

Speech Restorative Surgery In Pyriform Fossa Carcinoma

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Citation

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Abstract

Objective: To assess functional outcome with respect to speech and swallowing in patients undergoing speech restorative surgery for pyriform fossa carcinoma.

Setting: Tertiary Care Cancer Referral Centre.

Materials and Method: A total of 300 patients with pyriform sinus carcinoma underwent surgical intervention with/without adjuvant radiotherapy between 1990-2000. The present study details 123 patients(40%) with T1 - T4 pyriform fossa carcinoma who underwent speech restorative surgeries, having no significant contraindication for the same. 23 patients with supracricoid tumor and good pulmonary reserve were subjected to Extended Supraglottic Laryngopharyngectomy (Ext.SGLP); 89 patients with a tumor free interarytenoid mucosa underwent Near Total Laryngectomy (NTLP) and 11 Total Laryngectomy with partial pharyngectomy with Tracheoesophageal (TLP+TE) voice prosthesis.

Outcome measure: Successful social rehabilitation pertaining to swallow without aspiration and good speech intelligibility.

Results: All except 17% patients in Ext. SGLP were able to swallow without aspiration. speech quality was best in this group(90%), followed in order by ntlp(85%) and tlp with te prosthesis(80%). locoregional control rate at 3 years was 80% in the ext. sglp group (median follow up 23 months, range 2-70 months), 85% in ntlp (median 24 months, range 2-118 months) and 73% for the tlp+te group (median 20 months range 3-132 months).

Conclusion: These biologically aggressive malignancies are amenable to speech restoration with conservation surgery (ext. SGLP), NTLP and voice prosthesis with a locoregional control rate comparable with literature.

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INTRODUCTION

Despite advances in speech restoration amongst endolaryngeal tumors, surgical speech restoration in lesions

of the pyriform fossa is conspicuous by the paucity of published literature. Ogura J.H. was the first to lay down principles for supraglottic laryngectomy (SGL) in pyriform fossa lesions¹. According to him a modification of supraglottic laryngectomy could be performed in pyriform fossa cancer, which adhered to the following pre-requisite criteria –

1. The vocal cords and the arytenoids must be free of

gross disease and mobile.

2. There should not be involvement of the thyroid cartilage by the tumor.
3. There must be no involvement of the pyriform fossa apex 2,3.

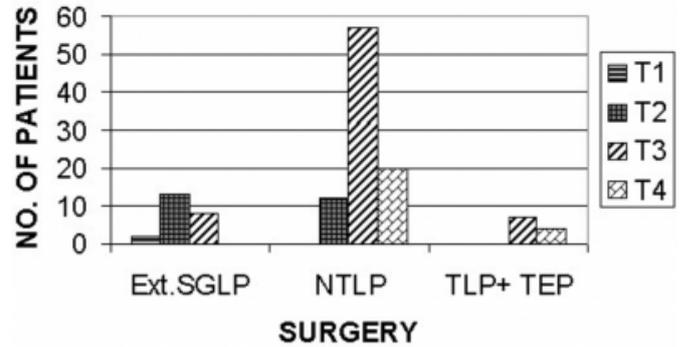
Adhering to these guidelines Ogura was able to successfully carry out Extended Supraglottic Laryngopharyngectomy (Ext.SGLP) in 48% of pyriform fossa cancers and achieved a 3- year disease free survival rate 59% ^{1,2,3}.

Pyriform fossa cancer constitute 78% of hypopharyngeal cancers which in turn constitute 13% of the upper aerodigestive tract malignancies seen annually in the department of head and neck oncology, Kidwai Memorial Institute of Oncology, Bangalore, India ⁴. Amongst these 88% belong to T₃ and T₄ stage. Owing to the large number of patients that present with advanced disease, historically, most pyriform fossa cancers were subjected to total laryngectomy and partial pharyngectomy at most centers. Owing to less than satisfactory speech rehabilitation after such ablative surgery there were a significant number of individuals (20%) who refused the procedure (The Laryngectomee Club, Kidwai Memorial Institute of Oncology - unpublished data). The importance of successful speech restoration becomes evident especially in a country like India where speech deprivation in an impoverished illiterate individual, belonging to a low socio- economic condition threatens the very livelihood of the afflicted individual.

