Exploring the relationship between stomal supply usage and communication participation in tracheoesophageal speakers following total laryngectomy

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Background

- Treatment for advanced larynx cancer may necessitate surgical removal of the larynx and creation of a tracheostoma at the anterior neck for breathing. This procedure is called a total laryngectomy (TL) and leads to voice loss (aphonia) and respiratory changes[1,2].
- Tracheoesophageal speech (TES) is considered the **gold standard** of alaryngeal voice restoration and involves the creation of a tracheoesophageal puncture (TEP) and use of a voice prosthesis (Fig. 1)[2,3].
- Supply needs for TEP patients vary depending on the shape, size, and anatomy of the tracheostoma (Fig. 2-3).
- Tracheostomal supplies include **heat and moisture exchangers** (HMEs), **adhesives**, and/or **intraluminal devices** (Table 2).
- The best voice production requires a complete seal around the stoma while phonating.
- Although the benefits of TES and pulmonary rehabilitation are well-known, the relationship between the usage of specific stomal supplies and patient-perceived communication is not well-understood.

Purpose

- The purpose of this study is to explore the relationship between stomal supply usage and self-rated communication participation in patients who have undergone TEP.

Figure 1. TEP anatomy

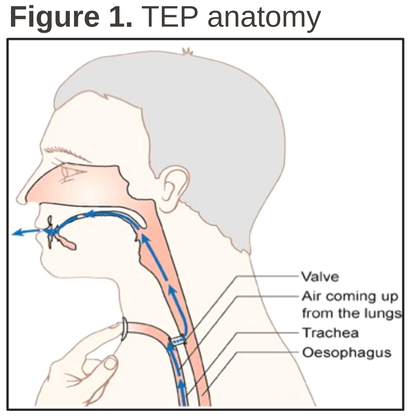


Figure 2. Ideal stoma shape

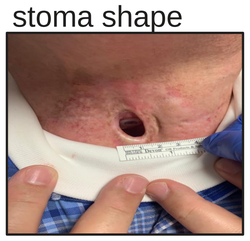


Figure 3. Irregular stoma

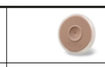
Table. 1 Cohort characteristics (n=73)

Age (mean)	66.98 (SD: 10.23)
Sex	
Male	60 (82.19%)
Female	13 (17.81%)
Race	
White	68 (93.15%)
Black	4 (5.48%)
Other	1 (1.37%)
Ethnicity	
Hispanic or Latino	8 (10.96%)
Non- Hispanic or Latino	65 (89.04%)
TL Indication	
Primary/definitive	29 (39.73%)
Salvage TL	41 (56.16%)
Elective (for dysfunction)	3 (4.11%)
Surgery Extent	
TL	47 (64.38%)
TL + Partial Pharyngectomy	15 (20.55%)
Total Laryngopharyngectomy	11 (15.07%)
Reconstruction Extent	
None	46 (63.01%)
Patch (pharynx)	15 (20.55%)
Near-circumferential	1 (1.37%)
Circumferential	11 (15.07%)
TEP Timing	
Primary	37 (50.68%)
Secondary	36 (49.32%)
Displaced orientation of TEP relative to stoma?	
No	58 (80.56%)
Yes	12 (16.67%)
Stoma Seal Function	
Complete seal	59 (81.94%)
Audible leak but functional	10 (13.89%)
Non-functional	0 (0%)
Voice Fluency	
Fluent	70 (97.22%)
Nonfluent or No voice	2 (2.78%)
Anxiety/Depression	
No	34 (46.58%)
Yes	39 (53.42%)

Methods

- This is a secondary analysis of the PATH Registry (NCT05036330) of 130 TL patients that were consented to receive a new line of HME supplies to understand adoption patterns of usage.
- Patients with a TEP at the time of consent were included in this analysis, resulting in a cohort size of 73 (Table 1).
- Patients were surveyed using the Communication Participation Inventory Brief (**CPIB**) and questionnaires regarding stomal supply usage patterns. CPIB scores were stratified by demographic, surgical, and stomal supply factors.

