
RESULTS OF REOPERATION ON THE UPPER ESOPHAGEAL SPHINCTER

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Objective: Reoperation on the upper esophageal sphincter is infrequent. We reviewed our experience in patients who underwent reoperation on the upper esophageal sphincter. **Methods:** This is a retrospective report of accumulative series from 2 separate institutions. **Results:** From September 1, 1976, to February 28, 1997, 37 patients underwent reoperation on the upper esophageal sphincter for recurrent or persistent obstructive symptoms. There were 29 men and 8 women. The median age was 69 years (range, 38-87 years). The original indication for the operation was a pharyngoesophageal (Zenker's) diverticulum in 33 patients (89.2%), oculopharyngeal dystrophy in 3 patients (8.1%), and muscular dystrophy in 1 patient (2.7%). One prior upper esophageal sphincter operation had been performed in 26 patients (70.3%), two operations in 9 patients (24.3%), and three operations in 2 patients (5.4%). All patients were symptomatic; 35 patients (94.6%) had dysphagia; 23 patients (62.2%) had regurgitation; and 12 patients (32.4%) had episodes of aspiration. Thirty of the patients (91.0%) with Zenker's diverticulum were found to have a recurrent or persistent diverticulum at reoperation. A diverticulectomy and cricopharyngeal myotomy were performed in 23 patients (62.2%); cricopharyngeal myotomy alone, in 7 patients (18.9%); diverticulopexy and cricopharyngeal myotomy, in 6 patients (16.2%); and diverticulectomy alone, in 1 patient (2.7%). There were no operative deaths. Complications developed in 10 patients (27.0%). Follow-up was complete in 34 patients (91.9%) and ranged from 2 to 149 months (median, 39 mo). Thirty-two patients (94.1%) were improved. Functional results were classified as excellent in 26 patients (76.5%), good in 2 patients (5.9%), fair in 4 patients (11.7%), and poor in 2 patients (5.9%). **Conclusions:** Reoperation for patients who have persistent or recurrent symptoms after an operation on the upper esophageal sphincter is associated with acceptable morbidity and mortality rates. Resolution of symptoms occurs in most patients. (*J Thorac Cardiovasc Surg* 1999;117:28-31)

Primary operation on the upper esophageal sphincter (UES) is associated with long-term success that varies from 70% to 93%.¹⁻³ Reports of reoperation on the UES are rare⁴ and, as a result, operative morbidity and long-term functional results are not well known. To evaluate postoperative morbidity and long-term functional results, we reviewed the collective experience of 2 centers with patients who underwent reoperation on the UES.

Patients and methods

From September 1, 1976, to February 28, 1997, 489 patients underwent an operation on the UES. Of these, 37 patients (7.6%) underwent reoperation for recurrent or persistent obstructive symptoms at the Mayo Clinic, Rochester, Minnesota, or Hotel-Dieu Hospital, Université de Montréal, Quebec, Canada. The records of these patients were analyzed for age, sex, symptoms, operative morbidity and deaths, and late functional outcome. Data were acquired from question-

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naires sent to patients and referring physicians and from visits to the outpatient clinics. Functional status was considered excellent, if the patient was asymptomatic; good, if the patient was improved postoperatively and had mild symptoms; fair, if the patient was improved but symptoms moderate; and poor, if the patient was unimproved after an operation or needed further surgical intervention because of a complication.

Clinical findings. There were 29 men (78.4%) and 8 women (21.6%). Median age at the time of reoperation was 69 years (range, 38–87 years). Twenty-six patients had 1 previous procedure on the UES, 9 patients had 2 previous procedures, and 2 patients had 3 previous procedures. The initial indication for operation was a pharyngoesophageal (Zenker's) diverticulum in 33 patients (89.2%), oculopharyngeal dystrophy in 3 patients (8.1%), and muscular dystrophy in 1 patient (2.7%). Previous operations included diverticulectomy and cricopharyngeal myotomy in 9 patients, diverticulectomy alone in 28 patients, cricopharyngeal myotomy alone in 7 patients, diverticulopexy and cricopharyngeal myotomy in 3 patients, and unknown in 3 patients.

