

ORIGINAL ARTICLE

Clinical profile of post-operative complications of total laryngectomy for laryngeal carcinoma: a 12-year observation in Sokoto, Nigeria

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INTRODUCTION

Carcinoma of the larynx is the most common malignancy of the head and neck, and the 11th most common cancer in men, worldwide.^{1,2,3} It is relatively uncommon in women. Globally the male:female sex ratio for laryngeal cancer lies between 2:1 and 10:1 due to regional variations. Laryngeal cancer

accounts for approximately 1.2% of all new cancers diagnosed in the United States, and the American Cancer Society has estimated that one-third of these patients would die of the disease.²

The aetiology is still unknown but, the synergistic action between tobacco smoking

ABSTRACT

Background: Laryngeal carcinoma is the most common malignancy of the head and neck.

Objective: To determine the pattern of post-operative complications following total laryngectomy and to highlight the predisposing factors in our centre.

Methodology: This was a retrospective chart review of 30 patients who consented to total laryngectomy following histologically confirmed laryngeal carcinoma from December 2000 to December 2012.

Results: In the 12 years under review, 30 (58.8%) patients consented to total laryngectomy. Twenty-three (76.7%) were males, while 7 (23.3%) were females, with a male: female ratio of 3.3:1. The age range was 20–75 years, with a mean age of 50.1 years. Post-operative complications were observed in 20 (66.7%) patients. The most common post-operative complications in this study were wound infection and pharyngocutaneous fistula, 4 (20%) cases, each. Others were tracheostomal stenosis 2 (10%), carotid blow out haemorrhage 3 (15%), stomal recurrence 2 (10%), pharyngeal stenosis 3 (15%) and hypocalcaemia 2 (10%). Common organisms isolated from wound swab were the pseudomonas species, which were treated with appropriate antibiotics. Predisposing factors observed in this study were middle age, cigarette smoking, co-existing medical condition, clinical and histologically high-grade cancer.

Conclusion: Meticulous pre-operative planning, good surgical technique and post-operative care will reduce these devastating complications.

Keywords: Cigarette smoking, haemorrhage, otorhinolaryngology, pharyngocutaneous fistula,

and alcohol consumption increases the risk due to their addictive carcinogenic effect on the larynx. Alcohol is thought to promote carcinogenesis through acetaldehyde exposure, malnutrition and desiccation of mucosa. Tobacco acts via polycyclic aromatic hydrocarbons like benzopyrene whose products bind directly to deoxyribonucleic acid (DNA) and ribonucleic acid (RNA).⁴ Other important risk factors that have been implicated include exposure to toxic inhalations of asbestos, formaldehyde and mustard gas and previous neck irradiations. Gastro-esophageal reflux disease (GERD), nutritional deficiency particularly that of vitamins and iron, have all been linked with hypo-pharyngeal and laryngeal carcinoma.^{1,5}

In a multi-centre study conducted in Nigeria, laryngeal cancer along with other head and neck cancers has been listed on the top-ten, and is the second most common otorhinolaryngological cancer in North-West Nigeria.⁶ Symptoms of laryngeal cancer vary according to location, size and degree of invasion of tumour.^{1,3} However, progressive hoarseness and difficulty in breathing are the most common presenting symptoms whereas, dysphagia, neck swelling, cachexia and fetor, indicate advanced disease.

There are various therapeutic options that are employed in the treatment of laryngeal cancer depending on the stage at presentation.³ These treatment options which include radiotherapy, laser surgeries, partial or total laryngectomies with or without neck dissection are planned to provide optimal survival, free of disease, with maximum functional results.

Total laryngectomy is a radical procedure, which entails the removal of the whole larynx. The procedure is useful in the treatment of advanced stages T3 and T4 by TNM (Tumour, Node, Metastasis) staging of laryngeal cancer and as a salvage procedure when previous partial laryngeal surgery or radiotherapy has failed.

Billroth performed the first laryngectomy in 1873 and for much of the 20th century; this

procedure was recognized as the gold standard in the treatment of advanced cancers of the larynx and hypopharynx.^{1,3,7}

Complications following total laryngectomy such as wound infection, pharyngocutaneous fistula, carotid blow out rupture, chyle leak, airway and swallowing problems increases the morbidity and mortality thus, adversely affect the prognosis.^{8,9} Several risk factors have been implicated in the development of complication following total laryngectomy, and these include radical neck dissection, previous radiation, pre-operative tracheostomy and extensive surgery with flap necrosis, poor surgical technique, etc.¹⁰ Early diagnosis and prompt management of these complications is important.

This study aims to find out the pattern of complications following total laryngectomy and highlighting the predisposing factors in our region.

METHODOLOGY

This was a retrospective study of 30 patients who consented to and had total laryngectomy on account of histologically confirmed advanced laryngeal carcinoma at the Department of Otorhinolaryngology, Usmanu Danfodiyo University Teaching Hospital Sokoto, Nigeria, from December 2000 to December 2012. This hospital is the only referral centre for three states in North-West Zone of Nigeria, and receives patients from neighboring countries like Republics of Niger and Benin.