METHODS AND MATERIALS

The present study addresses speech restoration in 123 consecutive cases of pyriform fossa cancers in the period 1991 – 2000[figure-1]. Tumor stage was assessed by direct laryngoscopy. CT/MRI scans were not routinely used for tumor delineation. Financial constraints in this part of the world also precluded routine use of these investigative modalities.

Figure 1
Figure 1: Tumor Profile



*Extended Supraglottic Laryngopharyngectomy
 **Near Total Laryngo Pharyngectomy
 *** Total Laryngopharyngectomy + Tracheo Esophageal Puncture

In the present study 19% of patients underwent ext.SGLP (T₂ - 13 , T₃ - 8). Cricopharyngeal myotomy, an oft-recommended procedure in ext.SGLP^{5,6} was not performed in any of the patients in this group in our study.

In a significant number of patients unfavorable tumor topography and/ or poor pulmonary reserve (12 patients) prevented the execution of this procedure. These lesions and those in which, there was disease extension to the apex of the pyriform fossa (transcricoid), but had a disease free zone between the two arytenoids were selected for the Pearson's near total laryngopharyngectomy (N.T.L.P.) (T₂-12, T₃- 57 ,T₄- 20). This is confirmed at surgery by an intra-operative frozen section pathological examination. Those beyond the realms of NTLP but with enough pharyngeal mucosa for primary closure were subjected to total laryngectomy with partial pharyngectomy (TLP) and primary tracheo-esophageal puncture (T.E.P.) along with pharyngeal plexus neurectomy and/ or cricopharyngeal myotomy (T₃ -7, T₄ -4). A rehabilitation expert critically monitored rehabilitation progress with respect to speech and swallowing parameters. Speech evaluation parameters included – maximum phonation duration, speech quality and speech intelligibility – assessed subjectively. Speech intelligibility was adjudged by two speech therapists and two blinded observers (head and neck surgeons) by playing back 20 phonetically balanced words. Postoperative radiotherapy with the dosage of 60 Gy in 30 conventional fractions was received by 70% of patients

RESULTS AND OBSERVATIONS:

Nearly 80% of patients had no evidence of microscopic

tumor at specimen periphery; while in the remainder tumor histology indicated a R1 resection viz. positive microscopic tumor at specimen margins. Swallowing restoration was achieved within three weeks in 30% ext.SGLP, 95% NTLP, 100% primary TEP. The rest viz. 53% ext.SGLP and 5% NTLP swallowed within 6 weeks. Seventeen percent ext.SGLP did not achieve swallowing normalcy and needed nutritional support in the form of percutaneous gastrostomy (2) and nasogastric intubation (2) [Table 1]. Delayed swallowing rehabilitation could be ascribed to mainly aspiration in ext.SGLP group and local wound problems due to pharyngeal salivary fistula in the NTLP group.

Figure 2

Table 1: Swallowing restoration

Surgery	Normal diet		Feeding aids
	<3 Wk	3-6 Wk	
Ext SGLP*	(30%)	(53%)	(17%)
NTLP**	95%	5%	Nil
TLP+ TEP***	100%		Nil

*Extended Supraglottic Laryngopharyngectomy
 **Near Total Laryngo Pharyngectomy
 *** Total Laryngopharyngectomy + Tracheo Esophageal Puncture

Table – 2 depicts the speech parameters in the 3 groups. It is evident that successful speech restoration was achieved with best quality of speech in the ext.SGLP followed by the NTLP group and the primary TEP in that order.

Figure 3

Table 2: Speech Evaluation

Surgery	Maximum Phonation Duration (MPD)	Quality of Voice	Speech Intelligibility	
			<50%	50-100%
Ext SGLP (23)*	3-17 sec	Hoarse – Hot Potato voice	2 (10%)	21 (90%)
NTLP (89)**	3-20 sec	N – 51 Strained - 27	2 (1.3%)	76 (85%)
TLP+TEP (11)***				
BS (5)	8 sec	N		3(60%)
Provox (6)	20-30 sec	N		6(100%)

Extended Supraglottic Laryngopharyngectomy*
 **Near Total Laryngo Pharyngectomy
 *** Total Laryngopharyngectomy + Tracheo Esophageal Puncture

