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Laryngeal Cancers in Sub-Saharan Africa

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1. Introduction

Laryngeal cancers are not common¹. Squamous cell carcinomas of the larynx are the commonest head and neck tumour in the western world. It represents approximately 1% of all malignancy in males¹. It's about five times common in men than in women. The cause is unknown but tobacco smoking and alcohol acting synergistically increases the risk, radiation, asbestos and a number of occupational factors are implicated. Patients usually present with progressive hoarseness and difficulty in breathing, pain is an uncommon symptom whereas dysphagia, neck swelling, cachexia and fetor indicate advance disease. All patients in our series are black Africans and unfortunately they presents late. The cancer is confirmed by biopsy of the tumour through direct laryngoscopy under general anaesthesia. And tentative treatment depends on the stage of the tumour.

2. Research methodology

This would be 10 years retrospective studies of black African patients with laryngeal carcinomas carried out in University of Maiduguri Teaching Hospital Maiduguri, Federal Medical Centre Nguru, Federal Medical Centre, Yola. These hospitals are located in the North Eastern region of Nigeria, Sub-Saharan Africa. These centers also receive patients from neighboring countries of Niger, Chad and Cameroon. Clinical records of all patients with histologically confirmed laryngeal carcinoma from January 2001 - December 2010 were reviewed, data extracted from the records includes biodata, presenting complaints (the main complaints for which the patient sought medical advice), and associated complaints (complaints regarded as unimportant by the patient), duration of presenting complaints, duration of symptoms on first presentation, Social habit, physical examination findings, X-ray of soft tissue neck, CT-Scan/MRI of the Larynx findings, the site of the lesion in the larynx, histopathological types, treatment offered and symptom free period after treatment (last entry in the case note) . Data was analyzed using Statistical Package for Social Sciences (SPSS) - version 15 software. Descriptive analysis done for all data; Chi square test, and correlation studies were applied where appropriate. Results was presented in tables and graphs. P - Value < 0.05 was considered significant.

3. Literature review

Grossly the larynx extends from the superior border of the epiglottis to the inferior border of the cricoid cartilage. Anteriorly, it is related to the lingual epiglottis, the thyrohyoid membrane, the anterior commissure, thyroid cartilage, cricothyroid membrane and the anterior arch of the cricoid cartilage. The posterior relations are the posterior commissure the arytenoids, and the interarytenoid Space.¹ Squamous cell carcinoma of the larynx is the commonest head and neck cancer in the Western world. In the UK it represents approximately 1% of all malignancies in men. (Powell and Robin, 1983). It is about five times commoner in males than in females. The incidence increases with age, but the peak age of presentation is in the seventh decade. The cause of cancer of the larynx is not known, but there is an indisputable relationship between tobacco smoking and alcohol consumption, (US surgeon general, 1979; Hinds, Thomas and O'Reilly, 1979). Verrucous carcinoma is a distinct variant of well differentiated Squamous cell carcinoma. (Ackerman's tumour). Other malignant tumour types include adenocarcinoma, adenoid cystic carcinoma, fibrosarcoma, Chondrosarcoma and lymphomas. Spread and growth depends on the site of origin of the primary tumour. Anatomical barriers are important factors in determining the direction and extend of tumour growth.

1. **Supraglottis.** This comprises the larynx superior to the apex of the ventricle. Exophytic supraglottic cancers do not often extends to the glottic region and seldom involve the thyroid cartilage, Ulcerative lesions may extend down below the anterior commissure, Cranially supraglottic cancers extend to the vallecular and base of the tonque, arytenoids cartilage and pyriform sinus is reach by deep invasion.^{1,2}
2. **Glottis.** This comprises the vocal cords and the anterior and posterior commissures. Most of the tumours originates in the free margins of the vocal cords which are covered by squamous epithelium. Tumour may extend along the cord to the anterior commissure and to the muscles of the vocal cord. Fixation of the vocal cords indicate deep invasion
3. **Subglottis.** This extends from the inferior border of the glottis to the lower border of the cricoids cartilage, tumours are rare, grow circumferentially, usually extensive before symptoms appear which is mainly inspiratory stridor.^{1,2}

