



CASE SERIES

## Our experience in postoperative management of total laryngectomy – A case series

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Total laryngectomy (TL) is recommended as a treatment for advanced laryngeal cancers, while salvage total laryngectomy is performed as a secondary procedure after recurrence following laser surgery, radiation, or chemoradiation. Establishing comprehensive standards of care for patients undergoing TL in the postoperative period has proven challenging. Perioperative care continues to exhibit considerable variability, often relying on anecdotal practices. This study aims to disseminate our knowledge and expertise on a case series of patients who have undergone TL, the challenges we encountered during the postoperative period, and to identify postoperative complications' risk factors and their management in the perioperative care of total laryngectomy patients. A retrospective analysis of 10 patients who underwent TL at Rajiv Gandhi Government General Hospital, Chennai, was included in the study. Notably, four of them were cases of recurrent laryngeal carcinoma following initial failure of definitive radiation (RT), either with or without chemotherapy. In total, 4 out of 10 patients developed complications. Complications, primarily pharyngocutaneous fistula, were observed in three patients managed surgically by flap cover closure. Complications occurred among patients with risk factors for inadequate wound healing such as comorbidities like uncontrolled diabetes mellitus and radiation, which increased hospital stay, antibiotic duration, and time to initiate oral feeds among reconstructed patients. This analysis contributes insights into postoperative challenges and risk factors associated with complications in TL patients.

**Keywords:** laryngectomy, laryngeal neoplasms, postoperative complications, length of stay, fistula

### Introduction

Total laryngectomy (TL) sometimes removes the entire larynx, strap muscles, paratracheal lymphatics, and the ipsilateral thyroid lobe (1). Even if TL often provides the

best odds of recovery, the side effects include a permanent tracheostomy and loss of natural voice. TL stands as the preferred treatment for patients with locally advanced laryngeal cancer who have not improved after conservative laryngeal surgery or initial chemoradiation treatment.



Because of a change in the therapeutic strategy toward organ preservation—either by nonsurgical intervention or by less invasive methods—TL is declining (2–4).

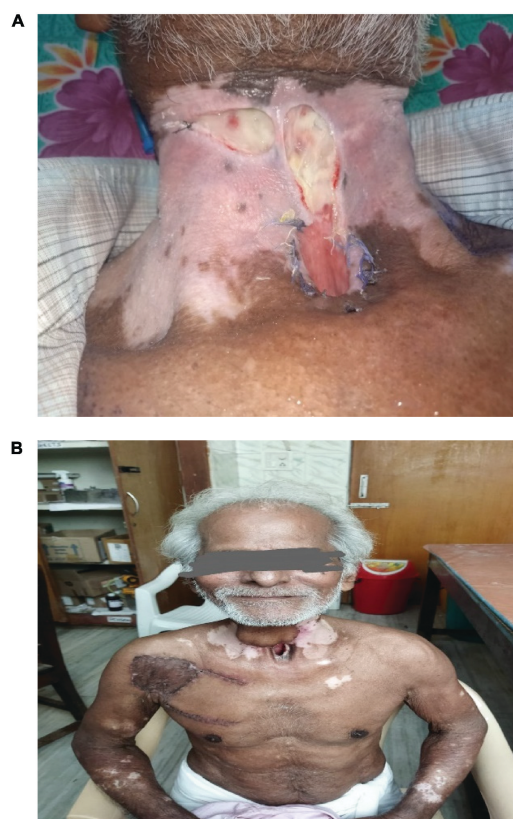
Following a TL, the patient's anatomy undergoes substantial changes, impacting essential functions such as breathing, communication, and swallowing. The postoperative care for laryngectomy patients is inherently challenging, demanding a specialized skill set from caregivers and healthcare providers. Failure to acknowledge the limitations of these patients can lead to severe and potentially devastating outcomes. After a total laryngectomy, complications are frequent and expensive; they can impact up to 34% of patients, and up to 26% of patients will require unexpected readmission (5). Post-laryngectomy complications, including pharyngocutaneous fistula (PCF), wound infection, chyle leak, and issues with swallowing and airway, exert a substantial influence on morbidity. These complications lead to extended length of stays and a consequent rise in healthcare expenses. Numerous factors contribute to the occurrence of complications, encompassing prior radiotherapy (RT), preoperative tracheostomy, radical neck dissection, as well as extensive surgical procedures and flap reconstruction. It is important to know about the postoperative complications and care to shorten hospital stays, lower expenses, and enhance patient outcomes.