Adequate speech for interpersonal social interaction was achieved in 95%, 80% and 72% in the extended SSGL, NTLP and primary TEP groups respectively [Table – 3] at final evaluation (3 months after surgery)

Figure 4

Table 3: Speech Outcome

Surgery	Socially adequate	Socially inadequate
Ext.SGLP*	95%	5%
NTLP**	80%	20%
TLP+ TEP***	72%	28%

*Extended Supraglottic Laryngopharyngectomy
 **Near Total Laryngo Pharyngectomy
 *** Total Laryngopharyngectomy + Tracheo Esophageal Puncture

The complications in the ext.SGLP consisted of serious tracheo- bronchial aspiration in 4 out of 23 (17%) patients and wound infection in 7 out of 23 (30%)[Table 4].

Figure 5

Table 4: Complications

Type of surgery	Serious aspiration	Wound		Fistula
		Minor	Major	
Ext.SGLP* (23)	(17%)	26%	4%	Nil
NTLP** (89)	Nil	13%	25%	30%
TLP+ TEP*** (11)	Nil	18%		Nil

*Extended Subtotal Supraglottic Laryngopharyngectomy
 **Near Total Laryngo Pharyngectomy
 *** Total Laryngopharyngectomy + Tracheo Esophageal Puncture

In comparison amongst the NTLP group, major wound infection was noted in 22 out of 89(25%), with pharyngo-cutaneous fistula in 27 out of 89(30%) cases. The primary TEP group had fastest convalescence with only 2 instances of minor wound infection without salivary leak. Locoregional control rate at 3 years was 80% in the ext. SGLP group (median follow up 23 months, range 2-70 months), 85% in NTLP (median follow up 24 months , range 2-118 months) and 73% for the TLP+TE group (median follow up 20 months, range 3-132 months).

DISCUSSION

Pyriform sinus cancers remain one of the common head and neck cancers seen at our center and often present in advanced stages at initial presentation. In the past,

traditionally most of these lesions were subjected to ablative total laryngectomy with partial pharyngectomy. These lesions have a propensity to spread circumferentially towards the retroarytenoid region as well as in a vertical direction towards the oropharynx upwards⁷. Further the biologic aggressiveness is reflected by the predilection to spread to regional lymphatics of both sides of the neck.

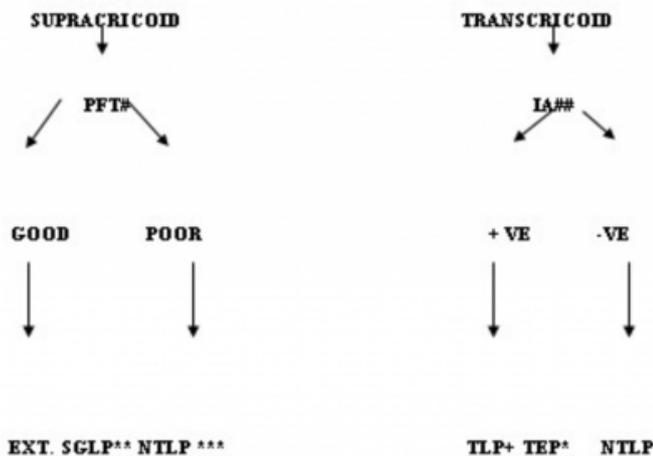
The 22% R1 resection is explainable by extensive submucosal spread depicted by these tumors, to the extent of 10mm quoted previously¹. A recent study documented that submucosal tumor extension is greatest in inferior aspect followed by lateral and then superiorly, thus advocating resection margins of 30mm, 20mm and 15mm in the respective directions⁸. Considering aggressive local behavior of the tumor as mentioned the microscopic positivity at resection margins in our study is lower as compared to 33% reported previously⁹.

Our experience does not support the use of these imaging modalities for pyriform fossa lesions, scarce use of which not jeopardizing tumor staging in majority. Mucosal disease is difficult to pick up even on MRI while differentiation between inflammation and tumor is neither characterized by CT scans nor MRI¹⁰. It has been our experience that conventional CT tends to overstage the disease and unless specific manoeuvres viz. valsalva during radiologic assay are undertaken it may not help differentiate medial wall lesions from those of lateral wall

The treatment strategy for selecting an appropriate speech restorative procedure at our institution is determined primarily by the tumor topography [Figure 2].

