

Outcomes of Tracheoesophageal puncture relative to surgical puncture, ablative and reconstructive technique

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BACKGROUND

- Tracheoesophageal puncture (TEP) with voice prosthesis is often used for voice rehabilitation in laryngectomy (TL) patients.
- Outcomes of rehabilitation are not only fluency of speech but also puncture related complications.
- These outcomes may be affected by treatment type, surgical reconstruction type, and TEP technique.

OBJECTIVE

- Elucidate factors affecting TEP-site and voice rehabilitation outcomes based on operative technique.

METHODS

- Multi-center retrospective chart review of TL patients undergoing primary or secondary TEP at institutions in Southeast Louisiana from 2013-2019.
- Demographic and tumor-specific data was collected.
- Operative records were examined in detail to record small nuisances of TEP placement technique as well as oncologic reconstruction details. Post-procedural TEP/surgical site complications, as well as speech-related variables were documented.

Table 1: Primary Outcomes Descriptive Data

Outcome	N (%)
Primary site wound complications	Superficial Dehiscence 10 (14)
	Infection 10 (14)
	Pharyngocutaneous Fistula 7 (9.5)
	Contained pharyngeal leaks 3 (4.1)
	Hematoma 3 (4.1)
TEP site complications	Chyle Leak 1 (1.4)
	Long tract 1 (1.4)
	Angulation 2 (2.7)
	Granulation 3 (4.1)
	Plugging 4 (5.4)
Speech fluency	Dislodgement 9 (12.2)
	Functional speech 56 (76)
Return to PO diet	Sound production 64 (87)
	Yes 67 (91)
	No 7 (9)

RESULTS

- 74 patients met inclusion criteria.
 - 18% pharyngectomy ; 88% bilateral neck dissection, 31% thyroidectomy, and 98% cricopharyngeal myotomy
- 78% had primary mucosal closure
- 66% of patients underwent primary TEP
 - 61% had placement of dummy prosthesis vs. 37% had red rubber catheter (RRC)
- Pharyngectomy and flap reconstruction demonstrated statistically significant association with wound complications (fistula, infection, hematoma) with an odds ratio of 4.8 and 3.8, respectively, (p=0.03, p=0.035). This significance was lost on analysis of just the primary TEP group.
- Placement of RRC had significantly higher (OR = 3.61) of PO diet acquisition (p=0.03) relative to dummy prosthesis.
- No variables significantly affected TEP complications (leaking, dislodgement, angulation), and sound production or functional speech.

Table 2: Factors associated with Speech Fluency acquisition and Return to PO diet

Variable	Speech Fluency		Return to PO		
	Sound production	Functional Speech			
Subsite	N (%)	N (%)	N (%)	OR	p-value
Subsite	Supraglottic 37 (88)	29 (69)	29 (69)	0.67	0.354
	Glottic 23 (92)	23 (92)	22 (88)	NA ^a	
	Subglottic 2 (67)	2 (67)	3 (100)	5842065	
	Unknown 2 (50)	2 (50)	3 (75)	3.55	
Prior radiation therapy	Yes 25 (83)	25 (83)	21 (70)	0.62	0.170
	No 39 (87)	26 (59)	30 (68)	1.00	
Post-operative radiation therapy	Yes 41 (85)	28 (58)	32 (67)	1.34	1.34
	No 23 (88)	23 (88)	19 (73)	1.00	
Total laryngectomy	With pharyngectomy 12 (92)	10 (77)	7 (54)	0.55	0.064
	Without pharyngectomy 52 (85)	46 (75)	49 (80)	1.00	
Bilateral neck dissection	Yes 57 (88)	49 (75)	49 (75)	0.69	0.835
	No 7 (78)	7 (78)	7 (78)	1.00	
Central neck dissection	Yes 9 (75)	9 (75)	11 (92)	4.76	0.109
	No 55 (89)	47 (76)	45 (73)	1.00	
Thyroidectomy	Yes 20 (87)	20 (87)	17 (74)	0.60	0.656
	No 44 (86)	36 (71)	39 (76)	1.00	
Pharyngeal closure technique	Primary closure 50 (86)	45 (78)	47 (81)	0.52	0.059
	Additional recon 14 (88)	11 (69)	9 (56)	1.00	
Muscular reinforcement of pharyngeal closure	Yes 1 (50)	1 (50)	2 (100)	3436252	0.279
	No 63 (88)	55 (76)	54 (75)	1.00	
Reconstructive technique	Circumferential tube 5 (100)	4 (80)	1 (20)	0.14	0.086
	Pharyngeal patch 7 (78)	6 (67)	6 (67)	1.00	
TEP Cannulation apparatus	Dummy prosthesis 38 (84)	32 (71)	30 (67)	3.61	0.028
	Red rubber catheter 24 (89)	22 (81)	24 (89)	1.00	
TEP Timing	NA ^b 2 (100)	2 (100)	2 (100)	NA ^b	NA ^b
	Primary 43 (88)	38 (78)	36 (73)	8.08	
	Secondary 21 (84)	18 (72)	20 (80)	1.00	

^a Glottic subsite was arbitrarily chosen as the reference value by which OR and p-value were calculated.