The purpose of this study was to share our experiences and the challenges we encountered during the postoperative period and to provide insight into risk factors associated with complications and management in the perioperative care of TL patients.

## Materials and methods

For this retrospective analysis, we collected all of the case data for 10 patients who were brought to the ENT ward at Rajiv Gandhi Government General Hospital in Chennai and were diagnosed with laryngeal squamous cell carcinoma (SCC) recurrence following the failure of initial definitive RT with or without chemotherapy and without any signs of distant disease. Preoperative assessment included detailed clinical ENT examination, computed tomography (CT) scans, magnetic resonance imaging (MRI) of the neck, positron emission tomography (PET)-CT, and pan endoscopy with biopsy for the recurrent cases.

In total, 10 male patients were included in the study. Notably, 4 out of the 10 had recurrent laryngeal cancer following the failure of the first definitive RT with or without chemotherapy. The duration between the end of radiotherapy and salvage surgery of these four patients was 11, 13, 15, and 18 months. Following the presentation at our institution's Tumor Board panel, the surgical procedure was scheduled. In total, three surgeons used the same surgical approach for every laryngectomy operation. Every case involved the extramucosal Connell method with an inverted



**FIGURE 1 | (A)** Pre-operative image of pharyngocutaneous fistula. **(B)** Post-operative image of healed flap cover.

T-shaped suture for pharyngeal closure. Just in cases where the neck nodes were clinically or radiologically positive, radical neck dissection was scheduled. Patients were followed up for 6 months without any preventative flap covering of the pharyngoplasty.

**Table 1** shows the analysis of the management of the postoperative period of TL patients under study.

## Post-operative complications faced

### Case 1

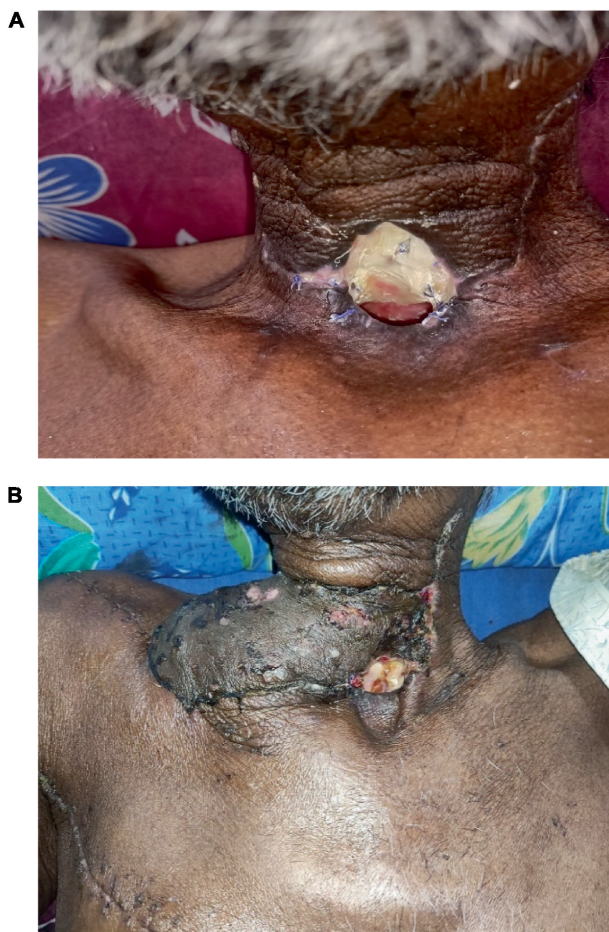
A 63-year-old male diagnosed with radio-recurrent malignant growth in the larynx (glottis)—SCC (T3N0M0)—underwent TL and total thyroidectomy. Following the procedure, the patient developed a PCF. To address this complication, a right deltopectoral flap cover was performed 1 month after the TL. **Figures 1A, B** illustrates the pre- and post-operative images of the flap cover procedure.

