Surgical Treatment of Pulsion Diverticula of the Hypopharynx: One-Stage Resection in 478 Cases*

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Diverticula may occur in any part of the esophagus. There are two general types: traction diverticula and pulsion diverticula. Traction diverticula are usually located in the middle third of the esophagus. They occur rather frequently, but usually have a large mouth and empty themselves freely so that they rarely cause symptoms or require treatment of any kind. Pulsion diverticula occur either at the lateral wall of the lower third of the thoracic portion of the esophagus or at the posterior wall of the hypopharynx near the junction of the pharynx and the esophagus. The former are called "epiphrenic" or "supradiaphragmatic" pulsion diverticula of the esophagus. The latter are actually pulsion diverticula of the hypopharynx, but are commonly known as pharyngo-esophageal diverticula. Diverticula most commonly requiring surgical treatment are those arising at the hypopharynx, and the remainder of this presentation will be concerned with these lesions and their management.

A pulsion diverticulum of the hypopharynx is a protrusion or herniation of the mucosa and submucosa of the hypopharynx through a muscular defect in the posterior wall of this structure. Diverticula of this type are remarkably constant in their location, which would indicate that the patient with such a lesion probably has a congenital defect in the muscular wall of the hypopharynx at the point of origin of the diverticulum. Although some rather complicated theories have been advanced to explain the cause and development of these diverticula, the situation actually seems quite clear. The act of swallowing results in pressure against the walls of the hypopharynx and esophagus. At the congenitally deficient or weakened place in the posterior wall, the pressure herniates the mucous and submucous layers through the defect. Gradually over a period of years this herniation develops into a true diverticulum. Once having developed, these pulsion diverticula tend to increase in size at an accelerating rate and to produce symptoms of increasing severity. Although these diverticula appear to have a congenital origin, it should be pointed out that it takes years for them to develop. The average age of patients treated surgically in our experience is approximately 55 years, and the youngest patient on whom one of us (O.T.C.) has operated for this condition was 34 years of age.

Symptoms and Diagnosis

As would be expected, the symptoms produced by pulsion diverticula of the hypopharynx are related to accumulation of food and liquids in the diverticulum and to obstruction to the passage of liquids and food

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into the esophagus. The earliest symptom is a sensation that food seems to catch in the throat when swallowing is attempted. Later regurgitation of undigested food and mucus may occur after eating. Swallowing may be accompanied by a gurgling noise, which may be a source of considerable embarrassment. There may be a sensation of fullness in the throat that can be relieved by pressure applied to the sides of the neck. Once the diverticulum develops it tends to increase in size rather rapidly as it is distended by the pressure involved in the act of swallowing and the more or less constant distention by retained food and secretion. The sac tends to extend downward between the esophagus and the prevertebral fascia into the mediastinum. As the diverticulum increases in size and descends, it tends to angulate the esophagus and obstruct the esophagus both by the angulation and by pressure of the filled sac against the posterior wall of the esophagus. Eating becomes a slow, laborious process, and loss of weight and severe malnutrition can occur. Severe coughing and choking spells may occur due to regurgitation of the contents of the diverticulum into the trachea. Aspiration pneumonia and lung abscess may be serious complications of a neglected pulsion diverticulum of the hypopharynx.

The presence of a pulsion diverticulum can be strongly suspected from the patient’s symptoms. Confirmatory evidence of the diagnosis can be obtained simply by watching the patient drink a cup of water and listening for the gurgling noise that swallowing produces in the presence of a diverticulum. The diagnosis can be firmly established by appropriate roentgenologic examination. Esophagoscopy usually is not necessary in patients with these diverticula. In fact, it should not be performed in most cases because of the danger of esophageal injury. If, because of some unusual clinical or radiologic finding, esophagoscopy should be indicated for a patient with a pulsion diverticulum, it should be performed with particular caution. It is often wise to perform esophageal dilatation before operation for pulsion diverticula of the hypopharynx to relieve any obstruction of the pharynx or esophagus that might have resulted from the diverticulum. This can be accomplished easily and safely if it is performed using a previously swallowed silk thread as a guide for the dilating bougie. A few years ago it was our practice to perform preoperative dilatation routinely. In recent years it has been used only for patients with large diverticula and with severe degrees of angulation and obstruction.

