

# FREQUENCY AND ASSESSMENT OF POST OPERATIVE COMPLICATIONS FOLLOWING LARYNGEAL CANCER SURGERY

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## ABSTRACT

**Objective:** To evaluate the frequency of post-operative complications of laryngeal cancer surgery and to analyze its association with various tumour, patient and treatment related factors.

**Study Design:** Case series.

**Setting & Duration:** Department of Otolaryngology, Head and Neck Surgery, Civil Hospital, Karachi from January 2003 to January 2008.

**Methodology:** Fifty patients of laryngeal carcinoma, who underwent different surgical procedures ranging from conservation to radical laryngectomies (TL, ETL) were included, to evaluate the presentations of various post operative complications. Those with N3 nodal status and with distant metastasis were excluded. All patients were reviewed to assess those possible factors that contribute to postoperative complications such as topography, stage of disease and surgical techniques. Data was analysed on SPSS 13.0 for frequency and percentage.

**Results:** Majority of tumors were Squamous cell carcinoma (98%) while only one (2%) case was of chondrosarcoma. Supraglottic tumours were found in 14 patients (28%), glottic in 16 patients (32%) and transglottic in 20 patients (40%). Total laryngectomy (TL) was performed in 31 patients (62%), extended laryngectomy (ETL) was done in 10 patients (20%), while conservation laryngeal surgery (CLS) performed in 9 patients (18%). Postoperative complications following different laryngectomy procedures, included pharyngocutaneous fistula in 9 (18%), nodal recurrence in 7 (14%), stomal recurrence in 3 (6%), stomal stenosis in 3 (6%), local recurrence in 2 (4%), pharyngeal stenosis in 3 (6%), post operative hemorrhage in 2 (4%), hypothyroidism in 1 (2%) and distant metastasis in 1 (2%). Over all complications were seen in 11 patients (22%). Topography of the tumor (SG) and type of surgery (ETL) were significantly associated with postoperative complications  $p < 0.05$ .

**Conclusion:** Pharyngocutaneous fistula is the commonest complication after total laryngectomy advance staged tumours especially supraglottic tumours with extensive soft tissue infiltration were significantly associated with the pharyngocutaneous fistula.

**KEY WORDS:** Laryngeal Cancer Surgery, Post-operative Complication, Pharyngocutaneous Fistula

## INTRODUCTION

Head and neck cancer and its treatment can have a profound impact on the most fundamental functions of life. After the treatment these patients are suffer from

difficulties in eating, speech, mastication, and respiration. Radiotherapy combined with chemotherapy has recently been increasingly applied to preserve organs, to achieve a better quality of life (QOL).<sup>1</sup> Various post-operative complications have been reported to occur more frequently after surgery following radiotherapy, compared to that without radiotherapy.<sup>2</sup> Billroth performed the first laryngectomy on New Year's Eve in 1873 in Vienna and was the first person to report pharyngocutaneous fistula as a complication. Fistula rates eventually increased with Gluck, who was the first to describe a single stage laryngectomy with primary closure of the pharynx putting more pressure on the pharyngeal suture line. In the 1950's when Cobalt 60 radiation was developed, it also increased fistula rates for patients that required salvage surgery.<sup>3</sup> Laryngeal cancer has seen the

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wind of change during the last century or more as far its management is concerned. Different modalities of treatment like surgery, radiation and chemotherapy are used either singly or in combination, to treat carcinoma of the larynx.

Surgery is an effective and economical mode of treatment in this country where facilities of other modalities such as radiotherapy and chemotherapy are not available uniformly.<sup>4</sup> There are many surgical options available for the treatment of laryngeal cancer including laser surgery, conservation laryngectomy,<sup>5,6</sup> total laryngectomy to extended total laryngectomy with or without neck dissection.<sup>7</sup> Radical procedures are useful in the treatment of advanced laryngeal cancer and as a salvage procedure when previous partial laryngeal surgery or radiotherapy has failed.<sup>8,9</sup>

Careful evaluation and early treatment brings a probability of cure where the failure may be followed by a relatively uncomfortable complications like pharyngocutaneous fistula, nodal recurrence, stomal recurrence, stomal stenosis, local recurrence and pharyngeal stenosis.<sup>1,10,11</sup> Occurrence of postoperative complications, following laryngectomy tends to increase morbidity, delay in adjuvant treatment, prolonged hospitalization and an increase in treatment cost and adversely affecting the prognosis.<sup>12</sup>

The aim of study was to determine the frequency of the various post operative complications and analyzed the risk factors in patients who underwent surgery over the past 5 years, and investigated the relationship of postoperative complications with reference to topography, stage of disease, and the surgical procedure.

