

Original Article

Complications of Total Laryngectomy

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Abstract:

Objective: To observe Post-operative complications of Total Laryngectomy in advanced Laryngeal Carcinoma Patients.

Methods: This prospective observational study was conducted in National Institute of ENT, Tejgaon, Dhaka. Study duration 3 years, from January 2015 to December 2017. 17 patients were selected who underwent total laryngectomy for histologically proven advanced carcinoma larynx. Patients were followed up monthly for 3 months & then after 6 months for life long.

Results: The age of the patients ranged from 39 to 66 years. The mean age was 47 years. Most of the cases are supraglottic carcinoma 12 (70.59%), Glottic carcinoma in 5 (29.41%) & no subglottic carcinoma. In this study, out of 12 supraglottic cases, 4 patients were presented in stage III & 8 in stage IV. Among the glottic cases 1 patient presented in stage I, 2 in stage III & 2 patients presented in stage IV. Patients were followed up monthly for 3 months & then after 6 months for life long. 2 patients (11.76%) developed pharyngocutaneous fistula within 7th to 15th post-operative day & these patients were managed conservatively which involved adequate drainage, frequent dressing & fresh blood transfusion. With these conservative management fistula healed completely within 3 to 4 weeks. 3 patients (17.65%) developed wound infection. Wound swab was sent for culture & sensitivity and antibiotics changed accordingly. Wound healed within 2-3 weeks with conservative treatment & adequate aseptic dressing. 1 patient (5.88%) developed postoperative hematoma which was drained immediately. This patient developed wound infection later on & was managed conservatively. 2 patients (11.76%) developed stomal recurrence 4 months after surgery, which was confirmed by biopsy. The cases were inoperable & were sent for radiotherapy. 2 patients (11.76%) developed dysphagia due to pharyngeal stenosis 4 months after surgery.

Conclusion: The most frequent troublesome immediate complication is pharyngocutaneous fistula all of which have been treated conservatively with satisfactory result. Preoperative radiotherapy is an important risk factor for the development of pharyngocutaneous fistula in total laryngectomy.

Keywords: Laryngeal Carcinoma, Total Laryngectomy, Radiotherapy, pharyngocutaneous fistula.

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Introduction:

Although history credits Patrick Watson for performing the first total laryngectomy (TL) in 1866, there are reports that this was a postmortem laryngectomy on a patient that died from a syphilitic larynx.¹ The first reported TL for a malignancy was performed by Bilroth in 1873 and was reported at the third congress of surgeons by his assistant Gussenbauer.¹⁻³ The early laryngectomies were fraught with complications like pneumonia, aspiration, sepsis and fistula formation that resulted in extremely poor outcomes with reported operative or early postoperative mortality of near 50%. Towards the end of the 19th century suturing the trachea to the skin was introduced by Solis-Cohen, and the principle of tracheal diversion with the primary reconstruction of pharynx was added by Gluck and Soerensen.^{4,5} The increasing attention to functional outcomes of laryngectomy, such as swallowing and speech resulted in continuous modification of the surgical procedure over time and the subsequent introduction of tracheo oesophageal puncture (TEP) in 1980 by Singer and Blom.⁶

Laryngeal cancer is the most common head and neck cancer and the eleventh most common cancer in men worldwide but is relatively uncommon in women.⁷ Laryngeal cancer accounts for approximately 1.2% all new cancers diagnosed in the United States. In Pakistan an incidence of laryngeal cancer ranges from 6.3% to 8%.⁷ In Bangladesh, it is the most common malignancy in men.⁸ Over 95% of laryngeal carcinoma is treatable.⁹

Total laryngectomy is a radical procedure which involves removal of whole larynx. This procedure is useful in the treatment of advanced laryngeal carcinoma and as a salvage procedure when previous partial laryngeal surgery or radiotherapy has failed.¹⁰

Complications of total laryngectomies such as pharyngocutaneous fistula, wound infection, chyleleak, swallowing and airway problems have a significant impact on morbidity causing prolonged hospitalization and inevitably increased health care costs. Many factors have been implicated in the development of complications including previous radiotherapy, preoperative tracheostomy, radical neck dissection, and extensive surgery and flap reconstruction.¹¹ Similarly late complications like pharyngeal stenosis can result in swallowing difficulty,¹² while stomal recurrence may render the tumor incurable thus adversely affecting prognosis.¹³ It is therefore important to diagnose these complications early so that timely intervention can be done.