Treatment

Although pulsion diverticula of the hypopharynx were first recognized almost 200 years ago, effective treatment for this condition was slow to develop. Surgical excision was first attempted in the latter part of the nineteenth century. The early operations were associated with high mortality and morbidity rates. In the early years of the twentieth century a two-stage operation was developed and it greatly reduced the complications and hazards of operation for this lesion. As recently as 1954 some experienced surgeons preferred and strongly advocated a two-stage operation for these lesions. There is no question that the two-stage operation is a safe and effective means of dealing with them. How-
ever, this technic does require two surgical procedures, two anesthetics, and a rather long period of hospitalization and convalescence. Surgical technics have been developed that permit a one-stage operation that is at least as safe and effective as the two-stage operation and which requires a much shorter period of hospitalization and postoperative attention.

During a 14-year period, from January 1, 1944, through December 31, 1957, 478 consecutive patients with pulsion diverticula of the hypopharynx were operated on by a one-stage procedure. During this entire period no patient was seen whose lesion was treated by a two-stage operation. The average age of patients operated on was more than 55 years of age. The youngest patient operated on was 28 years of age. Many patients were in the sixth decade of life, and a few were in the seventh decade. Many patients were debilitated and malnourished as a result of their lesion, and some had serious pulmonary complications resulting from their lesion. Four of the 478 patients died in the immediate postoperative period. The surgical mortality rate was 0.8 per cent. Esophagocutaneous fistulas developed postoperatively in four patients. All fistulas closed spontaneously in from 1 to 3 months. Infection of the wound of varying degrees without formation of a fistula developed in five cases. All wounds healed with adequate drainage. There were no instances of serious mediastinal infection. Unilateral paralysis of the vocal cord was noted postoperatively in 11 patients. In eight patients the paralysis was temporary and function was normal within 3 months. In three patients paralysis of the vocal cords was permanent. The average duration of hospitalization for all patients in this series was approximately 8 days. In recent years most patients have left the hospital within 5 days. The average time required from operation to final surgical dismissal for the entire series was approximately 13 days. In recent years this period has averaged 8 days.

A complete follow-up study of all the patients treated by one-stage excision of diverticula in this series has not been attempted. However, follow-up information was available on approximately half of the series. Symptoms or roentgenologic evidence of recurrence of the diverticulum had developed in six patients. Narrowing of the esophagus at the site of resection of the diverticulum requiring postoperative dilatation occurred in three patients. Seven additional patients complained of some dysphagia, although no definite organic cause could be detected. All other patients were completely asymptomatic.

The indications for operation for pulsion diverticula of the hypopharynx are clear. Small diverticula do not produce any symptoms of consequence. A diverticulum that is large enough to produce symptoms sufficient to lead to its diagnosis is large enough to warrant operation for its removal. Since these diverticula tend to increase in size and produce symptoms of increasing severity in spite of any conservative measures that are possible, there are few, if any, contraindications to operation.

Preparation of Patient.—Proper preparation for operation is essential. If there is evidence of marked angulation or obstruction of the esophagus, preoperative dilatation should be performed, with a previously
swallowed silk thread serving as a guide for the dilating bougie. The diverticulum should be emptied of all retained secretions, food, or barium before anesthesia is induced, in order to avoid aspiration of such material into the respiratory tract at the time of operation. If the patient is poorly nourished or dehydrated, appropriate measures should be employed preoperatively to get the patient into the best possible condition. Rarely it may be advisable to perform gastrostomy for feeding purposes. If aspiration pneumonitis or lung abscess has developed as a complication of a diverticulum it should be cleared if possible before proceeding with operation.

Either local or general anesthesia can be used for operation. In our earlier experience cervical block anesthesia was used extensively and was satisfactory. However, some nervous, apprehensive patients do not tolerate surgical procedures well under local anesthesia, and in recent years general anesthesia and an intratracheal tube have been used for most patients.

Technic.—Since these pulsion diverticula of the hypopharynx arise in the midline posteriorly, they can be removed equally well from either a right or a left cervical approach. Most diverticula tend to extend slightly to the left, however, and a left cervical incision was used in about 80 per cent of this series.