## METHODOLOGY

Its was descriptive case series conducted at the Department of Otolaryngology, Head and Neck Surgery at Civil Hospital Karachi from January 2003 to January 2008. Fifty patients were included in the study. All patients of either gender having carcinoma larynx with cervical nodal status up to N2, without distant metastasis under-going different laryngectomy procedures ranging from conservation to radical procedures were included in the study. Patients with N3 neck nodes, with distant metastasis (M1) and those responding to chemo radiation were excluded from the study. All patients underwent a detailed history, complete physical, systemic examination and relevant hematological and biochemical analysis and radiological investigations. The disease staged according to AJCC TNM classification. Decision for radical or conservation laryngeal surgery was made by taking into consideration the site and the extent of the primary

tumor on direct laryngoscopic examination. After surgery any post operative complications during their stay in the hospital and after discharge from hospital were observed at regular follow up. During each follow up visit a thorough clinical examination was done and appropriate investigations were carried out where indicated. The studied factors were topography, stage of disease and type of surgery. Post operative complications were defined as pharyngocutaneous fistula, nodal recurrence, Stomal recurrence, Stomal stenosis, pharyngeal recurrence, pharyngeal stenosis, post-operative haemorrhage, hypothyroidism and distant metastasis. Association between factors and complications made by cross tabulation using chi-square test on SPSS 13.0 and keeping significance at  $p < 0.05$ .

## RESULTS

It was descriptive study including 50 patients, 42(84%) male and 8(16%) female, the age ranged from 35- 67 years (mean  $54 \pm 7.9$ ). Supraglottic tumours were found in 14 patients (28%), glottic in 16 patients (32%) and transglottic in 20 patients (40%). Out of the total cases 52% were of T4 stage, 28% were of T3 while T2 were 8% and T1 were 12%. Out of fifty 42 patients (84%) had N0 neck nodes, 6 patients (12%) were N1 and only 2 patients (4%) were with N2 neck nodes.

In 49(98%) patients surgery was performed as primary modality of treatment while in one case total laryngectomy was done as a salvage surgery for T2 glottic tumor after failed radiotherapy. Conservation laryngeal surgery was done in 9(18%) cases; total laryngectomy was done in 31(62%) cases while extended total laryngectomy was performed in 10(20%) cases.

Neck dissection was performed in 8(16%) cases at the time of primary surgery. Radical neck dissections (RND) were done in 5(62.5%) cases, while modified radical neck dissection (MND) in 3(37.5%) patients. Out fifty cases only 11(22%) patients had developed complications. Out of eleven patients 9(81.8%) patients had developed pharyngocutaneous fistula, 3(33.3%) patients had developed pharyngocutaneous fistula at seventh post-operative day, 5(55.5%) patients at tenth post-operative and 1(11.1%) patient at 11th post-operative day following surgery. All of these fistulas healed with conservative management alone. Seven patients developed cervical nodal recurrence fine needle aspiration cytology of lymph nodes confirmed metastatic carcinoma. Two patients were managed with ipsilateral radical neck dissection, 5 patients managed with chemo radiation. One of these patients again developed loco regional recurrence on the same side of neck, only palliative treatment was offered. Three patients developed pharyngeal steno-

sis at an interval of four to six months after surgery, presented with progressive dysphagia for solid. It was managed by repeated dilatation of neopharynx with gum elastic bougies after recurrence was excluded by rigid esophagoscopy.