4. Clinical features

Hoarseness is the main symptoms; ^{1, 2, 3}. Dyspnoea and stridor are late symptoms and usually indicate an advanced tumour. Pain in the throat is an uncommon symptom. Dysphagia indicates pharyngeal invasion Neck swelling indicate extra laryngeal extension or lymph nodes involvement. Symptoms of anorexia, cachexia and fetor imply advanced disease. Indirect laryngoscopy should reveal the site and size of the lesions however because of difficulty in examining the subglottic and the laryngeal surface of the epiglottis. Flexible Fibre optic laryngoscopy helps in visualizing all part of the larynx. The neck should be palpated for the presence of enlarged lymph nodes. Laryngeal tumours usually metastasize to the upper deep cervical lymph nodes, but supraglottic tumours may cause bilateral nodes, and some subglottic tumours may spread to the upper mediastinal nodes.

Palpable lymph nodes are important in determining prognosis, about one-third of patients with no palpable lymph nodes have histologically positive nodes, and a similar number of palpable nodes are histologically negative.

5. Investigations of patients with laryngeal cancer

The main stay of investigation in our center was radiography. Plain X-rays soft tissue neck was done by the entire patient studied. Although plain X-rays soft tissue neck has no role in the current management of patients with carcinoma of the larynx, prevertebral soft tissue thickness, the epiglottis can be visualized; it is also affordable in the developing countries. Cost about 8USD. Computerized tomography scan(CT-Scan) which include contrast enhanced helical CT scanning has a high sensitivity 91% and high negative predictive values of 95% in detecting cartilage invasion of CA larynx⁷. In our survey only 15(16.1%) of our patients had CT scanning done. This is due to the high cost of CT scan per session. It cost about 300USD and most of the patients live on less than a Dollar a day. Magnetic resonance imaging(MRI) which has several advantages over CT-scan especially in pre- surgical planning can only be done by 6(6.5%) of our patients due to the cost per session of 400USD. The multiplanner capabilities of MRI are superior to the reformations available with the traditional CT-scan. MRI has been found to have a sensitivity of 89-94%, specificity 74-88% and a negative predictive value of 94-96% for the detection of neoplastic invasion⁷. Positron emission tomography (PET) which is critical in detection of metastasis and for follow-up of treated patients, but sadly such services is nonexistent in most developing nations.

6. Treatment options 1, 2, 3, 5, 6

The standard treatment of laryngeal carcinoma is surgery and radiotherapy in varying combinations. Surgery involves partial or total removal of the larynx to achieve cure, radiotherapy have been found to be effective in early laryngeal cancers (T1 and T2) with local control ranging from 70-100%. In advance laryngeal cancers (T3 and T4) post operative chemoradiation can achieve loco-regional control.⁴

	frequency	Percentage (%)
Partial laryngectomy and radiotherapy	6	6.5
Total laryngectomy and radiotherapy	18	19.3
Radiotherapy alone	32	34.4
Chemotherapy and radiotherapy	37	39.7

Table 1.

	1-2 years	3-4years	5-6 years	7-8 years	9-10 years	Total
Male	30	17	6	0	3	78
Female	6	3	0	3	0	15
Total	36	20	6	3	3	93

Table 2. Symptom free period

	<1year	1-2years	3-4years	5-6years	7-8years	9-10years	Total
supraglottic	9	12	5	3	3	3	35
glottic	0	0	6	3	0	0	9
subglottic	3	0	6	0	0	0	9
transglottic	13	24	3	0	0	0	40
total	25	36	20	6	3	3	93