Clinical records of these patients were extracted and reviewed, data that were extracted from the records included biodata, presenting complaints (the main complaints for which the patient sought medical advice), and relevant associated complaints, duration of presenting complaints, duration of symptoms on first presentation, social habits, physical examination findings, x-ray findings of the soft tissues of the neck, findings on computed tomography /magnetic resonance image of the larynx, the site of the lesion in the larynx, histopathological types, post-operative complications, treatment offered,

observed risk factors and follow-up visits.

RESULTS

In the 12years under review, a total of 51 patients were histologically confirmed to be squamous cell carcinoma of the larynx. Eighty-five percent were advanced T4 lesions from the American Joint Cancer classification. However, 30 (58.8%) patients consented to total laryngectomy. Twenty-three (76.7%) were males, while 7 (23.3%) were females with a male:female ratio of 3.3:1. The age range was 20–75years with a mean age of 50.1years. The TNM stage of tumour was T4 N0 M0 in 17 patients, whereas in 13 patients it was T3 N0 M0.

Histologically, 13 patients had well differentiated squamous cell carcinoma, 8 had poorly differentiated squamous cell carcinoma and 7 had moderately differentiated squamous cell carcinoma, while 12 patients received post-operative radiotherapy. Post-operative complications were observed in 20 (66.7%) patients.

The longest follow-up was four years in 4 patients; whereas 2 patients each followed-up for two and one years, respectively while 8 patients defaulted to follow-up after seven months. The post-operative complications in this study (Table 1) were wound infections which occurred 1 week following surgery in 4 (20%) patients and common organisms isolated from wound swab were pseudomonas species, which were treated with appropriate antibiotics. Pharyngocutaneous fistulae (Figure 2) occurred in 4 (20%) patients, with two each at 10th and 11th post-operative day, respectively, and were all successfully managed conservatively.

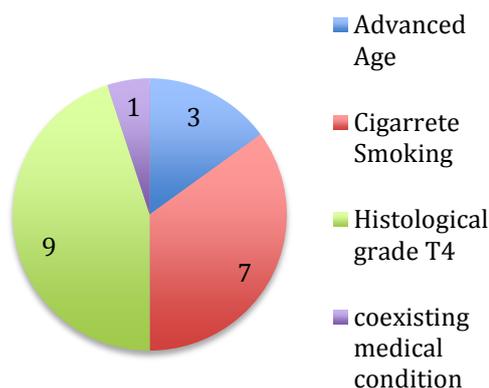
Feeding was through nasogastric tube with high protein diets, and the fistulae closed spontaneously in all four patients within 3 weeks, without any operative intervention. Tracheostomal stenosis occurred in 2 (10%) patients six months post-operatively, and was surgically managed. Carotid blow out haemorrhage in 3 (15%) patients within 3years of surgery and radiotherapy, and all

died. Stomal recurrence was seen in 2 (10%) patients 18months post-operatively and surgical resection of the tumour was carried out followed by radiotherapy. Pharyngeal stenosis in 3 (15%) patients at 5, 6 and 8 months post-operatively and all were managed by dilatation with gum elastic bougies after rigid oesophoscopy, to exclude recurrence.

Table 1. Post-operative complications

Complications	No.	%
Wound infections	4	20
Pharyngocutaneous fistulae	4	20
Pharyngeal Stenosis	3	15
Carotid blow out haemorrhage	3	15
Stomal recurrence	2	10
Hypocalcaemia	2	10
Stomal stenosis	2	10
Total	20	100

Figure 1. Predisposing factors to the development of complications



Also, hypocalcaemia developed in 2 (10%) patients by the 10th post-operative day and was managed with calcium supplements after serum calcium was observed to be persistently low. Less than 40% of these complications were seen after post-operative radiotherapy. Predisposing factors observed in this study (Figure 1) were old age, cigarette smoking, co-existing medical condition, clinical and high histological grade of the

cancer.

Figure 2. Laryngectomised neck showing healing pharyngocutaneous fistula



DISCUSSION

Laryngeal carcinoma is the most common malignancy of the head and neck and represents about 1% of all malignancies in men worldwide.^{1,2,3} It accounts for 40% of all head and neck malignancies and is relatively uncommon in women. Incidence of laryngeal cancer varies globally. The estimated incidence of carcinoma of the larynx in the United States is about 12,000 per annum, while in Nigeria the incidence is estimated at 783 *per annum*. The male:female ratio in North-West Nigeria is 5.7:1 and in the North-East 5.2:1, whereas reports from Pakistan had male:female ratio of 11.5:1.^{6,7} The reason for the predominance of the male gender could be their higher exposure to risk factors of laryngeal cancer.

In our study the peak age incidence was 50 years, while in a multi-centre study in Pakistan the peak age was 52 years. Squamous cell carcinoma constitutes the most common histological type worldwide. In our series, all patients had squamous cell carcinoma, and this agrees with the study from Pakistan by Aslam, *et al.*¹¹ Cigarette smoking and alcohol consumption are known risk factors with additive carcinogenic properties in laryngeal cancer. There was a strong association with cigarette smoking in our study but not to alcohol consumption, by virtue of the religious practices in the region, which

prohibits alcohol consumption. All patients in our series admitted to being or were wives of chain smokers of cigarette for some years.