Three patients developed the stomal recurrence. Three patients developed stomal stenosis, two in first and one in 5th months after surgery. Two patient managed by progressive dilatation and one with Z plasty repair. Two (4%) patients developed local (pharyngeal) recurrence. Postoperative haemorrhage was seen in two patients on second and third post-operative day and successfully managed by ligation of the bleeding vessels and blood transfusion. Hypothyroidism was seen in one patient in the sixth post-operative month after surgery. Distant metastasis was seen in only one patient (2%). The results are summarized in Table I-III.

## DISCUSSION

Larynx is one of the commonest sites for carcinoma and its incidence rate varies greatly through out the globe.<sup>4</sup> It accounts for 40% of all head and neck malignancies.<sup>13</sup> In a multicentre study conducted in Pakistan by PMRC and Cancer registry cell Sindh, laryngeal cancer along with other head and neck cancer has been listed in the top ten.<sup>4</sup> The peak age of incidence in Pakistan is 50 years<sup>14</sup>, whereas in this study it was 54 years. In a study conducted by Dedivitis<sup>12</sup> male to female ratio was 9:1 while in this study male to female ratio was found to be 5.2:1.

Out of fifty cases only 11(22%) patients had developed the complications after laryngeal cancer surgery. In this study pharyngocutaneous fistula (PCF) was found to be the most common complication i.e. 18%. The reported

incidence of PCF is extremely variable ranging from 12 to 25%.<sup>12,15</sup> A numbers of factors that result in PCF have been described like age, sex, site of primary, T stage, prior treatment radiotherapy, extent of nodal dissection, preoperative tracheostomy, low serum haemoglobin and early oral feeding, but there is still no agreement on the most significant factors. A retrospective study of 55 patients who underwent total laryngectomy analyzed that elderly patients (> 60 years) and patients previously submitted to tracheotomy presented with higher fistula incidence (60%).<sup>12</sup> In a prospective study of 143 patients Qureshi critically analyzed that use of pectoralis major flap to reconstruct the neopharynx and hypo pharyngeal disease were significantly associated with the PCF formation, they have found that extended laryngectomy invariably carries a higher incidence of fistula because of resection of large amount of pharyngeal mucosa leads to closure under tension.<sup>9-11,15</sup> These wounds are more prone for breakdown and formation of PCF, which is consistent with finding from the current study. In this study advanced staged growths (especially supraglottic tumours with extensive involvement of pyriform fossa) and associated neck dissection were found to be associated factors.

It is generally agreed that most of the fistulas respond well to conservative management.<sup>12,15</sup> Ahmed have found most fistulas can be successfully managed with conservative treatment.<sup>16</sup> In this study all fistulae closed spontaneously without surgical intervention in less than a month with good care and cure of infections. Sobol have managed mild cases of pharyngeal stenosis by dilatation by bougies, while severe by surgical intervention in the form of cricomyotomy, release of the scar contracture and resurfacing with pectoralis major myocutaneous flap.<sup>17</sup> In this study three patients were developed pharyngeal stenosis because of stricture of neopha-

**Table I. Association of Topography with post-operative complications**

Complications	Supraglottic	Glottic	Transglottic	p-Value
Pharyngocutaneous Fistula	4(28.5%)	1(6.5%)	4(20%)	0.271
Cervical Nodal Metastasis	4(28.5%)	--	3(15%)	0.078
Stomal Recurrence	3(21.4%)	--	--	0.017
Stomal Stenosis	3(21.4%)	--	--	0.017
Pharyngeal Recurrence	1(7.14%)	--	1(5%)	0.583
Pharyngeal Stenosis	3(21.4%)	--	--	0.017
Post-operative Haemorrhage	2(14.28%)	--	--	0.069
Hypothyroidism	1(7.14%)	--	--	0.269
Distant Metastasis	--	--	1(5%)	0.465