### Case 2

A 65-year-old male diagnosed with radio-recurrent malignant growth in the larynx (supraglottis)—SCC

**TABLE 1 |** Analysis of management of post-operative period of total laryngectomy patients.

Cases no age/sex	Diagnosis/ indication	Radiation status	Comorbidity	Procedure done	Antibiotics used	Day of RT feed started	Day of oral feed started	Flap cover (1 <sup>o</sup> /2 <sup>o</sup> )	Antibiotic duration	Length of stay	Complica- tions	Special mention
1.58/M	Ca glottis (T4aN0Mo) -SCC	Nil	Nil	Total laryngectomy	Cefepazone/ sulbactam	POD 2	POD 11	Not done	15 days	15 days	Nil	Nil
2.61/M	Ca supraglottis T4aN0Mo /SCC	Nil	Nil	TL with RND	Piptaz/ cipro/ cefotaxim	POD 2	POD 11	Not done	15 days	15 days	Nil	Nil
3.63/M	Radio-recurrent Ca glottis T3N0Mo- SCC	Post CCRT	HTN	TL & Deltopectoral flap	Taxim/ cefepazone sulbactam	POD 2	POD 11	DP flap 1 month after TL	40 days	45 days	Flap necrosis	Vitiligo vulgaris
4.65/M	Ca supraglottis T4aN1M0- SCC	Nil	T2DM post TB	TL with RND	Ceftriaxone/ piptaz/metro	POD 2	POD 11	2 <sup>o</sup> suturing 15 days after TL	25 days	27 days	Wound dehiscence	Seborric keratosis
5.70/M	Ca supraglottis T4aN1Mo- SCC	Nil	Nil	TL with RND	Piptax/cipro/ cefotaxim	POD 2	POD 11	Not done	15 days	15 days	Nil	Nil
6.65/M	Radio-recurrent Ca supraglottis T4aN1Mo SCC	Post CCRT	T2DM	TL with RND with DP flap	Piptaz/metro	POD 2	POD 11	DP flap 1 month after TL	40 days	45 days	Pharyngocu taneous fistula	Nil
7.62/M	Radio-recurrent Ca glottis T4aN1Mo SCC	Post CCRT	T2DM	TL with RND with Pectoralis major flap	Cefepazone sulbactam	POD 2	POD 11	PMMC flap 1 month after TL	40 days	45 days	Pharyngocu taneous fistula	Nil
8.80/M	Radio-recurrent Ca glottis SCC	Post CCRT	HTN	TL with RND	Ceftriaxone/ piptaz/metro	POD 2	POD 11	Nil	15 days	15 days	Nil	Nil
9.45/M	Ca glottis T4aN2Mo SCC	Nil	Nil	TL with RND	Piptaz/ metro/cipro	POD 2	POD 11	Nil	15 days	15 days	Nil	Nil
10.70/M	Ca glottis (T4aN1M0) SCC	Nil	Nil	TL with RND	Piptaz/ metro	POD 2	POD 11	Nil	15 days	15 days	Nil	Nil



**FIGURE 2 | (A)** Pre-operative image of pharyngocutaneous fistula. **(B)** Post-operative image of flap cover.

(T4aN1M0)—underwent TL with total thyroidectomy. Following the procedure, the patient developed a PCF. To address this complication, a right deltopectoral flap cover was performed 1 month after the TL. **Figures 2A, B** depicts the pre- and post-operative images of the flap cover procedure.

### Case 3

A 62-year-old male diagnosed with radio-recurrent malignant growth in the larynx (glottis)—SCC (T4aN1M0)—underwent a comprehensive surgical intervention, including TL with total thyroidectomy and right radical neck dissection. Subsequently, the patient experienced laryngectomy flap necrosis, prompting the performance of pectoralis major muscle flap cover 1 month after TL. **Figures 3A, B** displays the pre- and post-operative images of the pectoralis major flap cover procedure.