Table 3. Symptom free period

Most patients in our series were offered synchronous therapy of chemoradiation because of late presentation 54(58%) and 27(29%) presented in stage III and stage IV respectively, however the survival rate barely 1-2years and because of late presentation in our series most glottis tumours have progressed to transglottic on presentation with average symptom free period of 3years after treatment. Overall 6(6.5%) had partial laryngectomy and post-operative radiotherapy, 18(19.3%) had total laryngectomy and post-operative radiotherapy, 32(34.4%) had radiotherapy alone and 37(39.7%) had chemotherapy and radiotherapy. The common agents used in our series include cisplatin, 5-fluorouracil, docetaxel and Adriamycin in varying combinations and administered either as neoadjuvant, adjuvant or concomitant chemotherapy.

7. Discussion

Laryngeal cancer is the most common cancer of the aerodigestive track, it accounts for 20% of all head and neck cancers. The incidence of these tumours is closely correlated with smoking cigarettes, as head and neck tumours occur 6(six) times more often among cigarettes smokers than among non smokers.

Cancer of the larynx has been found to be commoner in males, it occurs in increasing age with the peak incidence being in the 5th decade.

In our study, 93 patients were surveyed with carcinoma of the larynx, 78 (83.9%) male and females constituted 15 (16.1%) mean age of 56 years (+ 6- 8yrs), M: F=5.2:1.

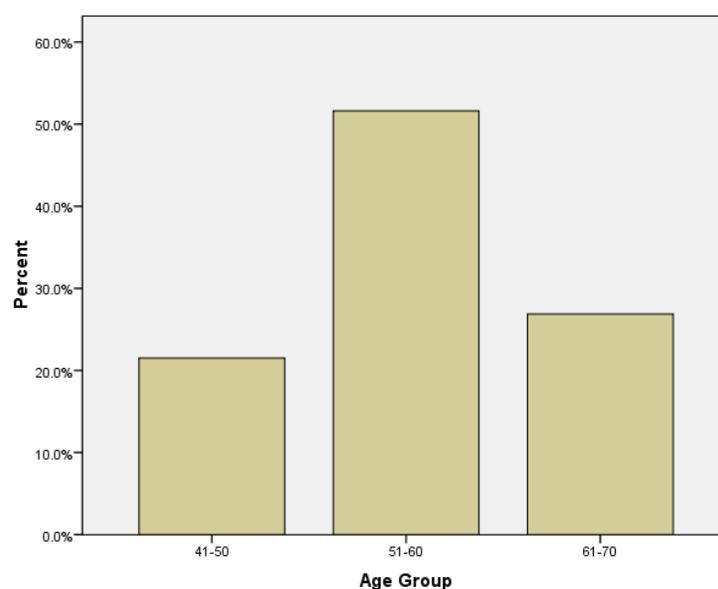


Fig. 1. Age distribution

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. Squamous cell carcinoma is the commonest histological type; in our series it constituted 90.3% other were verrucous Carcinoma, 32% and Adenocarcinoma 6.5%. Studies conducted elsewhere in the country by Amusa et al also showed the histological type to be predominantly squamous cell. ⁸

