Total Pharyngo-Laryngo-Cervical-Esophagectomy with Jejunal Free Flap Reconstruction in a Developing Country: A Case Report from Vietnam

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Patient: Male, 52-year-old
Final Diagnosis: Hypopharyngeal cancer
Symptoms: Dysphagia
Medication: —
Clinical Procedure: Surgery and radiotherapy
Specialty: Oncology • Surgery

Objective: Rare disease

Background: Esophageal invasion in hypopharyngeal cancer is an uncommon lesion and has a poor prognosis. Total pharyngo-laryngo-esophagectomy is the most effective treatment option. Reconstruction of the gastrointestinal tract in the same period of surgery is required. There are many different options, such as pedicle flap, gastric pull-up, pedicled transverse colon flaps, and free flap. In cases where only cervical esophagectomy is required, jejunal free flap is the first choice to reconstruct the esophagus. However, the extensive surgical resection requires interdisciplinary collaboration among surgical specialities, which is not always available.

Case Report: A 52-year-old male patient came to us with a chief concern of dysphagia, which first appeared 3 months ago. Rigid fiberoptic and direct laryngoscopes indirectly observed the tumor at the posterior wall; it had passed the esophagus opening and infiltrated to the cervical esophagus, with the rightmost part spread into the right pyriform sinus. Histopathology studies of the tumor showed a squamous cell carcinoma. The patient underwent total pharyngo-laryngo-cervico-esophagectomy, reconstructed with a jejunal free flap, and adjuvant radiation therapy after surgery. At follow-up 1 year after surgery, the patient was significantly recovery with no signs of tumor recurrence, no difficulties of oral intake, and his speech was restored by electrolarynx.

Conclusions: We reported the case of a patient with hypopharyngeal cancer who underwent total pharyngo-laryngo-cervico-esophagectomy and esophagus reconstruction using a jejunal free flap, performed for the first time in Vietnam. As expected, with good oncological and functional results, the degree of invasiveness and sequelae of the surgery can be well tolerated.

Keywords: Esophagectomy • Hypopharynx • Reconstructive Surgical Procedures

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Background

Hypopharynx cancer accounts for about 3-5% of all cases of head and neck cancer, and commonly has a poor prognosis in advanced stages [1,2]. Patients often develop chronic tobacco and alcohol intoxication and chronic malnutrition due to tumor-induced swallowing disorders. Approximately 70-85% of hypopharynx cancer cases are stage III or IV at the time of diagnosis, with 5-year survival rates of 15-45% [1-4]. Total pharyngolaryngectomy is the standard treatment for advanced hypopharyngeal cancer with laryngeal dysfunction [5]. In recent years, induction chemotherapy and concurrent chemoradiotherapy have been applied in advanced hypopharyngeal cancer to preserve remaining laryngeal function [4]. Esophageal-invasive hypopharyngeal cancer accounts for about 9% of all hypopharyngeal cancers, with a poor prognosis and a 27.3% 5-year survival rate [6]. Invasion of the esophagus by a tumor is a surgical challenge because total pharyngo-laryngo-esophagectomy is a complex major surgery. Since 1942, Wookey has used a neck skin flap to reconstruct the pharynx area after total hypopharyngectomy, and since then there have been different techniques using pedicled musculocutaneous flaps, gastric pull-up, fasciocutaneous free flaps, and jejunal free flaps [7]. Historically, the jejunal free-flap method was first performed in reconstruction of hypopharyngeal tumor treatment in 1957 by Seidenberg [8]. Previously, in 1946, Longmire used pedicled jejunal flaps for esophagus reconstruction [9]. In the mid-1980s, jejunal free flaps were widely used in hypopharynx and esophagus reconstruction. In the late 1990s and onward, the fasciocutaneous free flap was more commonly used. Given the fact that there are outstanding advantages, the jejunal free flap is still the first-line treatment for total hypopharynx defects with or without the esophagus [7]. In Vietnam, total pharyngo-laryngo-esophagectomy is a rarely used technique performed exclusively in a few major centers, with esophageal reconstruction using only pedicled transverse colon flaps, pedicled jejunal flaps, and gastric pull-up, but not jejunal free flaps. Performing this surgery requires a combination of specialties – head and neck surgery, gastrointestinal surgery, and plastic surgery; good anesthesia and resuscitation conditions, and specialized surgical instruments, which are not always available. We would like to share our experience with surgical total pharyngo-laryngo-cervico-esophagectomy using jejunal free flap for reconstruction at K Hospital in Hanoi, Vietnam.

Case Report

A 52-year-old male patient with a 30 pack-year smoking history, who had been drinking about 200 ml of distilled alcoholic beverages per day for about 20 years, came to us with a chief concern of dysphagia, which first appeared 3 months ago, along with persistent and gradually worsening swallowing difficulties. Recently, the symptoms of choking and pain in his neck when he swallowed solid foods increased gradually. The patient had no speech disorders and no overall notable changes.