Barium roentgenographic examination of the esophagus was performed in 37 patients (100%), esophageal manometry in 13 patients (35.1%), esophagoscopy in 8 patients (21.6%), and a radionuclide esophagogram in 5 patients (13.5%). Barium swallow demonstrated a Zenker's diverticulum in 33 patients (89.2%), nonrelaxation of the cricopharyngeus muscle in 4 patients, aspiration in 3 patients, and an esophagocutaneous fistula in 1 patient; findings were normal in 1 patient. High resting pressure of the UES was demonstrated on manometry in 6 patients, incoordination between pharyngeal contraction and UES relaxation in 2 patients, and low-amplitude pharyngeal contraction in 1 patient; findings were normal in 6 patients. At esophagoscopy, a diverticulum was visualized in 6 patients, and the examination was normal in 2 patients. Oropharyngeal stasis was present on radionuclide esophagogram in 4 patients, and a Zenker's diverticulum was seen in 1 patient.

Indications for reoperation were the presence of disabling obstructive symptoms in all patients and included dysphagia in 35 patients (94.6%), regurgitation in 23 patients (62.2%), and previous episodes of aspiration in 12 patients (32.4%). The median interval between the most recent operation and reoperation was 25 months (range, 1–217 months). The upper esophagus was approached through the left side of the neck in 30 patients, through the right side of the neck in 6 patients, and through bilateral cervical incisions in 1 patient. At reoperation, 30 patients (91.0%) with a previous Zenker's diverticulum were found to have a recurrent or persistent diverticulum. In 26 patients (70.3%), the cricopharyngeus muscle appeared intact. A diverticulectomy and cricopharyngeal myotomy were performed in 23 patients (62.2%), a cricopharyngeal myotomy alone in 7 patients (18.9%), a diverticulopexy and cricopharyngeal myotomy in 6 patients (16.2%), and a diverticulectomy alone in 1 patient (2.7%).

Results

Complications that occurred in 10 patients (27.0%) included unilateral vocal cord paralysis in 3 patients,

aspiration pneumonia in 2 patients, esophageal leak requiring reoperation in 1 patient, and wound infection, right eyelid ptosis, labial herpes, and gout in 1 patient each. One patient with aspiration pneumonia had a respiratory arrest requiring emergency orotracheal intubation, which resulted in impaction of a tooth in the floor of the mouth with secondary cellulitis and sepsis. This patient recovered but subsequently required laryngectomy for intractable aspiration. This patient remains alive and well 90 months later. There were no operative deaths. Median postoperative hospitalization was 6 days and ranged from 2 to 27 days. Follow-up was complete in 34 patients (91.9%) and ranged from 2 to 149 months (median, 39 months). Twenty-nine patients were alive at last follow-up. Five patients have died. Cause of death was pulmonary fibrosis in 1 patient, myocardial infarction in 1 patient, chronic obstructive pulmonary disease in 1 patient, and unknown in 1 patient. The remaining death occurred in a patient who underwent repair of an epiphrenic diverticulum 70 months after a successful UES operation. Overall, 32 patients (94.0%) were improved. Functional results were classified as excellent in 26 patients (76.5%), good in 2 patients (5.9%), fair in 4 patients (11.7%), and poor in 2 patients (5.9%). We could demonstrate no difference in outcome among the reoperative treatments.