We have preferred to make the incision along the anterior border of the sternomastoid muscle, extending from the hyoid bone above to a point about an inch above the clavicle. The sternomastoid muscle is retracted laterally and the incision deepened, exposing the omohyoid muscle. The carotid sheath and its contents are retracted laterally; the thyroid gland and larynx are retracted medially, and the pretracheal fascia is exposed. The diverticulum arises from the posterior wall of the hypopharynx at a point a little above the level of the omohyoid muscle. The diverticulum extends downward between the esophagus anteriorly and the prevertebral fascia posteriorly. The diverticulum is grasped with an Allis forceps and elevated into the wound. Dissection is carried down to the neck of the sac and its site of origin. Dissection of the neck of the diverticulum must be performed carefully to avoid injury to the recurrent laryngeal nerve. The dissection must be done thoroughly to avoid leaving a small pouch that might predispose to the development of a recurrent diverticulum.

A variety of technics for excision of the diverticulum and closure and repair of the hypopharynx have been used successfully by the several surgeons who performed the operations reported in this series. The technic used by one of us (O.T.C.) is as follows. After careful dissection of the neck of the sac, a curved clamp is placed over the neck of the sac in a transverse position. The clamp has a pin in its distal end to prevent the diverticulum from slipping out of the clamp. With the clamp on the neck of the diverticulum as a tractor, the mucosa of the hypopharynx is incised in stages proximal to the clamp. Interrupted silk sutures are used to close the mucosa as it is cut; the knots are placed inside the lumen of the esophagus and some of the sutures are left long so that they can be used as tractors. When the diverticulum is completely excised and the mucosa closed, the muscular and fascial layers of the
hypopharynx are closed in a transverse plane with fine continuous catgut sutures.

This technic accomplishes accurate and complete removal of the diverticulum and avoids any danger of narrowing or stricture of the esophagus at the site of repair. A small Penrose rubber drain is placed near the site of repair and the platysma and skin are closed with interrupted sutures. The results of operation by this technic have been unusually satisfactory. It is not necessary to insert a tube through the esophagus for temporary feeding purposes.

The patient is allowed to swallow small quantities of water 24 to 30 hours after operation. The intake of liquid and food is gradually increased. Most patients leave the hospital by the fifth postoperative day and by that time they are able to eat soft foods without difficulty. The Penrose drain is removed on the third postoperative day and the skin sutures on the sixth postoperative day. Patients are advised to chew their food well, to swallow only a small bolus of food at a time, and to omit rough or bulky foods for 2 weeks. The successful results of one-stage operations cannot be attributed to the use of antibiotics, since they were not used routinely in the postoperative management of this series of patients.

SUMMARY

It is apparent from this experience that pulsion diverticula of the hypopharynx occur somewhat commonly. Whenever dysphagia occurs it should be investigated promptly. Diagnosis of diverticula of the hypopharynx can be readily established by appropriate roentgenologic investigation. Surgical excision of diverticula of the hypopharynx can be performed as a one-stage operation with few complications and gratifying results.

RESUMEN

Según esta experiencia los divertículos de la hipofaringe por tracción son algo comunes. Cuando existe disfagia deben ser investigados inmediatamente. El diagnóstico de los divertículos de la hipofaringe puede hacerse fácilmente por el examen adecuado a los rayos X.

La excisión quirúrgica de los divertículos de la hipofaringe puede hacerse en un tiempo con pocas complicaciones y con satisfactorios resultados.

RESUMÉ

Il apparaît d'après l'expérience des auteurs que l'apparition de diverticules de pulsion de l'hypopharynx est assez banale. Dès qu'apparaît la dysphagie, on doit faire très rapidement les investigations nécessaires. Le diagnostic de diverticules de l'hypopharynx peut être rapidement établi par l'investigation radiologique appropriée. Leur exérèse chirurgicale peut être réalisée par une opération en un temps avec peu de complications et des résultats favorables.

ZUSAMMENFASSUNG

Es ergibt sich aus unseren Erfahrungen, dass Pulsations-divertikel des Hypopharynx ziemlich häufig vorkommen. Wann immer eine Dysphagie auftritt, muss eine sorgfältige Untersuchung vorgenommen werden. Die Diagnose eines Divertikels des Hypopharynx lässt sich bequem stellen durch eine entsprechende Röntgenuntersuchung. Die chirurgische Exzision eines Divertikels des Hypopharynx lässt sich als eine einfache Operation durchführen mit wenigen Komplikationen und erfreulichen Resultaten.