Figure 6

Figure 2: Treatment Algorithm



#Pulmonary Function Test

Interarytenoid region

** Extended Supraglottic Laryngopharyngectomy

***Near Total Laryngo Pharyngectomy

* Total Laryngopharyngectomy + Tracheo Esophageal Puncture

If the tumor is limited in extent (well circumscribed) and located predominantly above the cricoid (supracricoid) then the type of surgical procedure is decided by the pulmonary reserve of the individual. Only motivated and mentally resilient patients with good pulmonary function would qualify for ext.SGLP while candidates with poor lung function would be stratified for NTLP – thus individualizing the treatment to a great extent. Lesions of pyriform fossa with inferior extent to the apex (transcricoid) would undergo NTLP provided the inter and retro arytenoid regions were free of disease; should this be deemed unsafe by intraoperative frozen section examination, a total laryngectomy with partial pharyngectomy would be performed along with a TEP and / or prosthesis fitment at the same sitting. Frozen section controlled primary resection remains the gold standard for intra-operative decision-making during NTLP. This frozen section examination needs to address the disease extent at the mucosal as well as the submucosal levels; ideally this is determined from tissues from the patient's side after specimen resection. Sometimes where the pre-surgical evaluation of the tumor topography has been unsatisfactory, this approach helps to preserve all the speech restorative surgical options until the last.

Ext.SGLP, if successful is an eminently gratifying experience for both the patient and surgeon in well-selected individuals. However extreme caution should be exercised in case selection. Post-operative convalescence, especially swallowing rehabilitation is likely to be long drawn and tedious. Therefore pre-operative preparation with regard to improving pulmonary function is important. Almost all our patients who had restoration of swallowing normalcy to more than 3 weeks had undergone ext. SGLP with resection of variable extent of base of tongue and / or ipsilateral arytenoid.

Figure 7

Figure 3 : Structures resected during extended supraglottic laryngopharyngectomy

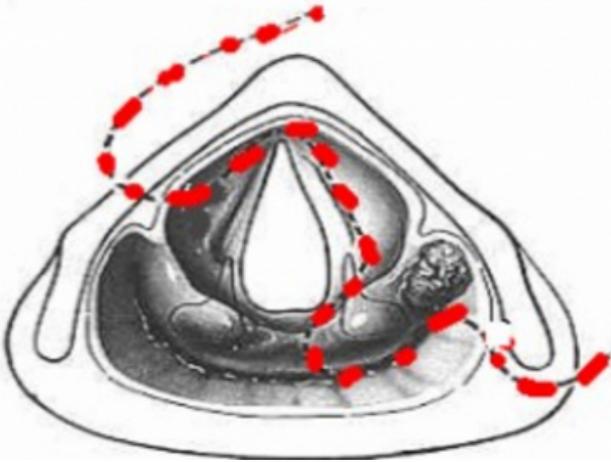
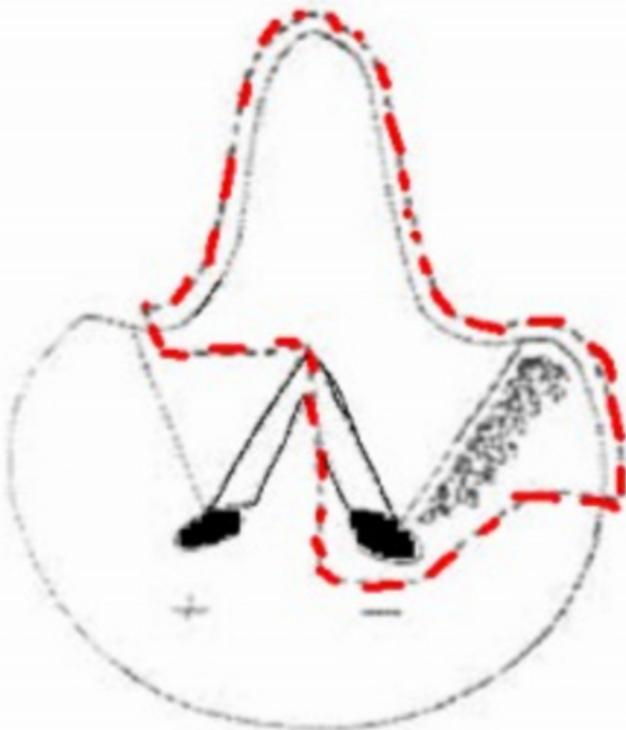