Discussion

Oropharyngeal dysphagia is a symptom complex characterized by hesitation in swallowing, food or liquid sticking in the throat, nasal or oral regurgitation, and postdeglutitive cough.⁵ Neuromuscular disease at any location along the neuraxis is usually the cause. Extramucosal cricopharyngeal myotomy has been considered the mainstay of therapy in selected patients because no uniformly successful treatment currently exists. In contrast to patients with other neuromuscular diseases, patients with either Zenker's diverticulum or oculopharyngeal dystrophy respond more favorably to surgical treatment.⁵⁻⁹ If the initial operation fails, symptoms can be disabling and, at times, devastating.⁴

Most of our patients (89.2%) had a previous Zenker's diverticulum. Recurrence after primary operation depends on factors that are difficult to quantify. These factors include leak and infection after the initial repair,¹⁰ increased pressures with deglutition after an incomplete myotomy,¹¹ postoperative scarring producing a traction mechanism on the weakened esophageal mucosa,¹⁰ and strictures creating a distal obstruction to pharyngoesophageal emptying.¹²

The operative records of previous operations should be carefully reviewed before reoperation is considered.

Preoperative evaluation should include upper gastrointestinal roentgenographic barium examination to delineate the anatomy. In our series, barium swallow demonstrated a diverticulum in 30 patients (sensitivity, 100%); however, it falsely diagnosed a diverticulum in 3 patients (specificity, 90.1%). Routine esophagoscopy is not recommended because of the risk of perforation but should be done when a cervical carcinoma is suspected or when an indication exists to examine the distal esophagus. Manometry is frequently difficult to interpret. Findings in patients with Zenker's diverticulum have been reported to range from minimal changes in most patients¹³ to significant abnormality in nearly every patient.¹⁴ For this reason, manometry is more likely to be helpful in other conditions.¹⁵⁻¹⁶ Several possible findings at manometry have been proposed that lead to a favorable outcome after cricopharyngeal myotomy. Included are changes in hypopharyngeal intrabolus pressure,¹⁷ failure of the pharyngeal pump, cricopharyngeal incoordination and incomplete relaxation,¹⁸ normal voluntary deglutition, adequate tongue movement, intact laryngeal function, and phonation and absence of dysarthria.¹⁹

Patients who have had previous operation for Zenker's diverticulum should be considered for reoperation only if they have progressively disabling or life-threatening symptoms and definite evidence of a diverticulum at barium swallow. Symptomatic patients with oropharyngeal dysphagia should be considered for reoperation if an incomplete myotomy is suspected and pharyngeal stasis is significant.^{15,19}

Reoperation on the UES can be a technical challenge. Previous operations often result in obliterated tissue planes and friable esophageal mucosa. The use of an indwelling bougie is particularly helpful, both as a landmark for the esophagus and as a mandrel over which esophageal repair can be accomplished without fear of luminal compromise.²⁰ Although 6 of our patients had diverticulopexy and 1 patient did not have a myotomy, we believe that diverticulectomy and cricopharyngeal myotomy are the treatments of choice for symptomatic patients with recurrent Zenker's diverticulum. The cricopharyngeal myotomy should extend for 3 to 4 cm on the cervical esophagus. Patients with recurrent oropharyngeal dysphagia should be treated with a cricopharyngeal myotomy.

In conclusion, reoperation on the UES can be done with acceptable morbidity and low mortality rates. Resolution of symptoms will occur in most patients.

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Discussion

Dr Mark B. Orringer (*Ann Arbor, Mich*). My compliments to Dr Rocco for a well presented and clear paper that reports an unusually large experience with reoperations on the UES in 37 patients.

It is not apparent from the abstract alone that this series is a cumulative 22-year experience of 2 institutions and groups of surgeons. In the case of UES dysfunction, demographic differences such as operative technique and the relative incidence of various disorders, such as oculopharyngeal dyspha-

sia in Quebec and so forth, may not be significant. As a general policy such abstracts, which are graded blindly, should probably inform the reviewers that the patients may not necessarily be a homogeneous group, having come from multiple institutions.

All that aside, there is good information here which reaffirms the tenets of esophageal surgery that have been espoused during the past several decades. Thirty-three of the 37 patients (89%) undergoing reoperation had a Zenker's diverticulum as the original indication for the operation, and 33 patients (89%) had a recurrent Zenker's on barium swallow. The treatment included a cricopharyngeal myotomy in all but 1 patient. So what is the message?

