

Case Report

Combined turnover and deltopectoral flap in closure of persistent pharyngocutaneous fistula

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Abstract Pharyngocutaneous fistula (PCF) is an infrequent complication of salvage total laryngectomy with associated increased morbidity. Chemoradiation for advanced laryngeal cancer is associated with increased incidence of PCF. In this case report, we present the first successful repair of a major PCF with prior chemoradiation therapy after multiple attempts at repair of the fistula in our health-care service.

Key Words: Chemoradiation, deltopectoral flap, laryngeal cancer, pharyngocutaneous fistula, turnover flap

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INTRODUCTION

Pharyngocutaneous fistula (PCF) is an infrequent complication of total laryngectomy with devastating psychological disturbance and continuous loss of fluid, electrolyte, and nutrients.^{1,2} It can also follow cut-throat injuries in suicidal and homicidal attempts.^{3,4} It is an abnormal communication between the pharyngeal mucosa and the skin of the neck. This results in the spillage of upper aerodigestive tract secretions, fluid and food ingested from the pharynx to the neck skin surface leading to spoilage and maceration. PCF results from failure of pharyngeal healing process due to factors such as residual cancer cells, poor pharyngeal closure techniques, malnutrition, and infection.^{5,6} It occurs in 3–65% of patients with laryngeal cancer who had salvage total laryngectomy.^{7–9} The consequence of this is increased morbidity, delay in administration of adjuvant therapy, long hospital stay, and higher treatment cost.¹⁰

The primary goal of laryngeal cancer treatment is disease extirpation and organ preservation to ensure apparent normal voice and swallowing.^{11–13} This can be achieved with chemoradiation and conservation laryngeal surgery in early stage laryngeal cancers.¹⁴ Salvage laryngectomy is performed in cases with failed chemoradiation therapy and advanced laryngeal cancer.¹⁵ The impact of chemoradiation for laryngeal cancer on the surrounding tissue is profound. The initial side effect of radiation of the neck region includes dermatitis and mucositis due to death of actively dividing cells. High doses may cause endarteritis obliterans, excessive fibrosis, and decreased cellular replication. The end result is impaired angiogenesis, tissue ischemia, and poor laryngeal wound healing.¹⁶ This makes PCF a common complication of salvage laryngectomy in patients who has had initial failed treatment with radiation.^{17,18}

The management of PCF is usually a challenge, not only to the managing physician but also to the patient. In most

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cases, small size PCF (≤ 2 cm) managed conservatively will close spontaneously. However, the presence of factors such as poor tissue vascularity, hypothyroidism due to near total thyroidectomy, malnutrition, previous flaps, associated medical comorbidities, and advanced disease may impair its spontaneous closure.^[9,12,13] Persistent small and large size PCF will require surgical closure. The managing otorhinolaryngologists and reconstructive surgeons are usually faced with the challenge of technique of closure that will improve airway function and re-establish oral feeding. The principle of closure of PCF involves closure with two epithelial surfaces; one to provide airtight internal lining and the second for external cover. Few closure techniques of PCF exist in the literature; each with its merits and demerits. In this report, we present the first successful repair of major PCF according to the Horgan and Dedo classification^[14] in our health-care service with the use of a "Turnover" flap and deltopectoral flap as a single stage procedure.

CASE REPORT

A 57-year-old male construction engineer first presented to our health-care facility in 2011 with 2 months history of unremitting hoarseness. He had a history suggestive of gastroesophageal reflux disease. He had smoked ten sticks of cigarettes per day for 20 years. Examination of the larynx revealed a subglottic mass. He subsequently had rigid laryngoscopy and biopsy. The diagnosis was a T2N0M0 invasive squamous cell carcinoma (large cell nonkeratinizing variant) of the subglottic larynx. He had chemoradiation with excellent outcome. However, he was lost to follow-up.

Three years after the initial treatment, he represented with upper airway obstruction and associated weight loss. Clinical evaluation revealed local recurrence T4N0M0 squamous cell carcinoma of the larynx. He had salvage laryngectomy, pharyngeal reconstruction, and tracheostomy. The relevant surgical finding was left a transglottic tumor with extension to the right side. The immediate postoperative period was uneventful. However, a wound breakdown was observed on the 4th day postlaryngectomy associated with leakage of saliva. The size of the defect was estimated to be 5 cm. A clinical diagnosis of a PCF was made. A nasogastric (NG) tube was passed for enteral feeding, and the PCF was initially managed conservatively. Persistence of the fistula beyond 6 weeks necessitated closure with "subplatysmal island flap" and "layered pharyngoplasty." This, however, broke down. The patient was reevaluated, and the tissue around the fistula was observed to have developed fibroatrophy likely from the previous neck irradiation. Furthermore, multiple local flaps done around the fistula had worsened the poor vascularity of the surrounding tissue [Figure 1]. Infection was controlled



Figure 1: The pharyngocutaneous fistula with nasogastric tube *in situ*, inferiorly is the stoma for permanent tracheostomy, with scars from previous procedures

with antibiotics. The patient was planned for fistula closure and reconstruction of neopharynx with deltopectoral flap and a "Turnover" flap.

