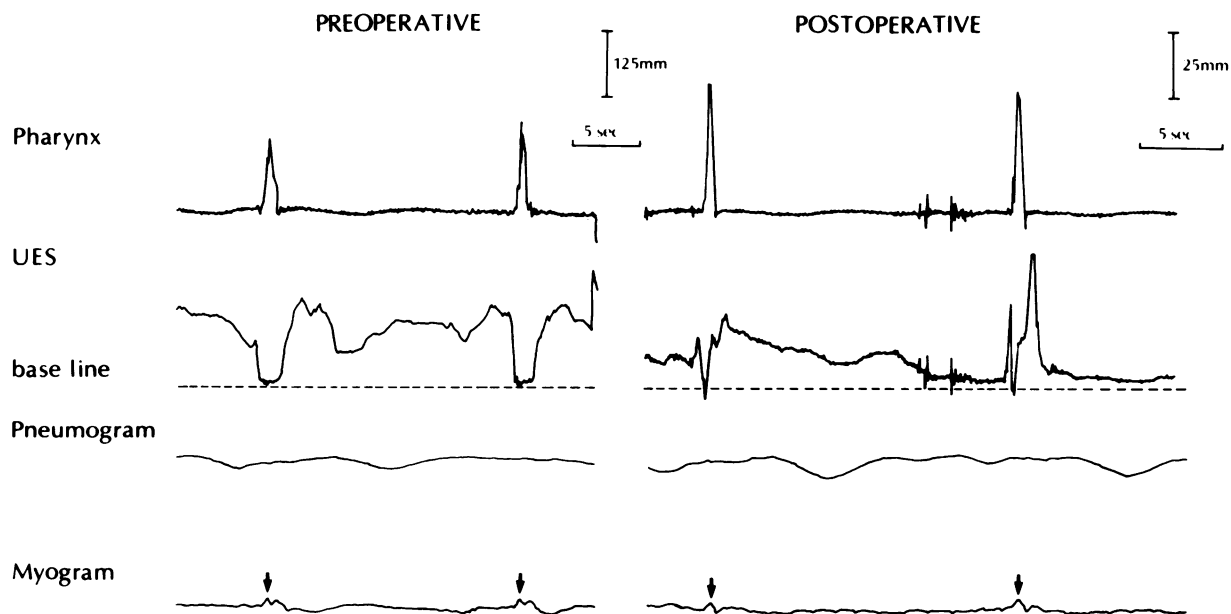


FIG. 9. Preoperative (left) and postoperative (right) esophageal motility tracings in patient with hypertensive UES. Calibration is different in the two tracings. Note marked decrease in resting UES pressure after operation. (↓ = Swallow.)

here, we suggest that it may be a more common cause of cervical esophageal dysphagia than heretofore recognized. Detailed studies of patients with globus symptoms by roentgenographic and manometric techniques would, therefore, seem justified, for the results of cricopharyngeal myotomy in patients with hypertensive UES are excellent.

The only other patient in this series who exhibited a hypertensive UES was a patient with cervical esophageal dysphagia after a cerebrovascular accident. Incoordination of the UES characterized by delayed sphincteric relaxation was also demonstrated manometrically in this patient, yet she did not benefit from cricopharyngeal myotomy, nor did the three patients with bulbar palsy secondary to amyotrophic lateral sclerosis. Smith and Norris^{25,26} have recommended myotomy for patients with amyotrophic lateral sclerosis on the basis of their experience and the good results reported in the literature. While it is true that a number of encouraging reports cite good results after myotomy for a variety of neuromuscular disorders resulting in cervical esophageal dysphagia,²⁷⁻²⁹ precise indications for its use are lacking, for most of the reports lack manometric identification of the underlying motor disorder. Even so, Mills³⁰ reported only 11 good results among 23 patients operated on. Akl and Blakeley³¹ reported only one successful result among five patients with neurologic disorders, while all nine patients with muscular disorders were benefited. Hurwitz and Duranceau³² suggest that patients with neuromuscular disorders fare better after cricopharyngeal myotomy if "voluntary tongue and pharyngeal movement is intact and if sensation in the oropharynx is present." Clearly, the proper role of surgery in the management of dysphagia secondary to neuromuscular disorders involving the pharyngoesophageal region requires clarification.