When operating for a Zenker's diverticulum, the critical pathologic evidence is a functional obstruction caused by a malfunctioning UES; and unless that muscle is divided, thereby relieving the obstruction, a recurrent diverticulum can be anticipated. So when we are referred a patient with a recurrent diverticulum, the ground rules remain the same: there are intact UES fibers, and these must be divided to obtain a successful outcome, which was a gratifyingly good or excellent functional result in 82% of the series presented today.

The complications of these reoperations on the cervical esophagus are not insignificant, as you have pointed out: vocal cord paralysis in 3 patients, aspiration pneumonia in 2 patients, and esophageal leak requiring reoperation in 1 patient. Vocal cord paralysis, particularly in an elderly patient who has chronic aspiration, can result in impaired swallowing that only further compromises an impaired airway and can result in life-threatening pulmonary sepsis.

Do you evaluate vocal cord function preoperatively in these redo cases to be certain of the status of the cords before reoperating?

On which side of the neck do you make the incision? Some prefer the virgin side where there are relatively fewer adhesions; others prefer to go back in on the side of the original operation, usually on the left.

What are the technical steps that you take to facilitate reoperations on the cervical esophagus? Do you have a dilator in the esophagus? Do you use an illuminated fiber optic esophagoscope? Do you drain the neck wound routinely? Do you routinely obtain a contrast study before the patient's discharge or, if he or she is doing all right, simply release the patient? Finally, if in the process of mobilizing the cervical esophagus and performing the third or fourth operation on the UES, the worst case scenario occurs and you wind up with irreparable disruption of esophageal continuity, what possible strategic options have you discussed with the patient in the event that this might occur?

Dr Rocco. About the vocal cords, we have evaluated vocal

cords, in selected patients, to make sure that the phonation was intact, before reoperation.

As far as the approach, we preferably go through the left side, but in some instances a collar incision has been the surgeon's preference. We use a bougie to facilitate the myotomy, and we do not routinely drain the neck. We did a barium swallow in 70% of our patients.

Dr Orringer. What about if you are left with 2 ends of the esophagus?

Dr Deschamps. Let me try to answer. Actually, Dr Orringer, I do not think we ever discussed a disaster situation like this. My approach in such a patient would be to leave both ends open, wake up the patient the next morning, and tell the patient that we might have to do a free jejunal transposition. But I must say, we do not routinely inform the patient of such a disaster nor do we take means of preparing the bowel for a large resection before the operation.

Dr Duranceau. We have pretty much the same attitude. Reoperations are described as something that is going to be more difficult with possibly more morbidity as opposed to the initial operation. From the existing literature, it was said that it was twice the morbidity seen in the first approach. We inform the patient of that, but we never get ready for a major operation that would immediately follow an upper sphincter myotomy. The other precaution that we do in this category of patients, which was described here, is to attempt to remove the whole area of the muscularis surrounding the pharyngo-esophageal junction to remove the whole strip of muscle so that there is no resistance left between pharynx and esophagus. Those would be the technical aspects that I would add.

Dr Orringer. I agree with you completely that the first time around, a second time redo is no problem, but I think when you get into the third and fourth operations, sometimes you may wind up with this. I think it is inevitable if you do have the misfortune of getting these people with third and fourth operations that you can get into an unfortunate situation where previous myotomies just leave you with nothing, but ideally it will never happen.

Dr Nasser K. Altorki (*New York, NY*). You have had the opportunity to do all these reoperations. Were you able to determine what the problem was? Did they do a short myotomy? I have had occasion to reoperate on some of those patients, and I never found any evidence of a myotomy in any of them.

Dr Rocco. Yes, definitely. Especially in patients with Zenker diverticulum, there was an incomplete myotomy in almost all instances.

Dr Altorki. Incomplete distally or proximally?

Dr Rocco. It was incomplete more on the distal aspect of the esophagus.