Complications	I	II	III	IV	p-Value
Pharyngocutaneous Fistula	1(16.7%)	--	2(14.3%)	6(23.1%)	0.689
Cervical Nodal Metastasis	--	--	1(7.14%)	6(23.7%)	0.266
Stomal Recurrence	--	--	2(14.3%)	1(3.8%)	0.689
Stomal Stenosis	--	--	2(14.3%)	1(3.8%)	0.465
Pharyngeal Recurrence	--	--	1(7.14%)	1(3.8%)	0.855
Pharyngeal Stenosis	--	--	2(14.3%)	1(3.8%)	0.465
Post-operative Haemorrhage	--	--	1(7.1%)	1(3.8%)	0.855
Hypothyroidism	--	--	1(7.1%)	--	0.453
Distant Metastasis	--	--	--	1(3.8%)	0.815

Table II. Association of stage with post-operative complications

ryn timer and were managed. Udaipurwala reported nodal relapse was found to be highest in supraglottic cancer whereas, glottic tumors had low incidence of nodal metastasis. Extra-capsular invasion, fixed nodes and improperly treated laryngeal cancers hall mark greater likelihood of developing nodal recurrence.<sup>11</sup> In this study nodal recurrence was observed in 14% (n=7) of patients. Supraglottic tumors were four and three transglottic growth at the time of primary surgery. Stomal recurrence is seen in 3 patients (6%). Rubin have reported 3.4% incidence rate of stomal recurrence in their study.<sup>18</sup> Emergency tracheostomy for airway blocking tumors is supposed to be an important cause of stomal recurrence as tracheostomy site is fertile field for malignant cell implantation in a study conducted by Dedivitis.<sup>12</sup> In this study all 3 patients, had undergone emergency tracheostomy before the proper surgery was performed, palliative chemo radiation was given in all patients.

Stomal stenosis can developed immediately post laryngectomy or any time thereafter. Cruise had reported 4% to 13% of laryngectomies experience this complication.<sup>19</sup> Three patients (6%) were developed stomal stenosis in 1st and 5th months probably due to post-operative infection and improper fashioning of stoma (oblique sectioning of trachea). Pharyngeal recurrence was seen in 2 patients after radical surgeries, managed by chemo radiation. A positive surgical margin was found to be significantly affecting local recurrence. Revision surgery or post-operative radiotherapy should be considered in patients with inadequate margins.<sup>12</sup>

Thyroid gland involvement during laryngectomy, pharyngolaryngectomy and postoperative radiotherapy may lead to hypothyroidism.<sup>20</sup> Subclinical hypothyroidism should be treated with thyroxine to prevent complication. In this study one patient of (ETL) developed hypothyroidism, successfully managed with oral thyroxin. Dis-

Table III. Association of surgery with post-operative complications

Complications	Total Laryngectomy	Extended Total Laryngectomy	Conservative Laryngal Surgery	p-Value
Pharyngocutaneous Fistula	2(6.5%)	7(70%)	--	0.000
Cervical Nodal Metastasis	2(6.45%)	5(50.0%)	--	0.001
Stomal Recurrence	--	3(30.0%)	--	0.002
Stomal Stenosis	--	3(30.0%)	--	0.002
Pharyngeal Recurrence	1(3.22%)	1(10%)	--	0.506
Pharyngeal Stenosis	--	3(30.0%)	--	0.002
Post-operative Haemorrhage	--	2(2.0%)	--	0.016
Hypothyroidism	--	1(10.0%)	--	0.130
Distant Metastasis	--	1(10.0%)	--	0.130



tant metastasis occurs in about 5% cases, lungs and bones are common sites of metastasis, so should be assessed carefully.<sup>21</sup> In present study distant metastasis was seen lungs in one patient (2%).

## CONCLUSION

Pharyngocutaneous fistula was the most frequently seen postoperative complication. Extended laryngectomies especially with neck dissections (radical surgery) and advanced staged supraglottic tumours were found to be the responsible causative factors.