This study was conducted on seventeen patients who had undergone total laryngectomy to find out various complications after total laryngectomy with respect to their presentation, diagnosis and management.

Aims and Objectives:**Methods:**

This prospective observational study was conducted in National Institute of ENT, Tejgaon, Dhaka, from January 2015 to December 2017.

Inclusion criteria:

- All patients who underwent total laryngectomy for histologically proven advanced carcinoma larynx.
- Post CT/RT failed carcinoma larynx.

Exclusion criteria:

- Patients with advanced carcinoma larynx not willing to do surgery.
- Patients with advanced carcinoma larynx medically unfit for surgery.

A detailed history was taken and every patient was examined thoroughly specifically focusing on laryngeal examination. Besides base line investigations, CT scan of the neck was carried out and MRI was performed in some cases where CT scan was not informative.

The patients were assessed for metastasis of the disease. Endoscopy was done in all cases and direct laryngoscopy assessment and biopsy was taken to get histological diagnosis. The disease was staged according to the TNM (Tumor, Node and Metastasis) staging system. All patients and relatives were counseled regarding nature of the disease, treatment options, expenses of the surgery and voice rehabilitation. A well informed consent was taken from patients and relatives explaining the total laryngectomy, its risks, benefits and associated complications. All patients were observed for any postoperative complications during their stay in the hospital and after discharge from hospital a regular follow up visit record was maintained. The patients were examined at regular intervals monthly for three months and every six months for life long. During each follow up visit a thorough clinical examination was done in all patients and appropriate investigations were carried out where indicated. A complete record of complications, their diagnosis and treatment was maintained during that period and the study was approved by the hospital ethical committee. Total laryngectomy with unilateral selective neck dissection, total laryngectomy with bilateral neck selective dissection, total laryngectomy with unilateral modified radical neck dissection and total laryngectomy with bilateral modified radical neck dissection with PMMC flap reconstruction were performed in some patients.

Surgical technique:

The patient was placed supine with neck extended. Neck was cleaned thoroughly with antiseptic from chin down to the chest at nipple level. Neck was infiltrated at the site of incision with Xylocaine Adrenaline preparation (2%, 1:100000). A transverse incision or Gluck-Sorenson incision was given and deepened to subplatysmal layer. Neck was opened in between strap muscles and sternocleidomastoid muscle.

Having exposed the larynx, the aim of surgical removal was to resect the tumor while maintaining the maximum amount of residual mucosa. Larynx was disconnected from its blood supply, the pharynx, the tongue base and the trachea. In the majority patients hemithyroidectomy was done in affected side with preservation of contralateral lobe on its inferior vascular pedicle.

The larynx was delivered from above to below. The hypopharynx was entered on the side opposite to the site of tumor after the muscles attached to the hyoid bone were divided. The epiglottis was grasped with tissue forceps after entry into the hypopharynx. There after the whole specimen was removed. A permanent tracheostomy stoma was created through a transvers stab skin wound on the lower skin flap, about 2-4 cm long. The trachea was pulled out through the stab wound and stitched to the skin after the endotracheal tube has been secured in the new tracheostomy. The pharynx was repaired in three layers. First layer was given interrupted with 3/0 vicryl & second layer was continuous with 3/0 vicryl. Third layer was given interrupted with 3/0 vicryl. In all cases, where PMMC flap were not given, new pharynx were covered with sternocleidomastoid muscle flap. Wound was closed in layers with drain.

Intravenous broad spectrum antibiotics were prescribed covering both aerobic and anaerobic organisms. Intravenous fluids were given along with routine analgesics for pain management. NG tube feeding was commenced 24 hours after surgery. NG tube feeding was continued for 3 weeks. After 3 weeks oral feeding was attempted with milk or water to see any leakage from the neck or wound site and gradually semisolid foods were given.