The most common presentation of laryngeal cancer in our series is upper airway obstruction (85%) followed by hoarseness, which is at variance with studies conducted by Wahid with hoarseness (100%) as the most common. Likewise in Ahmad's study the most common presentation of patients was hoarseness (92%) followed by odynophagia (28%).¹² Sangi, also, reported hoarseness as the most common (94.1%) presentation of laryngeal carcinoma.¹³

The treatment option for laryngeal carcinoma revolves around various factors like the clinical stage of the tumour, site of the tumour, lymph node metastasis, general health of the patient, age of the patient, experience of the surgical team and associated co-morbid disorders.¹⁴ In this study, all the patients presented in advanced T3 and T4 lesions, using the American Joint Cancer classification. The acceptable mainstay of treatment for advanced T3 and T4 laryngeal cancers is total laryngectomy with post-operative radiotherapy.^{1,2,3,6,7}

Total laryngectomy was performed in all our patients, with radical neck dissection in 9 (30%) patients, which is in agreement with the experience of Liu where total laryngectomy was performed in 72.4% patients and radical neck dissection in 34.8% patients. Similarly, Ampil revealed that total laryngectomy was performed in all the patients having Stage IV carcinoma of larynx, the same experience in Fazal's study in which total laryngectomy was performed in all patients and radical neck dissection in 8 cases (30.76%).^{15,16}

The most common complication after total laryngectomy is pharyngocutaneous fistula. In our study, wound infection and pharyngocutaneous fistula are the two most common complications, with 4 (20%) patient each developing these complications (*Table 1*). Post-operative wound infections are a major source of infectious morbidity in total

laryngectomy patients. The overall incidence of post-operative wound infection reported after major head and neck surgery is 23% and this becomes higher in those patients who have received pre-operative radiotherapy.¹⁵ None of our patients received pre-operative radiotherapy.

All our 4(20%) patients with wound infection had pseudomonas organisms isolated from the wound swab culture and were treated with appropriate antibiotics. This varies from reports where methicillin-resistant staphylococcus aureus (MRSA) has been implicated as the most important aetiological factor.¹⁷ Pre-operative administration of broad-spectrum antibiotics reduces the risk of infection. In total laryngectomy patients, 1gm cefazolin with 500mg of metronidazole has been recommended as surgical prophylaxis.^{18,19}

Inappropriate sterilization and poor ward sanitation were the risk factors resulting in the development of post-operative wound infection in our study. The reported incidence of pharyngocutaneous fistulae in the literature is 4%-15.9% which is lower than in our study of 20%, and the reason could be our small sample size of 30 patients. Low post-operative haemoglobin level is a significant risk factor in the development of pharyngocutaneous fistula. All our patients had low post-operative haemoglobin level <10gm/dl.

Other factors that could affect the incidence of development of pharyngocutaneous fistulae are pre-operative radiotherapy, positive surgical margins or extended hypopharyngeal mucosal excision.^{20,21} In our study, all fistulae closed spontaneously (*Figure 2*) without any operative intervention, as also reported previously in literature, with 70% fistulae known to close spontaneously. Three patients (15%) in our study presented with post-operative dysphagia and following rigid endoscopic examination to rule out recurrence, pharyngeal stenosis was seen and all were treated with repeated pharyngeal dilatation. Poor technique and insufficient mucosa for pharyngeal reconstruction are risk

factors in our study.

The incidence of nodal metastasis reported in literature is 44% supraglottic, 20% subglottic and 5% glottis.⁷ In our study, three patients (15%) developed recurrent nodal metastasis resulting in carotid blow-out haemorrhage and died despite radical neck dissection. Stomal recurrence occurred in 2 (10%) patients and was excised, and a new stoma refashioned.

Calcium supplements were instituted for 2 (10%) patients with post-operative hypocalcaemia. These patients had advanced T4 lesion at presentation, which is a risk factor in our study. The complication of tracheostomal stenosis is reported to have an overall incidence of 28% in the literature.^{22,23} Stomal stenosis also developed in 2(10%) of our patients and was managed by stomal revision. Important factors implicated in the incidence of tracheostomal stenosis included the female gender (smaller size trachea compared to male), technique of tracheal resection (with beveling having a lower incidence of stenosis compared to circular resection) and infection at the mucocutaneous junction leading to granulation tissue formation and healing by scarring which further reduces the stomal diameter.

CONCLUSION

Wound infection and pharyngocutaneous fistula are the most common complications following total laryngectomy though infrequently, but when they occur, will increase the morbidity and mortality. Clinical stage of tumour, pre-operative radiotherapy and low post-operative haemoglobin are important risk factors in the development of post-operative complications after total laryngectomy. Meticulous surgical operative technique and post-operative radiotherapy for advanced laryngeal lesion will reduce these complications.

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