### Case 4

A 65-year-old male diagnosed with malignant growth larynx (supraglottis) (T4aN1M0)—SCC—underwent TL with total thyroidectomy with right radical neck dissection and subsequently developed wound dehiscence



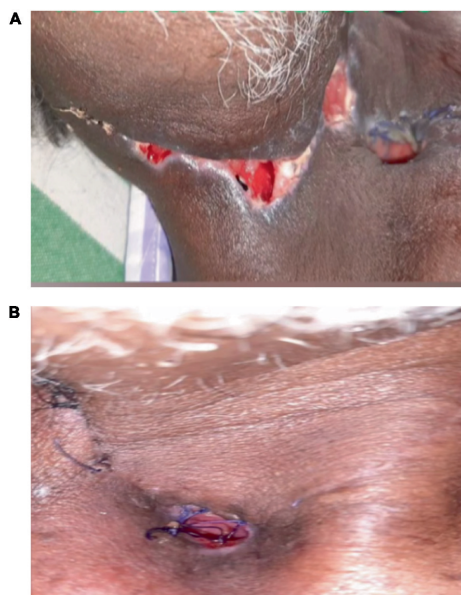
**FIGURE 3 | (A)** Pre-operative image of the pharyngocutaneous fistula. **(B)** Post-operative image of the flap cover.

for which secondary suturing was done 15 days after total laryngectomy.

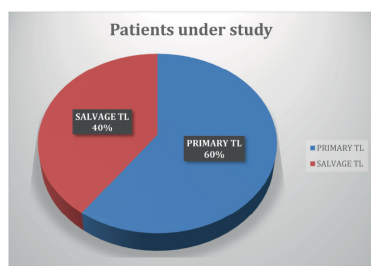
**Figure 4A** illustrates the wound dehiscence, and **Figure 4B** displays the wound after the secondary suturing procedure.

## Results

In total, 10 patients were included in the study. It included six primary TL (PTL) and four salvage TL (STL). The mean age of presentation was 63.9 years. All the patients included were male. Various factors were considered in the study to assess the outcome of the surgery postoperatively. It included patient factors such as age and comorbidity, treatment-associated factors such as radiation status, day of feed started, postoperative complications, and management. Among the 10 patients, four experienced postoperative complications, with three of them being radio-recurrent cases. All four patients with operative complications had underlying health conditions with three being known diabetic patients and one being hypertensive. Ryle's tube feed was started on the second day of the postoperative period for all the patients and oral feeds on the 11th day of the postoperative period. Higher-order antibiotics were started preoperatively for all the patients, and the duration of antibiotic administration varied depending upon the wound status. The common complications we encountered were PCF, which developed in three patients followed by wound dehiscence in one patient. Flap cover was performed for three patients out of which two were deltopectoral flap and one was



**FIGURE 4 | (A)** Pre-operative image of the wound dehiscence. **(B)** Post-operative image of the wound after secondary suturing.



**FIGURE 5 |** Primary TL vs salvage TL.

pectoralis major muscle flap. All the reconstructions were done after the complications developed. All the flap cover reconstructed patients had a longer duration of antibiotics and postoperative time but had good wound closure.

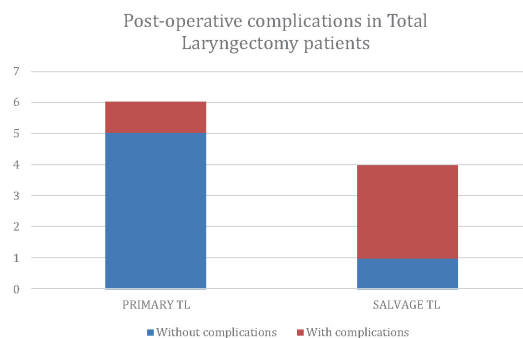
**Figure 5** represents the number of PTL and STL operated.

**Figure 6** compares the occurrence of complications in PTL and salvage TL.

## Discussion

The contemporary management of advanced laryngeal carcinoma has undergone a significant transformation, primarily driven by the intensification of nonsurgical treatments. Despite this shift, TL continues to play a crucial role, whether as a primary intervention for advanced tumors, salvage therapy, or in cases of a dysfunctional larynx resulting from prior treatments (1, 3, 6). However, there is still limited availability of outcomes data from extensive patient samples treated with TL in the current era (7–9).