All patients were observed for any post-operative complications during their stay in the hospital and after discharge from hospital a regular follow up visit record was maintained. Patients were followed up monthly for 3 months and then after 6 months for life long. During each follow up visit a thorough clinical examination was done in all patients and appropriate investigations were carried out where indicated. A complete record of complications, their diagnosis and treatment was maintained during this period.

Results:

In this series 17 male patients were studied. Out of them 4 patients received preoperative full dose curative radiotherapy.

The age of the patients ranged from 39 to 66 years. The mean age was 47 years. Most of the cases are supraglottic carcinoma 12 (70.59%), Glottic carcinoma in 5 (29.41%) & no subglottic carcinoma. In this study, out of 12 supraglottic cases, 4 patients were presented in stage III & 8 in stage IV. Among the glottic cases 1 patient presented in stage I, 2 patients in stage III & 2 patients presented in stage IV.

Histologically 16 (94.12%) were squamous cell carcinoma & 1 was adenoid cystic carcinoma. In 12 (70.59%) cases resection margin was > 1cm away from tumor & in 5 (29.41%) cases resection margin was < 1cm but not involved by tumor.

Patients were followed up monthly for 3 months & then after 6 months for life long. 2 patients (11.76%) developed pharyngocutaneous fistula within 7th to 15th post-operative day & these patients were managed conservatively which involved adequate drainage, frequent dressing & fresh blood transfusion. With these conservative management fistula healed completely within 3 to 4 weeks. 3 patients (17.65%) developed wound infection. Wound swab was sent for culture & sensitivity and antibiotics changed accordingly. Wound healed within 2-3 weeks with conservative treatment & adequate aseptic dressing. 1 patient (5.88%) developed postoperative hematoma which was drained immediately. This patient developed wound infection later on & was managed conservatively.

2 patients (11.76%) developed stomal recurrence 4 months after surgery, which was confirmed by biopsy. The cases were inoperable & were sent for radiotherapy. 2 patients (11.76%) developed dysphagia due to pharyngeal stenosis 4 months after surgery. Voice prosthesis was used in 4 cases (23.53%).

Table I :
Age distribution of Carcinoma larynx patients

Age (Years)	Number of patients	%
<40	1	5.88
41-50	3	17.65
51-60	10	58.82
>60	3	17.65

Table II :
Site of involvement

Site	Number of patients	%
Supraglottic	12	70.59
Glottic	5	29.41
Subglottic	0	0

Table III :
Staging of Carcinoma larynx patients

Site	TNM staging			
	Stage I T ₁ N0M0	Stage II T ₂ N0M0	Stage III T ₃ N0M0 T ₃ N ₁ M0	Stage IV T ₄ N0M0 Any T N ₂₋₃ M0 Any T Any N M1
Supraglottic	0	0	4	8
Glottic	1	0	2	2
Subglottic	0	0	0	0

Table IV :
Surgical procedure

Type of surgery	Number	%
Total Laryngectomy + Unilateral SND	3	17.65
Total Laryngectomy + Bilateral SND	4	23.53
Total Laryngectomy + Unilateral MRND	2	11.76
Total Laryngectomy + Bilateral MRND+	4	23.53
PMMC flap reconstruction		
Salvage Laryngectomy	4	23.53

Table V :
Use of voice prosthesis

Prosthesis used	Number	%
Yes	4	23.53
No	13	76.47

Table VII :
Status of resection margin

Margin	Number	%
>1cm away from tumor	12	70.59
<1cm away from tumor but free from tumor	5	29.41
Margin involved by tumor	0	0

Table VI :
*Postoperative histopathological
diagnosis*

Diagnosis	No. of patients	%
Squamous cell carcinoma	16	94.12
Adenoid cystic carcinoma	1	5.88

Table VIII :
*Immediate complications after total
laryngectomy*

Complications	No. of patients	%
Pharyngocutaneous fistula	2	11.76
Wound infection	3	17.65
Haematoma	1	5.88
Flap necrosis	0	0
Blood transfusion	2	11.76

Table IX :
Delayed complications after total laryngectomy

Complications	No. of patients	%
Stomal recurrence	2	11.76
Stomal stenosis	0	0
Dysphagia	2	11.76

Discussion:

Carcinoma of larynx accounts for 40% of all head & neck malignancies.¹⁴ Its incidence varies worldwide. In our study, the mean age of patients was around 47 years with the male preponderance. The main forms of treatment for head & neck cancer include surgery & radiotherapy. Initially, these are used aiming for cure. However, in some circumstances, they serve as a palliative treatment, depending on the type of tumor, extension, clinical condition and patient preferences. The correct diagnosis and staging are essential in the decision making process.¹⁵ Other factors, which should be considered, are age & general condition of patient, hospital facilities available & experience of surgical team.

