



## ORIGINAL ARTICLE

## How I Do It: Compressive Neck Dressing in Immediate Post-Laryngectomy Period To Reduce Pharyngocutaneous Fistula Rate

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### Abstract

**Background:** Pharyngocutaneous fistula (PCF) is the most common complication of total laryngectomy. Our objective is to present our compressive neck dressing protocol and demonstrate its effectiveness in reducing the rate of pharyngocutaneous fistula (PCF) development in patients after primary total laryngectomy (TL) and salvage TL.

**Methods:** Retrospective review of the clinical records of patients who underwent TL and salvage TL from 1/1/2009 to 12/31/2019 and who also received compressive neck dressing every day in the postoperative period until discharge. Closure technique and postoperative protocol were reviewed.

**Results:** There were 45 patients that met the inclusion criteria. Of these 45 patients, six developed PCF (13.33%). The incidence of PCF in patients who underwent primary TL and salvage TL was 9.09% and 17.86%, respectively.

**Conclusions:** Compressive neck dressing is an easy and effective method to reduce the incidence of PCF post primary and salvage TL.

### Keywords

Laryngectomy, Pharyngocutaneous fistula, Neck dressing, Head and neck, Fistula

### Introduction

Pharyngocutaneous fistula (PCF) is the most common complication of total laryngectomy (TL). Its occurrence can increase length of stay, delay initiation of oral feeding, and cause discomfort to patients from external salivary drainage. Occasionally, management requires free flap and salivary stent to facilitate

closure. According to a meta-analysis by Paydarfar, et al. the rate of post-laryngectomy PCF ranges from 3 to 65% [1,2]. Significant risk factors for PCF include low postoperative hemoglobin, prior tracheostomy, preoperative radiotherapy, large tumor size, positive surgical margin, pharyngeal closure technique, and concurrent neck dissection [3,4]. Several studies have also found that patients who undergo primary TL have lower rates of PCF compared to patients who undergo salvage radiation or chemoradiation [3-5]. In this study, we present our postoperative neck compressive dressing protocol and our PCF rate with its use.

### Methodology

This study was approved by Albany Medical Center Institutional Board Review. From operating room schedule records, we identified patients who underwent TL from 01/01/2009 to 12/31/2019. We reviewed patients' operative, pathological, and post-operative clinical records. We excluded patients with prior history of partial laryngectomy, pharyngectomy, positive margin, or free flap reconstruction for closure. We collected the following variables from clinical notes: age at the time of surgery, race, gender, postoperative hemoglobin, prior chemotherapy or radiation, and prior tracheostomy. From operative and pathological records, we collected information on neck dissection, tumor size, margin, nodal positivity, perineural invasion, lymphovascular invasion, and tumor site. Salvage TL was defined as total laryngectomy performed on a patient with a prior history of radiation or chemoradiation.

Descriptive analysis was used to analyze continuous variables.

### Closure technique

Once the laryngeal specimen was removed, a 3-0 Vicryl Connell stitch was used to close the pharyngeal mucosa inferiorly to superiorly. The incision was then reinforced with 3.0 Vicryl in interrupted fashion. The remaining portions of the stoma were sutured to the skin with a vertical mattress and 2-0 chromic sutures. The superior skin flap was brought down and the platysma was reapproximated with 3-0 chromic sutures. Once the stoma was completed, the skin was closed with staples. Prior to closure, 7-mm fully perforated Jackson-Pratt (JP)s were placed on either side of the neopharynx.

### Postoperative protocol

Patients who did not have a percutaneous endoscopic gastrostomy (PEG) had a nasogastric tube placed intraoperatively. All patients had nothing by mouth until postoperative day (POD) 2, when trickle tube feeds were initiated. Tube feeds were slowly advanced on POD3. No bolus tube feeds were attempted. Oral trials of grape juice were performed on POD5 in nonradiated patients and POD7 in radiated patients. If there was no leak through the JP drains and incisions, the JP drains were removed and patient was sent home on the same day (POD7). Occasionally, if patients had a PEG tube, feeding trials were delayed until clinic visit one week after discharge.

### Compressive neck dressing

We create a small fluff ball of Kerlix gauze sponge, Medline II Gauze Bandage 11.4 cm x 370 cm and place it in the region below the submental area and above the laryngectomy stoma. We then wrap Medline Conforming Stretch Gauze Bandage 10.6 cm x 190.5 cm multiple times around the neck and over the head to secure the Kerlix ball. The neck dressing, which we apply immediately after surgery, stays on at all times and is

replaced every morning if soiled. The patient is sent home with the compressive neck dressing and instructed to remove it the next day. [Figure 1](#) demonstrated how the neck dressing was placed.