Early complications after TL include bleeding/hematoma, infection, wound breakdown, and PCF formation. Corticosteroids should be given to reduce airway compromise and postoperative edema (5) in addition



**FIGURE 6 |** Post-operative complications in primary TL vs salvage TL.

to hematoma or seroma, which should be surgically removed right away, and wound infection brought on by the wound's perioperative exposure to germs, which can be reduced with broad-spectrum antibiotic use. The reported incidence of PCF is 14.3% for PTL and 27.6% for STL, according to the meta-analysis published in the international literature (10). Hasan et al. (11) stated that the total complication rate reported across the 25 studies was 67.5%.

Various factors can lead to postoperative complications like—

1. Preop hemoglobin levels,
2. Preop albumin levels,
3. Comorbidities,
4. Preop radiation,
5. Age, and
6. T-shaped closure vs vertical closure—vertical closure of the neopharynx in laryngectomy surgery showed a higher risk for developing a pseudo-diverticulum than “T”-shaped closure.

The prevalent and commonly reported complication following STL is the occurrence of a PCF. The systematic review reveals that it occurs in around a quarter of cases (28.9%) of all patients who undergo STL (11).

Preoperative radiation was linked in a meta-analysis to an increased relative risk of PCF (12). Preoperative hypoalbuminemia and comorbidities—diabetes mellitus in particular—were shown by Boscolo-Rizzo et al. to be strong predictors of PCF development (5, 13). To reduce the risk of PCF and avoid a delayed TL, optimization of comorbidities and correction of nutritional deficiencies with enteral or parenteral nutritional supplements should be attained as early as possible (5, 14). Given the high morbidity of PCF, STL stands out as one of the most common indications within head and neck surgery for regional or free tissue reconstruction (7, 15). The implementation of vascularized tissue reconstruction for the neopharynx, even in an onlay manner, has significantly diminished the occurrence of PCF and associated wound complications (14, 16, 17). Other complications, such as wound infection, dehiscence, and bleeding, are less frequently reported and

are likely underreported. Late complications encompass stomal stenosis, pharyngoesophageal stricture/stenosis, and hypothyroidism (2).

## Conclusion

Postoperative management of TL patients is highly variable. Assessing the vascularity and viability of the skin flap preoperatively will give better outcomes in these patients. In our study, about one-third of TL patients experienced problems, especially those with risk factors for poor wound healing such as comorbidities like diabetes mellitus and radiation. It would be prudent that in cases where complications are expected, prophylactic PMMC onlay flap cover can be done to augment the anastomosis. Expectedly, hospital stay, antibiotic duration, and time to initiate oral feeds were longer among reconstructed patients (11, 18). Moreover, a multidisciplinary head and neck team should oversee patients, with extra assistance from speech and swallowing therapists, dietitians, psychiatrists, dermatologists, and enough counseling regarding potential side effects of TL both before and after surgery (11, 19).

## Authors' contributions

VS: concept and design, manuscript preparation, and treating otolaryngologist. NK: revision of manuscript and treating otolaryngologist. SS: revision of manuscript and treating otolaryngologist. MV: revision of manuscript and treating otolaryngologist. TK: resident in charge. PR: resident in charge.

## Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## References

- Gourin CG, Johnson JT. A contemporary review of indications for primary surgical care of patients with squamous cell carcinoma of the head and neck. *Laryngoscope*. (2009) 119:2124–34. doi: 10.1002/lary.20619
- Agrawal N, Goldenberg D. Primary and salvage total laryngectomy. *Otolaryngol Clin North Am*. (2008) 41:771–80, vii. doi: 10.1016/j.otc.2008.02.001
- Department of Veterans Affairs Laryngeal Cancer Study Group, Wolf GT, Fisher SG, Hong WK, Hillman R, Spaulding M, et al. Induction chemotherapy plus radiation compared with surgery plus radiation in patients with advanced laryngeal cancer. *N Engl J Med*. (1991) 324:1685–90.
- Molteni G, Sacchetto A, Sacchetto L, Marchioni D. Optimal management of post-laryngectomy pharyngo-cutaneous fistula. *Open Access Surg*. (2020) 13:11–25. doi: 10.2147/OAS.S198038
- Helman SN, Brant JA, Moubayed SP, Newman JG, Cannady SB, Chai RL. Predictors of length of stay, reoperation, and readmission following total laryngectomy. *Laryngoscope*. (2017) 127:1339–44. doi: 10.1002/lary.26454
- Forastiere AA, Goepfert H, Maor M, Pajak TF, Weber R, Morrison W, et al. Concurrent chemotherapy and radiotherapy for organ preservation in advanced laryngeal cancer. *N Engl J Med*. (2003) 349:2091–8.
- Verma SP, Mahboubi H. The changing landscape of total laryngectomy surgery. *Otolaryngol Head Neck Surg*. (2014) 150:413–8.
- Terrell JE, Fisher SG, Wolf GT. Long-term quality of life after treatment of laryngeal cancer. *Arch Otolaryngol Head Neck Surg*. (1998) 124:964–71.
- Weber RS, Berkey BA, Forastiere A, Cooper J, Maor M, Goepfert H, et al. Outcome of salvage total laryngectomy following organ preservation therapy: the radiation therapy oncology group trial 91-11. *Arch Otolaryngol Head Neck Surg*. (2003) 129:44–9. doi: 10.1001/archotol.129.1.44
- Sayles M, Grant DG. Preventing pharyngo-cutaneous fistula in total laryngectomy: a systematic review and meta-analysis. *Laryngoscope*. (2014) 124:1150–63. doi: 10.1002/lary.24448
- Hasan Z, Dwivedi RC, Gunaratne DA, Virk SA, Palme CE, Riffat F. Systematic review and meta-analysis of the complications of salvage total laryngectomy. *Eur J Surg Oncol*. (2017) 43:42–51. doi: 10.1016/j.ejso.2016.05.017
- Paydarfar JA, Birkmeyer NJ. Complications in head and neck surgery: a meta-analysis of postlaryngectomy pharyngocutaneous fistula. *Arch Otolaryngol Head Neck Surg*. (2006) 132:67–72. doi: 10.1001/archotol.132.1.67
- Boscolo-Rizzo P, De Cillis G, Marchiori C, Carpena S, Da Mosto MC. Multivariate analysis of risk factors for pharyngocutaneous fistula after total laryngectomy. *Eur Arch Otorhinolaryngol*. (2008) 265:929–36. doi: 10.1007/s00405-007-0562-z
- Vasani SS, Youssef D, Lin C, Wellham A, Hodge R. Defining the low-risk salvage laryngectomy-A single-center retrospective analysis of pharyngocutaneous fistula. *Laryngoscope Investig Otolaryngol*. (2018) 3:115–20. doi: 10.1002/lio2.144
- Thompson CSG, Asimakopoulos P, Evans A, Vernham G, Hay AJ, Nixon IJ. Complications and predisposing factors from a decade of total laryngectomy. *J Laryngol Otol*. (2020) 134:256–62. doi: 10.1017/S0022215120000341
- Goepfert RP, Hutcheson KA, Lewin JS, Desai NG, Zafereo ME, Hessel AC, et al. Complications, hospital length of stay, and readmission after total laryngectomy. *Cancer*. (2017) 123:1760–7. doi: 10.1002/cncr.30483
- Brody-Camp SA, Parsel SM, Freeman ZA, McCoul ED, Hasney C, Moore BA. Decreased complications after total laryngectomy using a clinical care pathway. *Ochsner J*. (2021) 21:272–80. doi: 10.31486/toj.20.0070
- Obid R, Redlich M, Tomeh C. The treatment of laryngeal cancer. *Oral Maxillofac Surg Clin North Am*. (2019) 31:1–11. doi: 10.1016/j.coms.2018.09.001
- Rosenthal DI, Mohamed AS, Weber RS, Garden AS, Sevak PR, Kies MS, et al. Long-term outcomes after surgical or nonsurgical initial therapy for patients with T4 squamous cell carcinoma of the larynx: a 3-decade survey. *Cancer*. (2015) 121:1608–19. doi: 10.1002/cncr.29241

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