

Original Article

Surgical Outcome and Quality of Life After Total Laryngectomy in Advanced Laryngeal Cancer- A Study in Combined Military Hospital, Dhaka

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Abstract

Introduction: Total laryngectomy is the gold standard treatment for advanced laryngeal cancer. Sacrifice of voice is one of the most important shortcomings of the procedure. Possibility of achieving good quality voice is greater with prosthesis compared to other method. Post laryngectomy voice rehabilitation with prosthesis yield excellent outcome in most of the cases. Swallowing, pulmonary and olfactory rehabilitation should be managed by multidisciplinary team for better quality of life (QoL).

Objectives: The purpose of this study was to observe the outcomes of voice, swallowing pulmonary and olfactory rehabilitation and QoL following total laryngectomy.

Methods: This cross sectional retrospective clinical study was conducted at the Head & Neck Oncology Unit, Combined Military Hospital (CMH), Dhaka. Total 57 candidates were selected. Diagnosis was done by thorough clinical examination, Fibre Optic Laryngoscopy. Contrast Enhanced Computed Tomography (CECT) scan of neck was done except few cases where MRI of neck was done for subtle cartilage erosion was suspected. Examination under anaesthesia, direct laryngoscopy and biopsy was done for every cases. Candidates were post chemo-radiated/ radiated biopsy proven recurrent cases, clinically nonfunctional larynx with aspiration and radiologically evident of cartilage erosion. In all cases artificial voice prosthesis was used. All the laryngectomees underwent voice, swallowing, pulmonary and olfactory rehabilitation in laryngectomy club of head & neck oncology unit, CMH Dhaka for a period of 3 months as per standard protocol.

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Results: Among the 57 patients 42 of them are using voice prosthesis without any complications till to date. Voice rehabilitation started after wound healing & developed meaningful voice in around 6 weeks. Satisfactory speech & voice outcomes were observed near about 3 months. Voice quality was assessed by multivariate statistical analysis. Excellent voice was observed for 38 patients, good voice for 12 patients, fair voice for 05 patients and poor voice for 02 patients. Troubleshooting like mycotic infection developed in 6 patients which was managed by anti-fungal medication with regular appropriate cleaning, Pharyngocutaneous fistula developed in 5 patients, 3 healed later by pressure dressing and anticholinergic & 1 required exploration and flap reconstruction, 01 developed recurrent stomal stenosis which managed surgically by Y-V advancement. Prosthesis expelled out in 3 cases. 02 cases developed dysphagia due to tonicity of pharyngoesophageal (PE) segment & managed by botox injection. Significantly better voice & swallowing were reported by patients undergone laryngectomy alone in comparison with patients receiving adjuvant radiotherapy & patient undergoing salvage laryngectomy.

Conclusion: Awareness should be developed as sacrifice of voice box is no more a permanent comorbidity of total laryngectomy. Excellent voice can be developed by insertion of voice prosthesis as well as swallowing pulmonary and olfactory rehabilitation following laryngectomy for better of QoL.

Key words: Voice Prosthesis, Voice Rehabilitation, Quality of Life, Total Laryngectomy.

Introduction:

Total laryngectomy is still indispensable procedure in treating advanced or recurrent cancer of larynx and hypopharynx. The larynx has important functions in olfaction and respiration and is more than just an organ of voice production. Its removal requires rehabilitation of all three systems. Perhaps loss of voice is the most distressing to the patients as they loss power of communications and establishment of an acceptable voice is critical for successful psychological adjustment. Multidisciplinary team effort is mandatory to achieve optimal results and good QoL.

Prosthetic rehabilitation of voice in laryngectomized patient has become popular after the original article published by Singer and Blom (1980)¹. subsequently several high quality voice prosthesis were introduced and have been used successfully such as Panje², Groningen³ etc. The possibility of achieving good voice is greater with prosthesis

comparing with the esophageal voice. Now a days the provox voice prosthesis is the commonest prosthesis used. The first provox voice prosthesis manufactured by Atos Medical, Sweden in 1990. Several version of provox introduced till date. In 2009 the third generation provox vega with smart Inserter was introduced. In our study provox voice prosthesis and vega voice prosthesis were used⁴⁻⁶.

