

MICROSURGERY AND FLAP

Pectoralis Major Musculocutaneous Flap and Split-thickness Skin Graft for The Reconstruction of Pharyngocutaneous Fistula After Total Laryngeal Resection

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Background: Pharyngocutaneous fistula (PCF) is the most frequent complication in the early postoperative period after total laryngectomy. Most PCF respond well to conservative management, but when it fails and the fistula persists surgical closure is indicated.

Patients and Methods: Sixty-five year-old male was consulted to our division following total laryngectomy by the Ear Nose Throat surgeons, with wound dehiscence and pharyngocutaneous fistula. We performed a pectoralis major musculocutaneous flap (PMMCF) to close the fistula after a failed conservative management. The skin island of PMMCF was used as an inner lining to close the laryngeal fistula, the exteriorized muscle part of the flap was then covered by skin graft.

Results: PMMCF is a technically simple and reliable distant musculocutaneous pedicled flap to cover defect on the neck area. The skin island of the flap provided an adequate air-tight cover and successfully closed the laryngeal fistula.

Summary: PCF is a problematic complication resulting from the resection of head and neck tumor. Early diagnosis and proper multidisciplinary management is required to prevent further morbidity. PMMCF is a simple, easy to perform and reliable option for closure of PCF.

Keyword: *Pharyngocutaneous fistula, pectoralis major musculocutaneous flap*

Latar belakang: Fistula faringokutan (PCF) adalah komplikasi awal yang sering dihadapi setelah prosedur laringektomi total. Pada kebanyakan kasus, masalah ini dapat ditangani dengan perawatan konservatif. Namun bila fistula persisten, dapat dilakukan intervensi bedah untuk menutup fistula.

Pasien dan Metoda: Laki-laki berusia 65 tahun dikonsultasikan ke divisi kami dengan masalah dehisensi luka di daerah leher dan fistula faringokutan pasca reseksi total larings oleh ahli Telinga-Hidung-Tenggorokan. Setelah perawatan luka konservatif tidak berhasil, dilakukan penutupan defek dengan flap muskulokutan pektoralis mayor (PMMCF). Bagian kulit dari flap ditaruh sebagai inner-lining mukosa laring untuk menutup fistula, dan bagian otot dari flap yang ditaruh di sisi luar kemudian ditutup dengan graft kulit split-thickness.

Hasil: PMMCF adalah flap berpedikel jarak jauh yang secara teknis tidak sulit dilakukan dan dapat dengan adekuat menutup defek daerah leher. Bagian kutan dari flap dapat menjadi penutup fistula laring yang kedap udara, dan fistula berhasil ditutup.

Ringkasan: PCF adalah komplikasi yang sering menimbulkan masalah pasca operasi pengangkatan tumor kepala/leher. Diagnosa awal dan penanganan multidisiplin diperlukan untuk mencegah berlarutnya masalah dan timbulnya morbiditas lain. PMMCF adalah flap yang cukup mudah dilakukan dan dapat diandalkan untuk menutup fistula faringokutan.

Kata Kunci : *Pharyngocutaneous fistula, pectoralis major musculocutaneous flap*

Pharyngocutaneous fistula (PCF) is the most frequent complication (3% - 65%) in the early postoperative period after total laryngectomy. It creates an open passage between the pharynx and the cervical skin around the surgical incision, or less frequently, with the stoma of the tracheotomy. The

pharyngeal contents, usually saliva, flows through the fistula to the cutaneous orifice.¹⁻⁴

The potential risk factors for post laryngectomy PCF are history of preoperative radiotherapy, older patient age, more advanced tumor stage, certain tumor location, previous tracheotomy, concurrent neck dissection,

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Figure 1. Male, 65 yo, with pharyngocutaneous fistula and wound dehiscence after total laryngectomy (23 days postoperation).

existence of systemic disease (i.e. diabetes mellitus, chronic pulmonary diseases, and chronic hepatopathy), type of incision (T versus vertical), suture material used in pharyngeal closure, positive surgical margins, early oral feeding, hemoglobin level lower than 12.5 g/dL hypoalbuminemia, postoperative vomiting, hematoma formation, and wound infection.⁵⁻⁸

Most PCF responds well to conservative management. Conservative treatments consist of antibiotics and anti-inflammatory drugs administration, suspension of oral feeding replaced by feeding via tube or parenteral nutrition, and local wound care. Daily local wound care should include the drainage of fluids from the fistulous tract, wound cleaning by antiseptic and antibiotic solutions, removal of all necrotic tissue followed by curettage of the fistulous borders, and pressure dressing above the neck flaps. Successful fistula healing rates is between 65% and 94%, especially with a small PCF in nonirradiated patients.^{1,2,4,9} With prior history of radiation, the rate falls down to 33%.^{5,9}

Surgical management is mandated when conservative treatment fails and the fistula persists. Persistent fistula expose patients to a continuous salivary leak with inherent risks of infection, aspiration, as well as carotid artery exposure and even rupture. Closure options include a direct primary suture, local random-patterned cervical flaps, axial fasciocutaneous

flaps (deltopectoral), rotational muscle or musculocutaneous flaps (sternocleidomastoid, pectoralis major, trapezius and latissimus dorsi), and free tissue transfers (radial forearm, jejunum and gastrointestinal free flaps). No single recommendation favors either method as superior to the others.⁹

Pectoralis major flap has been described as the good-friend of plastic surgeons as it is reliable and relatively uncomplicated to perform. It has been the workhorse flap in head and neck reconstruction since Ariyan first describe this flap 35 years ago. Although microsurgical free tissue transfer is on a higher demand in the recent decades, pectoralis major flap is still a favorable option.^{10,11}

PATIENT AND METHODS

Sixty-five year-old male was consulted from the Ear Nose and Throat (ENT) department to our division. Twenty-three days prior to the date of consult, total laryngectomy was performed. Physical examination revealed a 15 by 9 cm transverse incisional wound dehiscence on the neck region, with productive nonpurulent salivary-like secrete from a laryngeal wound tract (Figure 1).