Ever since its introduction by Asherson, in 1950,³³ the term "achalasia" has been widely accepted and indiscriminately applied to patients with a wide variety of abnormalities of cricopharyngeal function. Strictly speaking, the term denotes absence of relaxation or incomplete relaxation in response to swallowing. Rarely has this type of cricopharyngeal motor disorder been demonstrated manometrically. Hurwitz and associates³⁴ have documented the occurrence of cricopharyngeal achalasia in patients with Parkinson's disease and in patients with pharyngoesophageal diverticula, and Duranceau and associates³⁵ have reported it in some patients after laryngectomy. In only one of our 20 patients could impairment of cricopharyngeal relaxation be demonstrated. Dysphagia secondary to incomplete sphincteric relaxation was relieved by cricopharyngeal myotomy in this patient. In view of the rarity of

cricopharyngeal achalasia, use of the term should be discouraged unless properly documented. Its inappropriate use could have therapeutic implications not in the best interest of the patient.

The uniformly good results, which we have obtained using a limited cricopharyngeal myotomy of 4-5 cm in length, support continued use of the procedure in properly selected patients. Our patients experienced no postoperative complications, although death from massive tracheobronchial aspiration has been reported.³² Others³⁶ have reported vocal cord paralysis and salivary fistulas. Results using the surgical technique described do not support Orringer's recommendation that patients with cervical esophageal dysphagia be treated by an extended myotomy reaching from the level of the superior cornu of the thyroid cartilage to a point several centimeters below the clavicle.

Acknowledgment

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DISCUSSION

DR. CLEMENT A. HIEBERT (Portland, Maine): I wish to make a few comments based on my own 20-year experience with this procedure, as first taught to me by Ronald Belsey.

I have the same number of patients, and lest any of you get the idea that I am operating rather too eagerly, this represents a rate of approximately one patient per year.

As Dr. Ellis indicated, the key to the correction of a pharyngeal diverticulum is treatment of the offending culprit, the cricopharyngeus muscle. I ignore the mucosal balloon, preferring to upend it, if it is large, or simply to ignore it, if it is smaller than 2 cm.

The use of local anesthesia is a second point on which I differ with Dr. Ellis's technique. For the past fifteen years I have done this operation under either a regional field block or local anesthesia; there are several evident advantages. With the cricopharyngeus muscle exposed, the patient is given gelatin dessert to swallow, and it is possible to view the physiology. Dr. Ellis said that "presumably" the radiographic indentation was caused by the cricopharyngeus muscle. Well, this otherwise ephemeral muscle can actually be viewed as a sharply indented collar when the patient swallows.

A second advantage of local anesthesia is the ability to achieve rather accurate division of the muscle. One can actually cut until the patient proclaims relief. Third, the patient can eat immediately afterward. Fourth, there is no opening made in the gullet with this technique, so that the patient may be discharged from the hospital either that night or the following day.

In summary, my experience supports that of Dr. Ellis. Nowhere in the entire gastrointestinal tract can so much be accomplished with so small a cut.

DR. DAVID B. SKINNER (Chicago, Illinois): My own experience with cricopharyngeal myotomy over the same 12-year period is similar. Among 20 such operations, 16 patients had a Zenker's diverticulum, and four had a sphincter abnormality causing dysphagia and aspiration, but without the diverticulum.

Manometric examination is difficult in these patients, as the catheter is hard to pass, especially in patients with a diverticulum. Several studies, including our own, agree with Dr. Ellis that discoordination, rather than increased pressure of the cricopharyngeus, is the usual finding with a diverticulum.

A number of years ago, we recalled six patients at random from a list of those who had undergone diverticulectomy alone in years past. Five of the six had roentgenographic evidence of the persistence or recurrence of the diverticulum, and three had symptoms. This, coupled with manometric data, persuaded me that myotomy was the essential element in treating Zenker's diverticulum. If the pouch is still present after myotomy, I routinely add an upending diverticulopexy to the prevertebral fascia, as described by Belsey. By using this approach, none of my 16 patients required diverticulectomy, and all remain asymptomatic; nine have been followed more than five years. Several patients at poor risk were operated on under local anesthesia, as described by Hiebert.

A consensus, thus, seems to be developing that myotomy, preferably with diverticulopexy rather than resection, is the treatment of choice for Zenker's diverticulum. Two important issues remain. Our data is similar to Dr. Ellis' in that some, but not most, of our patients had documented gastroesophageal reflux. When symptomatic, and documented by pH or other studies, reflux should be treated in these patients as well as performing the myotomy, to avoid postoperative aspiration. On occasion, the cricopharyngeal myotomy and antireflux repair may best be done simultaneously.

The other issue I would like to highlight is the indication for myotomy in the absence of diverticulum. I have not operated on patients with bulbar palsy, because the whole swallowing mechanism is disordered, not just the sphincter. Dr. Ellis's data validate this decision. In only four patients have we been able to document by manometry a solitary cricopharyngeal disorder that might be improved by myotomy, and 3 of the patients clearly benefited, but