Materials and Methods:

This cross sectional retrospective study was conducted among the patients suffering from advanced laryngeal cancer had undergone total laryngectomy from Jan 2013 to Jan 2020 in the department of ENT & head-Neck surgery, Combined Military Hospital, Dhaka. Candidates were post chemo-radiated/ radiated biopsy proven recurrent cases, clinically non functional larynx with aspiration and radiologically evident of cartilage erosion.

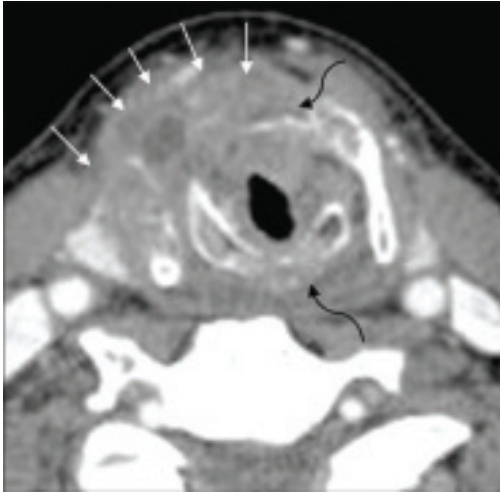


Fig 1: Cartilage erosion in CECT.

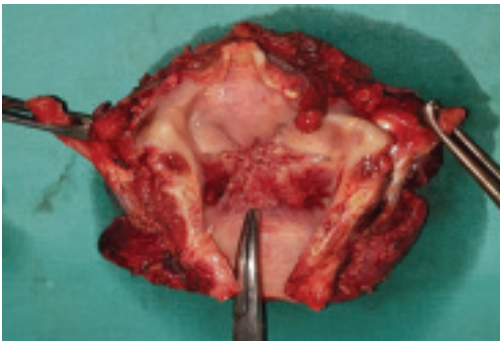


Fig.-2: Laryngectomy specimen.

Detailed history, clinical examination and investigations were done and recorded in the form. Informed written consent was taken in each case. Methods of using the voice prosthesis with potential problems and also swallowing, pulmonary and olfactory rehabilitation were discussed with each patient preoperatively.

Table I :
The outcome of using voice prosthesis.

Initiation	Duration
Swallowing	After 14 days
Speech	After 21 days starting of semisolid diet from liquid.

Table II :
Post operative initiation of swallowing & speech Clinical Data N= 57

Outcome	No	%
No complication	42	73.68
Mycotic infection	6	10.52
Fistula and closed	5	8.77
Expelled out	3	5.26

Table-III :
Showing clinical data of all patients (N=57).

Characteristic	Finding
Male/Female	56/1
Age range (mean)	45-77 (58.6)
Indication of laryngectomy (site)	No. (%)
- Supraglottic	27 (47%)
- Glottic	16 (28%)
- Pyriform fossa	14 (25%)
Radiation No. (%)	31
- With Pectoralis Major Myofascial Flap	20 (35%)
- Without Pectoralis Major Myofascial Flap	11 (20%)
Upfront No. (%)	26 (45%)
Reconstruction by FALT No. (%)	1 (1.75%)
Voice rehabilitation No. (%)	
- Primary Tracheo Esophageal Puncture (TEP)	52 (91%)
- Secondary TEP	05 (9.0%)
- Primary tonic control, TEP- Myotomy	
- Secondary tonic control, PE	57(100%)
- Botox injection	2 (3.50%)
Follow up No. (%)	
- Days with provox in situ till date	54 (94.73%)
- Days without Provox till date	03 (5.26%)

Results:

In this series total 57 patients were studied. Among the 57 patients 42(73.68%) patients had no complication with excellent voice outcome. We found 7(12.28%) patients having mycotic infection. Prosthesis had to be changed in these 7 patients. We found 5(8.77%) patient with tracheo-oesophageal fistula. Expelled out 3.