Rigid fiberoptic and direct laryngoscopy (Figure 1) with general anesthesia indirectly showed an irregular-surface tumor at the posterior wall from the lower border of the oropharynx to the hypopharyngeal, passing the esophagus opening, infiltrating the first 2 cm into the cervical esophagus, and covering one-half of the esophagus circumference, with the rightmost part spread into the right piriform sinus and the cervical esophagus.

Figure 1. Endoscopic image: posterior hypopharynx wall tumor.

Figure 2. MRI image: tumor’s invasion into the right piriform sinus (blue arrow) and the cervical esophagus.
and left lymph node level 3 were mobile and were 1 cm in diameter. 18 FDG-PET/CT did not detect any distant metastasis. The multidisciplinary team diagnosed T4aN0M0 hypopharynx cancer according to the AJCC 8th classification, for which surgery is the first-line treatment.

The operation involved 2 teams: the head and neck surgeons and the gastrointestinal surgeons. The head and neck surgeons performed total pharyngo-laryngo-cervico-esophagectomy, in which the upper edge at the upper border of the posterior oropharynx extended laterally to the right palatine tonsil and cut through the root of the tongue anteriorly. The lower edge completely expanded over the cervical esophagus, reaching the jugular notch. The pharyngeal defect was 18 cm long from the upper end of the palatine tonsil to the upper end of the thoracic esophagus. We also performed selective neck dissection of bilateral level II to level IV lymph nodes, right-lobe thyroidectomy, and central neck dissection (level VI) (Figure 3A, 3B). The gastrointestinal surgeons harvested a jejunal flap at 60 cm below the angle of Treitz through a midline incision. The 20-cm-long flap was supplied by the second branch of the mesenteric artery (Figure 4). Flap ends were marked. The pedicle was taken at the very base. Donor site jejunum ends were then connected by end-to-end anastomosis using full-thickness single-layer sutures. The free jejunal flap was transferred to the neck to form the esophagus from the posterior wall of the oropharynx and the root of the tongue to the upper border of the thoracic esophagus. Due to the mismatch between the pharyngeal and jejunal diameters, we performed a free longitudinal incision of the proximal jejunum to increase the circumference in accordance with Figure 5.
the pharyngostoma to avoid postoperative narrowing of the anastomosis (Figure 5). The pedicle was connected with the superior thyroid artery and the left facial vein using end-to-end anastomosis (Figure 6). The patient was given Lovenox 4000 UI/day for 2 weeks to prevent thrombus and had no postoperative complications. A contrast esophagram taken 2 weeks after surgery showed no oclusions or leaks (Figure 7). The patient was discharged after 2 weeks and received oral nutrition.

Postoperative histopathology showed no lymph node metastases and the resection margins were non-cancerous. The patient received three-dimensional conformal radiotherapy after the operation with a total dose of 60 Gy/6 weeks/30 fractions at the tumor bed and 50 Gy/5 weeks/25 fractions at bilateral cervical lymph nodes in level II to level IV. During the 1-year follow-up, the patient had significant recovery with no signs of tumor recurrence and no difficulties with oral intake, and his speech was restored by electrolarynx.

