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Abstract

Introduction: Pharyngocutaneous fistula (PCF) after total laryngectomy (TL) can be a challenging complication. In the setting of previous (chemo)radiation, the rate, duration, and severity of PCF is often greater. Free and regional flaps are now routinely used to reinforce the pharyngeal suture line in patients with a history of (chemo)radiation. Debate on the advantages and disadvantages of free flap versus regional flap reconstruction remain, and there is a paucity of data comparing flap overlay of the pharyngeal suture line versus incorporating skin into the pharyngeal suture line. We examined the impact of concurrent pharyngectomy, history of chemoradiation, reconstruction choice, and closure technique on the incidence of PCF.

Methods: We performed a retrospective review of all patients undergoing TL at our institution from 2007 to 2016. We analyzed the indication for TL which included primary TL as first line treatment for oncologic control, salvage TL after (chemo)radiation failure, and functional TL for dysfunctional larynx. Subset analysis pooled salvage TL and functional TL together as post-treatment TL. We examined the impact of concomitant pharyngectomy (none, partial, total). We calculated fistula rate in these patients stratified by reconstruction type (primary closure, free flap, or pectoralis flap) and also by closure type (inlay versus onlay). Categorical comparisons were made using X-squared.

Results: 278 patients underwent TL. The mean age was 65 (range 24-92) and 78% were male. There were 137 (49.3%) primary TLs, 121 salvage TLs (43.5%), and 20 functional TLs (7.2%). The fistula rate was 12.4% in primary TLs, 29.8% in salvage TLs, and 20% in functional TLs (p=0.005). Amongst primary TLs, the fistula rate was 14% in those without pharyngectomy, 13.3% in those with partial pharyngectomy, and 7.7% in those with total laryngopharyngectomy (p=0.82). Among post-treatment TLs the fistula rate was 29.8% in those without pharyngectomy, 30.4% in those with partial pharyngectomy, and 23.8% in those with total laryngopharyngectomy (p=0.85). When looking specifically at patients undergoing post-treatment TL without pharyngectomy, the fistula rate was 36.8% with primary closure, 29.4% with free flap closure, and 5.6% with pectoralis flap closure (p=0.049). In patients undergoing TL without pharyngectomy there was no difference in PCF based on inlay versus onlay technique (26.7% vs 12.0%) (p=0.18). Patients that developed a PCF had significantly longer length of stay (13.5 vs 9.5 days, p<0.001).

Conclusions: History of chemoradiation therapy does increase the risk of PCF. The addition of pharyngectomy to laryngectomy does not increase the risk of PCF. In the post (chemo)radiation setting pectoralis muscle flap may be superior to fasciocutaneous free flaps in mitigating the risk of PCF. PCF significantly increases length of stay.

Introduction

- Pharyngocutaneous fistula (PCF) is the most common complication after total laryngectomy (TL) with a higher rate in patients with a previous history of (chemo)radiation therapy.¹⁻³
- To decrease the risk of a PCF in this population, surgeons currently reinforce the pharyngeal suture line with either a regional flap or a free flap. However, the advantages and disadvantages of free flap versus regional flap reconstruction as well as the technique of closure remain controversial.³⁻⁷
- We examined the impact of concurrent pharyngectomy, history of chemoradiation, reconstruction choice, and closure technique on the incidence of PCF.

Methods and Materials

- Retrospective review of all patients undergoing TL at TJUH from 2007 to 2016.
- Indications for TL were analyzed and consisted of: primary TL as first line treatment for oncologic control, salvage TL after (chemo)radiation therapy failure, and functional TL for dysfunctional larynx.
- The post-treatment TL group pooled together the salvage TL and functional TL populations.
- PCF rate was calculated with regards to concomitant pharyngectomy (none, partial, total), reconstruction choice (primary closure, use of free flap, use of a pectoralis flap) and also by closure technique (inlay versus onlay).

Results

Table 1. Population Characteristics.

Population Characteristics	
Age (years)	Mean: 65 Range: 24 - 92
Sex	Male: 217 (78%) Female: 61 (22%)
TL Indication	Primary TL: 137 (49.3%) Salvage TL: 121 (43.5%) Functional TL: 20 (7.2%)
Pharyngectomy	No: 187 (67.3%) Partial: 57 (20.5%) Total: 34 (12.2%)
Reconstruction Type	Primary Closure: 128 (46.1%) Free Flap: 116 (41.7%) Pectoralis Flap: 34 (12.2%)
Hospital Length of Stay (days)*	No PCF: 9.5 PCF: 13.5

* P < 0.001

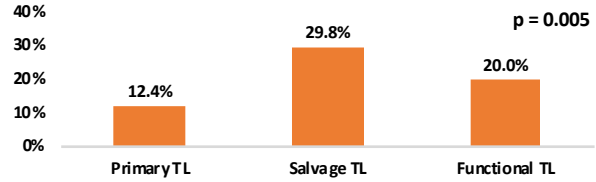


Figure 1. PCF rate with relation to TL indication.

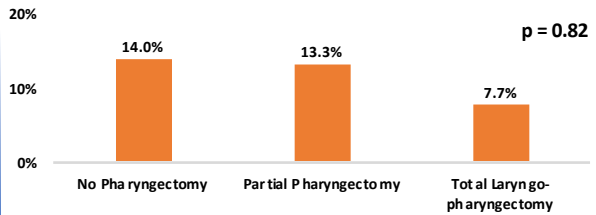


Figure 2 (A). PCF rate with relation to pharyngectomy in primary TL.

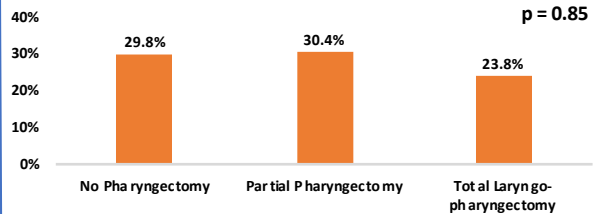


Figure 2 (B). PCF rate with relation to pharyngectomy in post-treatment TL.

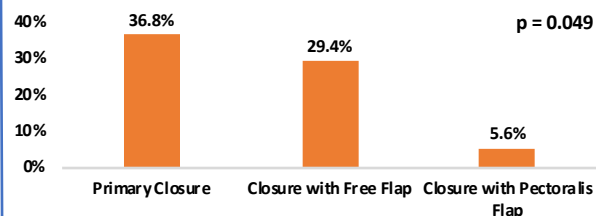


Figure 3. PCF rate in post-treatment TL with relation to type of closure.

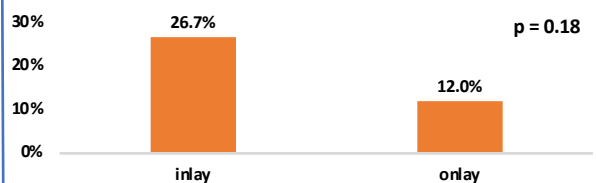


Figure 4. PCF rate in TL with no pharyngectomy with relation to inlay vs onlay technique.

Discussion and Conclusions

- PCF significantly increases duration of hospitalization.
- Patients with a history of (chemo)radiation are at increased risk for PCF.
- Concomitant pharyngectomy with TL does not increase the risk of PCF.
- In the post (chemo)radiation setting, a pectoralis major flap remains a robust flap that is very effective in reducing PCF risk and should not be overlooked in the reconstructive armamentarium of salvage TL defects.
- Future studies are needed to define the exact mechanism through which flaps decrease PCF, whether it is by partially reversing the radiation-induced local tissue hypoxia, or by simply acting as a physical barrier and mechanically strengthening the pharyngeal suture line.

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