Operative technique

Preoperatively, the emerging points of deltopectoral flap perforators were carefully localized with Doppler ultrasound. Under general anesthesia with the patient in a supine position, medially based deltopectoral flap was designed [Figure 2]. The flap was raised to include the deep fascia from the lateral limit and carefully dissected through the subfascial space, with the medial limit just close to the emerging points of the perforators from internal mammary artery, approximately 7 mm lateral to sternum as shown in Figure 3.^[15] A "Turn over" flap [Figure 4] was raised to close the fistula directly, so as to create the air- and water-tight internal lining. The identified poorly vascularized skin around the fistula was excised, and a pathway was created for the deltopectoral flap [Figure 4]. A skin flap was mobilized from the right side of the neck to augment the closure of the secondary defect on the chest, and the deltopectoral flap was inset [Figure 5].

Postoperatively, the wound healed satisfactorily [Figure 6], and the NG tube was removed on the 12th day. However, a postural leakage of recently drank fluid was noted [Figure 7] but this resolved by day 24 [Figure 8].

Patient has gained 7 kg from discharge weight of 47 kg and is tolerating both liquid and solid food freely. He has been followed up monthly for 6 months.

DISCUSSION

The experience in the management of this patient agrees with similar reports that in addition to preoperative neck irradiation, short duration after salvage laryngectomy



Figure 2: Flap design with perforators marked

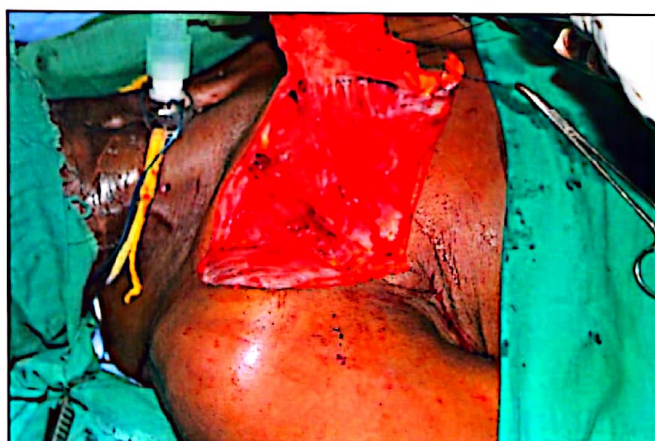


Figure 3: Flap dissection through the infra fascia space to medial limit of internal mammary perforators

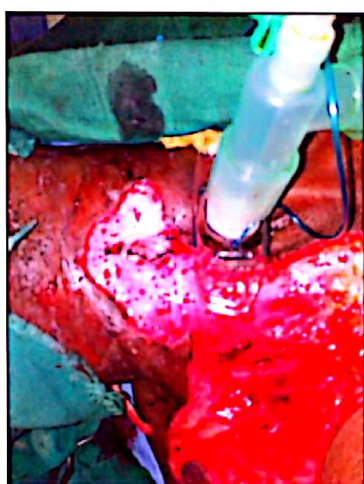


Figure 4: "Turnover" flap to provide the inner lining for closure



Figure 5: Skin closure after neck's skin advancement flap and deltopectoral flap inset



Figure 6: Postoperative picture showing satisfactory wound healing

before the commencement of oral feeding, history of gastroesophageal reflux disease, older age, preoperative tracheostomy, malnutrition, and stage of the disease may be contributing factors to the development of PCF.^[3] Radiation therapy has a significant negative effect on wound healing as a result of impaired angiogenesis and tissue ischemia. Many authors have advocated introduction of well-vascularized



Figure 7: Demonstrating the extravasation of contrast at immediate postextubation

tissue at the time of primary closure of the pharynx to reduce PCF formation.^[16] However, in many institutions, especially in resource poor countries, the standard of care still remains primary direct closure of the pharynx after salvage laryngectomy.



Figure 8: Barium swallow result on day 24 with no extravasation of contrast

CONCLUSION

We recommend this simple, easy to perform, and effective technique in closing PCF in postirradiated neck.

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Conflicts of interest

There are no conflicts of interest.

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Studies have shown that most PCF with a history of neoadjuvant chemoradiation requires surgical closure.^[17,18] The available surgical intervention ranges from direct closure to free tissue transfer.^[19] Sadigh *et al.* advocated adherence to the principle of closure in which two epithelial surfaces are required irrespective of the technique used to achieve a better treatment outcome.^[20] The inner epithelial surface will provide air-water tight closure, whereas the outer epithelial surface will continue with the skin of the neck. This was the technique that finally provided satisfied closure of the PCF in this case.

Patients who are unable to withstand extensive reconstructive surgery have been shown to benefit from alternative nonsurgical methods which entailed the use of fibrin glue, platelet-derived growth factor, autologous fat grafting, collagen patches, and vacuum-assisted closure.^[21-25]

The deltopectoral flap was used to augment the vascularity of the turnover flap, thereby improving the chances of survival of the turnover flap. A similar technique was noted in literature in which a turnover flap was used with local flap.^[20] This technique will give a less satisfactory result in our patient with a history of prior chemoradiation and failed closure with local flaps. In another report, a prelaminated deltopectoral flap with skin graft was used to close a PCF successfully.^[26] However, this involved multiple stages with possible donor site morbidity for a secondary defect created by harvest of skin graft. The use of pectoralis major flap for closure of PCF is well documented in the literature,^[27] but it is fraught with bulkiness of the flap and donor site morbidity, whereas deltopectoral flap is thin, pliable, and is suitable in color and texture for replacement of the covering of the neck.^[26]

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