Figure 8

Figure 4 : Near total laryngopharyngectomy for pyriform fossa carcinoma



Decannulation is directly related to patients ability to cope with the variable degrees of initial aspiration associated with partial resection with attempts at restoration of swallowing normalcy .Aspiration severe enough to require feeding aids has been reported in the realms of 66 % for this group of patients⁶. In addition it has been observed that arytenoid

resection negatively impacts restoration of swallowing normalcy ^{6,11}. The 80% success of swallowing rehabilitation in this study on the contrary is very encouraging. This could be attributed to laryngoplasty, which is routinely used to reconstruct arytenoid at our center whenever it is resected. This is done by utilizing the posterior strut of ipsilateral thyroid cartilage hinged on the inferior constrictor. It is also important to fix the vocal process in a median position with 3.0 prolene to the posterior edge of the cricoid^{6,12,13}. Delayed swallowing and failures are attributable to blunting of lateral food channel due to pyriform fossa mucosa resection, a decreased sensory input leading to an uncoordinated swallow and injury to ipsilateral superior laryngeal nerve.

It has been stressed previously ¹⁴ that in any partial resection of the larynx intra-operative details need to address the following:-

1. Preservation of at least one mobile arytenoid
2. Restoration of posterior glottic bulk to prevent aspiration
3. Maintenance of anteroposterior diameter of the glottic remnant to preserve an adequate airway and phonation

For oncological safety and to avert the trouble some aspiration and prolonged hospital stay Pearson's NTLP is recommended for lesions in which inferior extent mandates resection of the cricoid. While it does away with the dreaded complication of aspiration in ext.SGLP, the procedure is associated with high incidence of wound breakdown and pharyngo-cutaneous fistula owing to inadequate pharyngeal mucosa to bury the tracheopharyngeal speech shunt With meticulous attention to surgical technique, prophylactic antibiotics and good nutritional support this rate still stands at 30% with respect to fistulas.

The TEP group , bereft of all the aforesaid problems poses a greater burden in terms of care and cost of prosthesis to the patient. This is especially relevant in a developing country , with varying levels of literacy, where “prosthesis linked physician dependence” precludes its use in many patients.

In terms of useful surgical speech restoration in pyriform sinus cancer we found scarce reference in literature. Ogura's landmark study³ points this as being 52% for pyriform sinus lesions following ext.SGLP . Experience from this study indicates ability to preserve speech in 90% patients including

those who required nutritional support and could not be decannulated owing to aspiration. This provides an impetus for its continued use in a carefully selected group.

In the NTLP group success rates varying from 70%-100% have been quoted previously^{15,16,17,18,19}. Amongst all these studies pyriform fossa lesions formed only a third of cases in one¹⁵; earlier reports from this center have recounted similar experience in 60% & 75% respectively^{17, 18}. The success rates were 82%, 75% & 81% respectively. Our success rate of 82% in this select group, with an equal number achieving a socially adequate speech provides a satisfactory rehabilitation.

CONCLUSION

All three surgical procedures provide satisfactory speech outcomes with best results being for ext.SGLP. Good rehabilitation of swallowing would make ESGLP the surgery of choice for T1-T3 supracricoid tumors. NTLP and primary TEP are speech restorative options for tumors that extend to apex of pyriform sinus and mandate resection of ipsilateral hemicricoid to ensure a satisfactory oncologic clearance. Wound problems if overcome would make NTLP the preferred surgical outcome in T3-T4 group. Practice of primary TEP as today in India is decided by economic status of the patient and/ or insurance support. There is a tendency to opt for permanent indwelling prosthesis as they have minimal prosthesis related problems and a long life in the body. TLP in our experience is to be reserved only for lesions/ patients who fail to fit into either of the above groups.

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