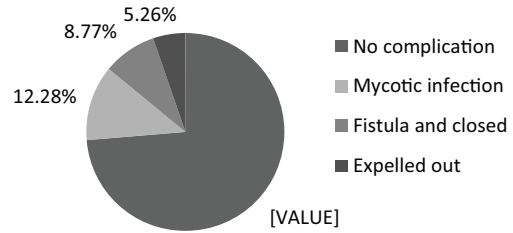


Diagram-1: Showing the result.

Mean voice quality (MVQ) score:

- To allow the use of the voice quality in multivariate statistical analysis, a mean voice quality (MVQ) score was established by calculating the sum of the individual ratings (1-5) during the whole study period, divided by the number of voice quality evaluations per patient.
- Mean voice scores were rounded (excellent, e" 4.5; good, 3.5 - 4.4; etc.).

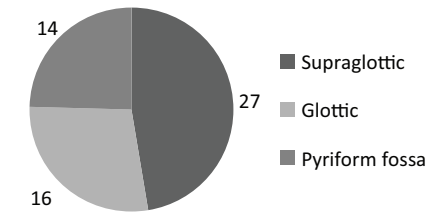


Diagram-2: Site of lesion.

The assessment of voice quality was performed using the following 5 points scale rating:

- Excellent 5
- Good 4
- Fair 3
- Poor 2
- No voice 1

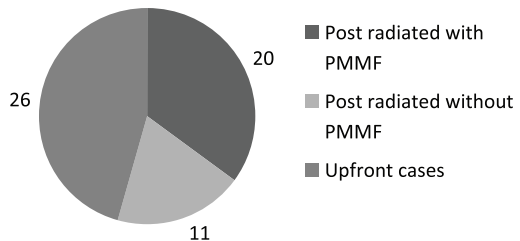


Diagram-3: Pre op radiated & upfront.

- Excellent and good indicate a fluent and intelligible voice used under all social circumstances, and excellent was used only when the patient's voice approached normal.
- Fair indicates a somewhat less satisfactory voice that was still used as the main method of communication.

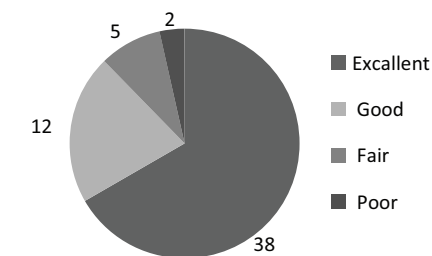


Diagram-4: MVQ at 6th months.

Poor indicates a voice with unsatisfactory quality that was not useful as a primary communication method.

Discussion:

Rehabilitation following total laryngectomy is multidimensional. Voice rehabilitation is one of them. Others are pulmonary and olfactory.

Voice rehabilitation:

For the last 140 years the methods of voice rehabilitation is gradually improving. There are three methods of rehabilitation of voice in laryngotomies patient⁷.

1. Oesophageal voice.
2. Electrolarynx.
3. Tracheo-oesophageal puncture (TEP).

In our study all the 57 cases were rehabilitated with TEP with provox and vega voice prosthesis of 6mm and 8 mm internal diameter according to the on table measurement of TE party wall. This procedure for restoration of speech in patients who had undergone total laryngectomy was first introduced by Blom and Singer in 1979¹. This valve formed a one way conduit for air into the oesophagus and also prevents leakage of oesophageal contents into the airway. Voice prosthesis is actually a one way valve made of medical grade silicon. This is a barrel shaped device with two flanges. One flange enters the oesophagus while the other one rests in the trachea. It actually fits snugly into the tracheo-oesophageal puncture wound. This prosthesis is provided with a unidirectional valve at its oesophageal end. TEP can be performed either immediately after laryngectomy or 6 weeks following successful laryngectomy. TEP performed along with laryngectomy is known as primary TEP and if performed 6 weeks after laryngectomy it is known as secondary TEP. It should be state that radiotherapy poses no threat to TEP. This procedure initially was reserved for patients who have got flap reconstruction during primary surgery, failed to acquire oesophageal speech even after prolonged effort, and are displeased with the voice produced by artificial larynx. Currently primary TEP is getting popular.