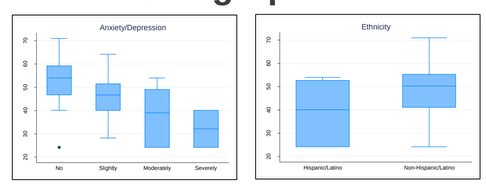
Table. 2 Stomal supplies

Heat Moisture Exchange (HME) Filter	Filter cassette attached to the stoma to heat and moisten the air you breathe	
Stoma Attachment	Tube, button, or sticker attached in or over your stoma	
Stoma adhesive	Sticker like adhesive housing attached over your stoma to hold a filter or speaking valve	
Laryngectomy tube	Soft, flexible tube that fits just inside your stoma	
Laryngectomy button	Soft, flexible button that fits just inside your stoma	

Results

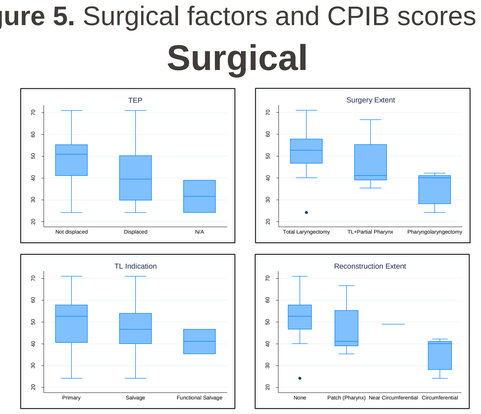
- N=73 patients (mean age: 67 years, 82% male).
- Average time since TEP was 5.18 years, with 50.68% of patients receiving primary TEP.
- The average CPIB summary score was ~16, **mildly reduced**.
- Most participants reported mild reductions in their communication participation (Fig. 7).
- Patients reported more difficulty talking with people they **did not** know.

Figure 4. Demographics of patients



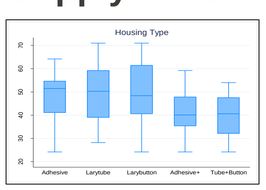
- The demographic factors associated with lower CPIB scores were being Hispanic or Latino and experiencing anxiety and/or depression (Fig. 4).
- Sex and race did not demonstrate meaningful differences in communication participation scores.

Figure 5. Surgical factors and CPIB scores



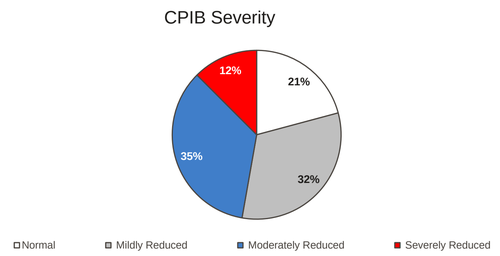
- Surgical factors associated with lower CPIB scores were undergoing any form of pharyngectomy with reconstruction, displaced orientation of TEP, and having a salvage or functional salvage procedure (Fig. 5).
- TEP timing and time since TEP had no effect on communication participation scores.

Figure 6. Supply-based factors and CPIB scores



- Patients who used multiple attachments had notably lower scores compared to those who only used one (Fig. 6).
- Varying HME type throughout the day, use of a hands-free device, and reduced stoma seal did not lead to meaningful differences in scores.

Figure 7. CPIB Severity Scores



Limitations

- Our study was conducted with patients from one institution, limiting the generalizability of these results to other institutions.
- Patients in our study had access to free supplies associated with the PATH study. Results may not represent patients who are unable to afford supplies.

Discussion/Conclusion

- Most TE speakers report abnormal communication participation.
- Most supply factors did not appear to impact communication participation. A reduction in CPIB was only seen in patients who use multiple attachment types. The reason for this reduction following the use of multiple attachment types is unclear and would benefit from further study.
- Extent of surgery, reconstruction, location of TEP, and TL indication appear to impact communication scores. These factors have been previously associated with TEP complications and voice and swallow dysfunction after TL[2, 4].
- Patients who were Hispanic or Latino or reported having anxiety or depression had lower communication participation. Communication participation is a psychosocial activity, with cultural and psychological influences (in addition to the effects of speech and voice themselves).
- Future directions for this work include analyzing data to identify any significant associations between CPIB and surgical, demographic, and stomal supply factors and expanding upon these covariates to include psychosocial factors.

References

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