### Results

There were 45 patients that met the inclusion criteria. Patients were followed up to nine months after the TL. Of these 45 patients, six developed PCF (13.33%). No cases were noted to have pressure necrosis at the site of the compressive neck dressing. Among the 28 salvage TL cases, five developed PCF (17.86%). There were 17 patients who underwent radiation only prior to TL and three developed PCF (17.65%). Of the 11 patients who underwent primary chemoradiation, two developed PCF (18.18%). In the 17 patients without prior radiation, the incidence of PCF was 9.09%. The indications for TL in patients who developed PCF were squamous cell carcinoma (four patients), chondrosarcoma (one patient), and functional laryngectomy for aspiration (one patient). In the non-PCF group, the TL were performed in 36 patients for squamous cell carcinoma, one patient for chondrosarcoma, one patient for laryngeal necrosis, and one patient for aspiration. All patients in the PCF group had prior tracheostomy while 40.00% of patients in the non-PCF had prior tracheostomy. The number of days until detection of PCF was 12.83 ( $\pm$  7.80) ranging from 6 to 29 days. Of the six patients who developed PCF, four were treated conservatively and two needed flaps. Half of the PCF patients had PEG tube at the time of surgery, while the other half had nasogastric tube insertion during surgery. Only one out of six patients with PCF had oral feeding trial prior to the leak detection. Characteristics of patients with PCF and without PCF are shown in [Table 1](#).

### Discussion

PCF is a well-known complication of TL. Potential causes include anemia, prior tracheostomy, pharyngeal closure technique, tumor size, and bilateral neck



**Figure 1:** Neck dressing demo.

**Table 1:** Comparison of risk factors and pathological data between fistula and non-fistula patients.

	Fistula % (n)	Non-fistula % (n)
Number of patients	6	39
Average Age*	57.17 ( $\pm$ 5.30)	64.44 ( $\pm$ 9.88)
Gender (M:F)*	5:1	34:5
Race (White: others)*	5:1	38:1
Postop Hemoglobin*	10.48 ( $\pm$ 2.60)	11.15 (1.76)
Prior Radiation	50.00 (3)	35.90 (14)
Prior chemoradiation	33.33 (2)	23.08 (9)
Neck dissection		
Bilateral	33.33(2)	25.64(10)
Unilateral	16.67(1)	51.28(20)
None	50.00(3)	23.07(9)
Margin (mm)*	4.20( $\pm$ 3.76)	7.33( $\pm$ 7.43)
Tumor size (mm)*	28.2( $\pm$ 12.35)	29.9( $\pm$ 8.59)
Tumor stage		
T4	50.00 (3)	56.41 (22)
T3	33.33 (2)	23.08 (9)
T2	16.67 (1)	10.27 (4)
T1	00.00	05.13 (2)
Nodal positive	16.67 (1)	23.08 (9)
Perineural invasion	33.33 (2)	33.33 (13)
Lymphovascular invasion	16.67 (1)	33.33 (13)
Site		
Glottic	50.00 (3)	76.92 (30)
Supraglottic	16.67 (1)	15.38 (6)
Subglottic	33.33 (2)	07.69 (3)
Prior tracheostomy	100.00 (6)	46.34 (19)

\*: Units are noted on the left-hand side column.

dissection. In patients with salvage TL, Patel, et al. found the incidence of fistula to be 34% with primary closure and 25% in patients with interposed free flap; his group advocated the use of vascularized flap to reduce fistula incidence in salvage cases [6]. A similar recommendation was suggested by Withrow KP, et al. [7]. PCF imposes a significant burden on both patients and the healthcare system as it leads to longer lengths of stay, delayed oral feeding, and decreased quality of life. Our study aims to demonstrate the use of neck compression to reduce PCF in the postoperative period after TL.

The incidence of PCF in literature varies from 3 to 65% [1,8]. A meta-analysis performed in 2017 found the rate of PCF in salvage TL to be 28.9%, with wide variation from 5.6% - 73% [9]. The incidence of PCF in our study for primary TL and salvage TL was 9.09% and 17.86%, respectively. This is in the lower end of the current reported literature. The surgery techniques employed in this study were common in many institutions; however, the use of a compressive dressing seems to be a unique factor in our dataset. It bears consideration whether there is a mechanistic reason for the better outcomes. Evidently, multiple factors affect the

formation of fistula; for example, prior radiation causes poor wound healing and tissue breakdown. However, the dead space between the skin and platysma flap and the underlying tissue provides a holding reservoir to allow serious fluid, blood, and saliva from the pharynx to enter and accumulate. The presence of fluid in this dead space of the neck overtime will cause wound breakdown leading to PCF. This similar phenomenon is seen in cheek fistula formation from congenital ectopic salivary gland where the ectopic parotid gland produces saliva but does not have communication with Stenson's duct to drain, ultimately leading to development of cutaneous fistula [10]. The compressive neck dressing in our practice prevents PCF formation by reducing fluid accumulation in the dead space of the neck and promote coaptation of the skin flap to the underlying neopharynx. It is also useful in reducing lymphedema in dependent submental and anterior neck region. This principle of compressive dressing has been employed in treating salivary fistula in post-parotidectomy as well [11,12]. In summary, the results and overall low PCF rate in this study suggest that compressive neck dressing is an effective and easy to perform adjunct in reducing

PCF rate. A future randomized control study is needed to validate the results of this study.

## Conclusion

Compressive neck dressing is an easy and affordable method that might reduce the incidence of pharyngocutaneous fistula in both primary and salvage TL.

## Financial Disclosures

None.

## Conflicts of Interest

None.

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