Fig.-3: Showing a patient with voice prosthesis



Fig.-4: Showing provox voice prosthesis.

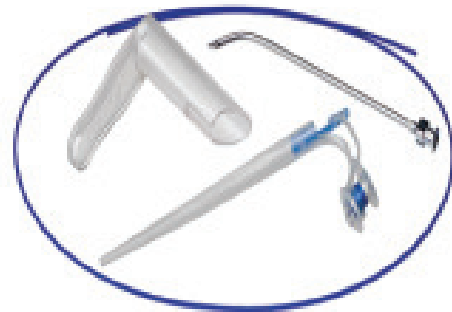


Fig.-5: Showing vega voice prosthesis



Fig.-6: Fungal colonization.

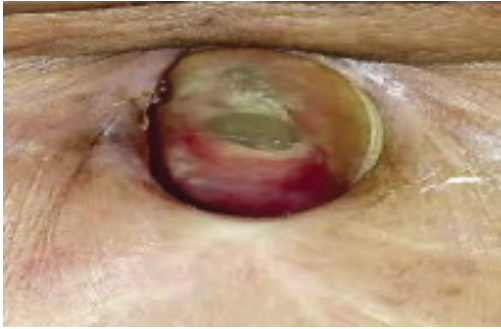


Fig.-7: Leakage through prosthesis.

Anatomical site for puncture is 8 - 10mm from the cut edge of trachea.

TEP should ideally be performed in the midline, thereby decreasing the risk of bleeding from midline vessels. Structures that need to be penetrated during TEP procedure include:

1. Membranous posterior wall of trachea.
2. Oesophagus (Consists of 3 muscles layers coated with oesophageal mucosa).
3. Interconnecting tissue in the tracheo-oesophageal space.

Trouble shooting of TEP:

1. Fungal colonization.
2. Leakage through prosthesis.
3. Leakage around prosthesis.
4. Immediate aphonia / dysphonia.
5. Hypertonicity problems.
6. Delayed speech.

Pulmonary rehabilitation:

After total laryngectomy patients have excessive sputum production, coughing with forced expectoration. The heat moisture exchanger (HME) protects the airway, maintains a more natural tracheal environment, and decreases mucous production and coughing as the trachea is more protected from drying and cooling (which can cause thick and crusty mucous to

form)^{11,13}. For HME restoration of upper respiratory tract function is possible.

Olfaction rehabilitation:

There is anosmia or hyposmia following laryngectomy due to odor molecules cannot reach olfactory epithelium for by passing and creating new airway. Impaired olfaction leads to reduced flavor, food enjoyment and reduced food intake. This reduces the QoL significantly'.



Figure-8: Heat moisture exchanger (HME).

Hilgers et al.¹⁴ developed nasal airflow inducing manoeuvre (NAIM) in which repeated extended yawning movement is performed lowering the jaw keeping the lips securely closed. This maneuver induces negative pressure in the oral cavity and oropharynx which generates nasal airflow, enabling odorous substances to reach the olfactory epithelium again.

50% of the patients can be rehabilitated by NAIM procedure¹⁴.

Birgit Risberg-Berlin confirmed that the NAIM is easy to learn and rapidly improves smell and taste.

A single intervention session is sufficient, but many patients benefit from repeated training¹⁵.

Conclusion:

Nobody is ready to sacrifice his voice at any cost. Total laryngectomy with rehabilitation

of voice, pulmonary and olfaction is a new dimension for post laryngectomy rehabilitation in recent advancement of surgical skill and technology. It improves the quality of life tremendously. The success of the operation has aroused inspiration amongst the patients and their families as well.

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