^b Two patient did not have documentation of the type of TEP cannulation present at time of TEP creation

Table 3: Factors associated with TEP site wound complications

Variable	TEP site complication		
	N (%)	OR	p-value
Subsite	Supraglottic 8 (19)	0.41	0.578
	Glottic 8 (32)	NA ^a	
	Subglottic 0(0)	NA ^b	
	Unknown 3 (75)	0.40	
Prior radiation history	Yes 11 (37)	0.83	0.952
	No 6 (14)	1.00	
Post-operative radiation therapy	Yes 6 (13)	0.94	0.555
	No 11 (42)	1.00	
Total laryngectomy	With pharyngectomy 5 (38)	2.14	0.162
	Without pharyngectomy 12 (20)	1.00	
Bilateral neck dissection	Yes 16 (25)	3.05	0.333
	No 1 (11)	1.00	
Central neck dissection	Yes 2 (17)	0.56	0.559
	No 15 (24)	1.00	
Thyroidectomy	Yes 2 (9)	0.23	0.036
	No 15 (29)	1.00	
Pharyngeal closure technique	Primary closure 12 (21)	1.36	0.386
	Additional recon 5 (31)	1.00	
Muscular reinforcement of pharyngeal closure	Yes 1 (50)	2.50	0.398
	No 16 (22)	1.00	
Reconstructive technique	Circumferential tube 1 (20)	2.00	0.590
	Pharyngeal patch 3 (33)	1.00	
TEP Cannulation apparatus	Dummy prosthesis 12 (27)	0.58	0.425
	Red rubber catheter 5 (19)	1.00	
TEP Timing	NA ^d 0 (0)	NA ^d	NA ^d
	Primary 13 (27)	0.56	
	Secondary 4 (16)	1.00	

^a Glottic subsite was arbitrarily chosen as the reference value by which OR and p-value were calculated.

^{b,c} There are zero (0) patients in the subglottic subsite with TEP complications.

^d Two patient did not have documentation of the type of TEP cannulation present at time of TEP creation

Table 4: Factors associated with primary site wound complications in primary TEP

Variable	Primary site wound complications		
	N (%)	OR	p-value
Subsite	Supraglottic 16 (57)	2.78	0.351
	Glottic 7 (39)	NA ^a	
	Subglottic 1 (33)	2.50	
	Unknown 7 (37)	1.27	
Prior radiation history	Yes 7 (37)	1.27	0.712
	No 9 (33)	1.00	
Post-operative radiation history	Yes 15 (48)	1.67	0.448
	No 8 (80)	1.00	
Total laryngectomy	With pharyngectomy 2 (40)	1.78	0.562
	Without pharyngectomy 15 (34)	1.00	
Bilateral neck dissection	Yes 16 (36)	1.68	0.644
	No 2 (40)	1.00	
Central neck dissection	Yes 5 (11)	0.26	0.168
	No 16 (40)	1.00	
Thyroidectomy	Yes 6 (43)	1.60	0.489
	No 11 (31)	1.00	
Pharyngeal closure technique	Primary closure 14 (33)	2.91	0.235
	Additional recon 3 (50)	1.00	
Muscular reinforcement of pharyngeal closure	Yes 0 (0)	0.00	0.240
	No 17 (36)	1.00	
Reconstructive technique	Circumferential tube 3 (60)	23129758	0.1895
	Pharyngeal patch 6 (67)	1.00	
TEP Cannulation apparatus	Dummy prosthesis 10 (45)	0.44	0.210
	Red rubber catheter 6 (24)	1.00	
	NA ^b 1(50)	NA ^b	NA ^b

^a Glottic subsite was arbitrarily chosen as the reference value by which OR and p-value were calculated. Therefore, there is no reportable OR.

^b Two patients did not have documentation of the type of TEP cannulation present at time of TEP creation

CONCLUSION

- Total laryngectomy with pharyngectomy, and placement of dummy TEP prosthesis were associated with higher odds of PO diet acquisition.
- Reconstruction type demonstrated no significant relationship to study outcomes. No variables were noted to have significant effect on TEP complication or speech acquisition outcomes.