Discussion

Hypopharynx cancers have a poor prognosis because the majority of patients have been diagnosed in advanced stages with lymph node metastasis and distal metastasis during follow-up [3]. Biopsy is considered the criterion standard procedure for diagnosis and can be performed under local or general anesthesia during panendoscopy but is sometimes difficult to obtain because of difficult intubation in some patients with large tumors or a submucosal site. In some cases, tracheostomy must be done before the biopsy. Squamous cell carcinoma is the most common histopathology type, followed by adenocarcinoma and chondrosarcoma [10]. The treatment method of advanced-stage hypopharyngeal cancer has changed over time. Surgery and postoperative radiotherapy have been the standard treatment. In recent years, the treatment strategy for advanced-stage cancers has prioritized laryngeal conservation, with a positive result of 5-year survival time nearly equivalent to that of surgery, and the ability to live with a functional larynx [4]. The posterior hypopharyngeal wall is the rarest site for hypopharyngeal carcinomas, while the most common location is the pyriform sinus followed by the posterior cricoid-epiglottic region [11,12]. Therefore, there are only a few studies published in the literature specifically concerning carcinoma of the posterior wall of the hypopharynx (CPWH). Primary surgery and postoperative radiotherapy (RT) remain a first-line treatment for CPWH, with a higher survival rate than with radiotherapy alone (40% vs 30%) [13]. Surgical methods differ depending on the extent of the tumor and the involvement of posterior wall tumor with the bilateral pyriform sinuses and esophagus. To harvest a small lateral pyriform sinus wall minimally invasive tumor more than 2 cm away from the anterior angle and the esophagus opening, the surgical approaches include a larynx-preserving tumor removal using lateral pharyngotomy, suprahyoid horizontal pharyngotomy, or transoral procedures, either with transoral laser microsurgery (TLM) or with transoral robotic surgery (TORS) save for small defects. Otherwise, hypopharyngeal defects required reconstructive flaps such as anterolateral thigh (ALT)/radial forearm (RF) free flaps or pectoralis major/infrayroid pedicled flaps. Bora et al [12] reported 10 cases of T2-T3 posterior hypopharyngeal (9 patients had T3 lesions and 1 patient had a T2 lesion). The preferred hypopharynx approach was a lateral pharyngotomy using reconstructive RF free flap, with average follow-up period of 38.3 months. Two patients died due to regional recurrence in the retropharyngeal lymph nodes and systemic metastasis. Posterior wall tumors had spread laterally to the pyriform...
sinus but had not fixed the ipsilateral cricoarytenoid joint, had not spread across the midline, and the distance to the mouth of the esophagus was more than 2 cm in some cases, which were strictly selected for possible hemilarynx-conserving indications and required reconstruction of one-half of the cricoid cartilage and hypopharynx using the Urken technique [14]. In other cases, in which the tumor has invaded further, total pharyngo-laryngectomy is required. If the tumor has invaded the cervical esophagus, a total pharyngo-laryngo-cervico-esophagectomy is required, as in our case. In addition, a defect extending from the oropharynx to the upper border of the thoracic esophagus needs flaps to reconstruct the pharynx, preferably free flaps. Compared to fasciocutaneous flaps, use of jejunal flaps is the method of first choice due to advantages in length, tubular shape, digestive tract mucosa, natural peristalsis, and diameter equal to that of the esophagus. Furthermore, in the same stage, jejunal flap patients have a higher survival rate than patients with reconstructive musculocutaneous flaps (pectoralis major/latisissimus dorsi musculocutaneous flap) or fasciocutaneous free flap (ALT, RFFF). Chan et al [15] reported on 95 patients with hypopharyngeal cancer who underwent total pharyngolaryngectomy; the 5-year survival rates for the fasciocutaneous flap group and jejunum flap group were: stage II (61% vs 69%, \(P=0.9\)), stage III (36% vs 46%, \(P=0.2\)), and stage IV (32% vs 14%, \(P=0.04\)). The reason for the difference in stage IV patients was the intestine’s high sensitivity to radiation, so the jejunum flap group could only receive a reduced postoperative radiation dose. Thus, jejunal free flaps are the first-line treatment for stage III patients. In stage IV cases, the fasciocutaneous free flap is favored to avoid radiation dose reduction. However, when we reviewed these results carefully, among recurrent cases of stage IV using jejunal flap in the study, failure was due to lymph node recurrence and distant metastasis with no local recurrence. In our patient, the classification was NO, so the selection of a jejunum flap was reasonable because we could extensively remove the tumor vertically and the postoperative radiation does not need the maximum dose. Regarding postoperative local complications and patient function, most of the studies suggested that jejunal free flaps are not prone to leak, provide better swallowing ability, and patients have shorter recovery time and/or length of hospital stay. Pegan et al [16] reported 31 hypopharyngeal cancer cases that needed total pharyngolaryngectomy; regarding oncological and functional results as well as complications, the jejunum flap was the first choice, followed by gastric pull-up and fasciocutaneous free flaps. Nakatsura et al [17] compared the results of total pharyngolaryngectomy (TPL) for 109 hypopharynx cancer cases between 70 cases using jejunal flap and 39 cases using radial forearm free flap (RFFF). The rate of postoperative fistulas in the jejunal flap group was 4% versus 40% in the RFFF group. Stenosis esophageal was 9% (jejuna free flaps) versus 39% (RFFF). Sharp et al [18] evaluated the long-term function of TPL patients with jejunal free flap reconstruction and found it to be an excellent method to preserve a patient’s ability to swallow and speak, thereby improving the patient’s quality of life.

Conclusions

With outstanding advantages, the jejunal free flap is the first choice to reconstruct the hypopharynx after total pharyngolaryngectomy. We reported the case of a patient with hypopharyngeal cancer who underwent total pharyngo-laryngo-cervico-esophagectomy and esophagus reconstruction using a jejunal free flap, performed for the first time in Vietnam. As expected, with good oncological and functional results, the degree of invasiveness and sequelae of the surgery were easily tolerated. We found the following factors contributed to the success of the surgery: close cooperation between head and neck surgery, gastrointestinal surgery, and plastic surgery; flap ends were marked; taking the proximal pedicle at the site of origin from the superior mesenteric artery and vascular anastomosis with vessels of similar size (superior thyroid artery) to increase the diameter of the tip of the flap; and postoperative anticoagulation.

Department and Institution Where Work Was Done

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Declaration of Figures’ Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

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