Histopathological examination revealed free-tumor margins. Patient received chemoradiations before operation. Coexisting morbidity include early-stage renal failure not-



Figure 2. After debridement prior to closure, the defect consisted of a 10 cm x 9 cm skin loss, and a missing 3 cm x 2.5 cm laryngeal mucosa.



Figure 3. A pectoralis major musculocutaneous flap was used to reconstruct the neck defect with the following: design (left, top), pectoral branch of thoracoacromial artery as the dominant pedicle of PMMCF (right top, black arrow), part of the skin flap to be overturned to cover the mucosal component of fistula (left, bottom), and split-thickness graft placed above the muscle component PMMCF (right bottom).



requiring hemodialysis, moderate hypertension, and type 2 diabetes mellitus controlled under medications.

Initially, we managed the patient by intravenous antibiotic administration based on swab culture, nasogastric tube feeding, and daily wound care with topical honey application. Four-weeks following conservative management, fistula did not resolve and there was spontaneous bleeding from the superior thyroid artery. Colleagues from the ENT department performed exploration and ligation of the ruptured artery, fistula was closed by primary suturing. Ligation was successful, bleeding stopped, however two days postoperation the fistula recurred. We performed debridement and closure of FTC and the surrounding defect using a pectoralis major musculocutaneous flap (PMMCF) combined with split-thickness skin graft (STSG). Under general anesthesia via tracheotomy airway ventilation, patient underwent surgery with the neck maintained in a hyperextended position. After debridement, the defect consisted of a 10 cm x 9 cm skin surface loss, and a 3 cm x 2.5 cm mucosal defect on the larynx (Figure 2).

The pectoralis major flap was then dissected and elevated to include the pectoral branch of thoracoacromial artery. A 7 cm by 3 cm skin component was included with the flap to be overturned and used as an inner-lining to cover the mucosal component of the PCF (Figure 3). The rest of skin was then de-epithelialized. Two-layer sutures were used on the lateral side of the mucosa and three-layer sutures on the cranial part. After flap inset, split-thickness skin graft from the left thigh was used to cover the muscle component of the flap which lied on the outer side. The procedures consumed a total of 6-hour time.

RESULT

The PCMMF which included an overturned skin island to provide air-tight coverage for pharyngeal fistula successfully resolved the PCF and cutaneous neck defect. Long-term follow up result is unavailable because the patient expired not long after the

operative procedures, due to preexisting comorbidities and poor general status.

DISCUSSION

At time of presentation to our division, patient had undergone total laryngectomy 23 days earlier and presented with neck wound dehiscence complicated by pharyngocutaneous fistula. Caution must be taken because as a reconstructive surgeon facing such case only after a prior extensive operation, we cannot be sure of the exact structures resected, hence rendering us partially blind. Nowadays, many centers use a joint team-approach consisting of the ENT and plastic surgeons in performing total laryngectomy. We believe that this approach is more favorable for us plastic surgeons, to either perform an immediate wound closure following laryngeal resections, or especially in cases where further reconstructions are required, because we will know exactly what was performed and thus help decide the reconstructive options. In 2009, Gil and colleagues mentioned the use of PMMCF as a reconstructive adjunct to be used in high-risk patients who will undergo a total laryngectomy. The purpose was to minimize the risk for the development of a pharyngocutaneous fistula.¹²

In this case, conservative treatment with medications and local wound care were conducted for 4 weeks. The decision was made under the odds, knowing that the literature shows a fistula healing rate in a previously irradiated neck is only around 33%. Surgery should have been performed sooner to prevent complication, which in this case was the rupture of a superior thyroid artery. Surgical intervention was delayed considering patient's general condition, complicated by pneumonia.⁵

Many options are available to reconstruct PCF, depending on surgeons preference. In this case, the defect was large and inflamed due to the active mucus production from PCF. Vital organs such as esophagus and nearby arteries were also exposed. The fistula should be patched, the significant amount of surrounding tissue loss and also the external

skin coverage must be reconstructed, and it was decided that the pectoralis major muscle would sufficiently provide the tissue bulk needed to eliminate dead space as well as protect the arteries. Free tissue transfer was not opted considering the brittle surrounding tissues following total laryngectomy and chronic wound that followed, a history of spontaneous nearby arterial rupture, and prior local radiation therapy combined with chemotherapy. These circumstances render highly probable complications in finding a reliable nearby recipient vessels for anastomosis.⁽⁹⁾

The operative techniques in elevating PMMCF is relatively uncomplicated to perform by the general plastic surgeons, and donor defect can be closed primarily. Based on the single dominant thoracoacromial artery pedicle the muscle can provide coverage for the head and neck area up to the level of the inferior orbital rim. For reconstruction of the neck area, PMMCF might be the first flap of choice.⁽¹³⁾

SUMMARY

Pharyngocutaneous fistula is a problematic complication which often follows tumor resections of head and neck region. Although fistula resolves in most cases by conservative management, in large PCF with a history of neoadjuvant chemotherapy and radiation, surgery is preferred rather than conservative treatment. We found that PMMCF is a simple and technically reliable option for the head and neck reconstruction.

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