## REFERENCES

1. Akihiro S, Kenji O, Junichi O, Muneo M, Hiroyuki F, Masahiro I. Statistical Analysis of Post-operative complications after head and neck surgery. *Tokai Journ Exp Clin Med* 2008; 33(3): 105-109.
2. Sassler A M, Esclamado R M, Wolf G T. Surgery after organ preservation therapy. Analysis of wound complications. *Arch Otolaryngol Head Neck Surg* 1995; 121: 162-165.
3. Lue A. Pharyngocutaneous Fistula after Laryngectomy. Available from [http://www.bcm.edu/oto/grand/08\\_03\\_00.htm](http://www.bcm.edu/oto/grand/08_03_00.htm) accessed on 10 April 2009.
4. Ziadi S H. A monograph on laryngeal cancer. *Pak Journ Otolaryngol: Supplement 2*. 1996; 12.
5. Flint P W. Minimally invasive techniques for management of early glottic cancer. *Otolaryngol Clin North Am* 2002; 35(5): 1055-66.
6. Pradhan S A, D'Cruz A K, Pai P S, Mohiyuddin A. Near-total laryngectomy in advanced laryngeal and pyriform cancers. *Laryngoscope* 2002; 112(2): 375-80.
7. Couch M E. Laryngopharyngectomy with reconstruction. *Otolaryngol Clin North Am*. 2002; 35(5): 1097-114.
8. Gallo A, Moi R, Simonelli M, Vitolo D, Fiorella M L, Marvaso V, Mancio V, de Vincentiis M. Salvage resection after previous laryngeal surgery: total laryngectomy with en bloc resection of the overlying cervical skin. *Arch Otolaryngol Head Neck Surg* 2001; 127(7): 786-9.
9. Thakar A, Bahadur S, Mohanti Bk, Nivsarkar S. Clinically staged T3 N0M0 laryngeal cancer: how is it best treated? Definitive radiotherapy with salvage surgery v/s combined surgery and radiotherapy. *J Laryngol Otol* 2000; 114: 108-12.
10. Udaipurwala. I H, Iqbal. K, Jalisi M. Current options in the treatment of laryngeal carcinoma. *Pak Journ Otolaryngol* 1995; 11: 96-103.
11. Udaipurwala I H, Iqbal K, Alam J, Jalisi M. Nodal relapse in laryngeal cancer after laryngectomy. *Pak Journ Otolaryngol* 1994; 10: 69-71.
12. Dedivitis R A, Ribeiro K C, Castro M A, Nascimento P C. Pharyngocutaneous fistula following total laryngectomy. *Acta Otorhinolaryngol Ital* 2007; 27(1): 2-5.
13. Nikolaou A C, Markou C D, Petridis D G. Second primary neoplasms in patients with laryngeal carcinoma. *Laryngoscope* 2000; 110: 58- 64.
14. Hassan S, Zaidi A N, Mohammad I A, Raza M. The pattern of ENT diseases in Pakistan. *Pak Journ Otolaryngol* 2000; 16:25-9.
15. Qureshi S S, Chaturvedi P, Pai P S, Chaukar D A, Deshpande M S, Pathak, D'cruz A K. A prospective study of pharyngo cutaneous fistulas following total laryngectomy. *J Can Res Ther* 2005; 1: 51-6.
16. Rohail A, Irshad M, Fahim M. Incidence of pharyngocutaneous fistula after total laryngectomy. *J Fatima Jin Med Coll* 2007; 1(3-4): 64-7.
17. Sobol S M, Prince K, Cronin D. Anterior neopharyngeal diverticulum following laryngectomy. *Head and Neck* 1990; 12: 520-523.
18. Rubin J, Johnson J T, Myers E N. Stomal recurrence after laryngectomy: International risk factors study. *Otolaryngol Head and Neck Surgery* 1990; 103-5 (Pt.1): 805-12.
19. Cruise A, Patal M, Chisholm E. Dilatation of Tracheostomal Stenosis Using Aural Speculums. *Oto-rhinolaryngology, Head and Neck Surgery* 2004; 8(2): 63-64.
20. Donnelly M J, O' Meara N, O' Dwyer T P. Thyroid dysfunction following combined therapy for laryngeal carcinoma. *Clin Otolaryngol* 1995; 20: 54-7.
21. Stoma S E, Robey T C, Devaney K O, Krause C J, Hogikyan N D. Subglottic carcinoma; review of a series and characterization of its pattern of spread. *Ear Nose Throat J* 1999; 78(8): 622-8.