The most complication after total laryngectomy is Pharyngo Cutaneous Fistula (PCF).¹⁶ Bilroth was the first person to report PCF as a complication.¹⁷ PCF after laryngectomy occurs when there is a failure in the pharyngeal repair resulting in a salivary leak.¹⁸ This is a demoralizing complication not only for the surgeons involved but also for the patient & his family. Its occurrence leads to increased morbidity, delay in adjuvant treatment, prolonged hospitalization & increased treatment costs.¹⁹

In our study pharyngocutaneous fistula was second most common complication. The reason for this was small sample size of 17 patients. Incidence of PCF has been

reported in the literature between 4% to 15.9%.²⁰ In our study 2 patients (11.76%) developed PCF. This rate is consistent with the work of Parikh SR et al.²¹, who in large series of 125 patients of laryngectomy reported 22% incidence of fistula. The highest incidence of PCF was reported as 66% by Bresson K et al.²² The lowest incidence of PCF 2%.²³

Preoperative radiotherapy was reported as a significant risk factor in the development of PCF.²⁴ In our study preoperative radiotherapy was important risk factor because patients who developed postoperative PCF had received preoperative radiotherapy. Positive surgical margins, extended hypopharyngeal mucosal excision & low hemoglobin level have also been reported as risk factors for the development of PCF.²⁵ None of our patients had positive surgical margins or extended hypopharyngeal mucosal excision. Spontaneous closure of fistula with conservative measures has been reported in 70% of cases²⁶, which is lower than our study. This recent study revealed that 83.3% fistula closed spontaneously without any surgical intervention.

Postoperative wound infections are major source of infectious morbidity in total laryngectomy patients. The overall incidence of postoperative wound infection after major head & neck surgery is 23% & this becomes higher in those patients who have received preoperative radiotherapy.²⁷ The most important aetiologic factor is Methicillin Resistant Staphylococcus aureus (MRSA).²⁸ Administration of prophylactic antibiotics reduces the risk of postoperative infection. In total laryngectomy patient, we gave 1gm Ceftriaxone with 500 mg of Metronidazole for surgical prophylaxis. Despite these measures, 3 patients (17.65%) developed postoperative wound infection. Out of these

3 patients, 2 also developed PCF & have received preoperative radiotherapy. Postoperative Cephalosporins & Metronidazole were given to all patients. This rate is in accordance with the findings of Aslam MJ et al.²⁹ The factors probably responsible are absence of well trained & well oriented nursing staff, inability to maintain absolute sterilization in the postoperative period especially during repeated suction & also because of the contamination from visitors.³⁰

The reported incidence of dysphagia varies from 16% to 42%³⁰. In our study 2 patients (11.76%) developed this complication. On endoscopic examination pharyngeal stricture was seen which was treated with repeated dilatation after ruling out recurrence. However, incidence is 12% in the series of Aslam MJ et al.²⁹

Here, 2 patients (11.76%) developed tracheostomal stenosis. Subsequently they developed stomal recurrence. A lower rate of 5% was evident in the series of Mantravadi R et al.³¹

In our study, no patient developed nodal metastasis. Aslam MJ et al.²⁹ opines that postoperative radiotherapy to the neck reduces the risk of nodal metastasis after total laryngectomy.

Conclusion:

Complications following total laryngectomy are infrequent but when they occur patient's morbidity is considerably increased. To comment on postoperative complications of total laryngectomy, it demands further elaborate and extensive study to come to a decisive opinion. The present study reflects that complications are higher in radiation failure cases. Complications are almost equal to most comparable published series. The most frequent troublesome immediate complication is pharyngocutaneous fistula all

of which have been treated conservatively with satisfactory result. Preoperative radiotherapy is an important risk factor for the development of pharyngocutaneous fistula in total laryngectomy.

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