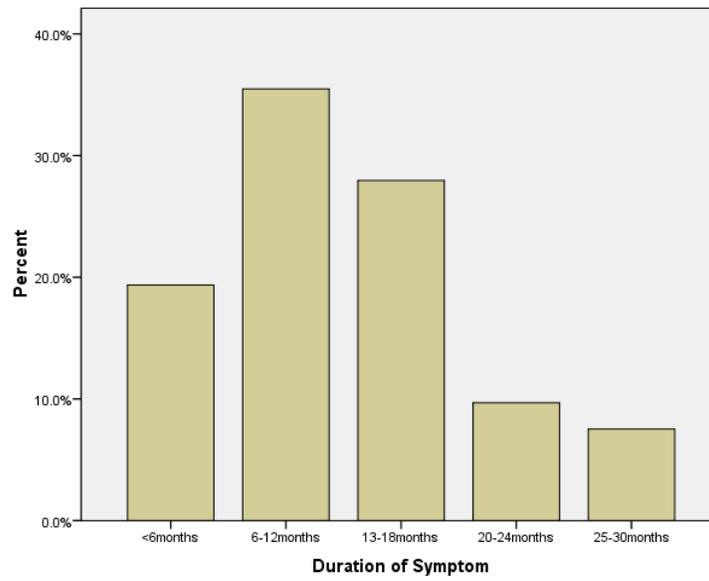


Fig. 2. Duration of symptoms

	frequency	Percentage (%)
Squamous cell carcinoma	84	90.3
Verrucous carcinoma	3	3.2
Adenocarcinoma	6	6.5
Total	93	100.0

Table 4. Histological types

Transglottic carcinoma was found to be the commonest with 40 (43.0%), supraglottic, 35 (37.6%): table V. This is in contrast to other studies in which most laryngeal cancers arise from the glottis,⁹ this could be due to the late presentation in most of the patients with loco-regional involvement, (images 1, 2 and 3)

Site	N (%)
Transglottic	40(43.0)
Supraglottic	35(37.6)
Glottic	9(9.7)
Subglottic	9(9.7)
Total	93(100.0)

Table 5.

Most of the patient presented with stage - III tumours, this is in agreement with most head and neck tumour presentation in developing countries.

	Supraglottic	Glottic	Subglottic	Transglottic	Total
Male	29	9	6	34	78
Female	6	0	3	6	15
TOTAL	35	9	9	40	93

Table 6. Site of lesion

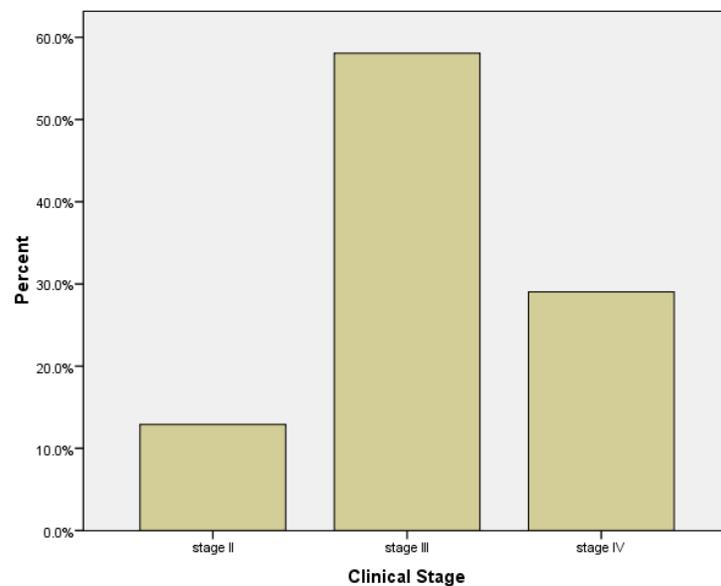


Fig. 3. Clinical stage at presentation

There was a significant correlation between the clinical stage of the tumour at presentation and the site of the lesion, most patient present with stages III & IV transglottic or supraglottic tumour. $P < 0.05$ (0.000).

	Stage II	Stage III	Stage IV	Total
Supraglottic	3	20	12	35
Glottic	9	0	0	9
Subglottic	0	9	0	9
Transglottic	0	25	15	40
Total	12	54	27	93

Table 7. Correlation between clinical stage of patient and site of lesion

Correlation also exist between the site of the lesion and the social habit of the patients, with those who smoke cigarettes and drink alcohol presenting more with glottis tumours $P < 0.05$ (0.00) This could be due to the synergistic effect of cigarette smoking and alcohol on head and neck tumours.

	Supraglottic	Glottic	Subglottic	Transglottic	Total
smoke	12	0	0	15	27
alcohol	0	0	0	3	3
Smoke and alcohol	3	6	3	3	15
None	20	3	6	19	48
Total	35	9	9	40	93

$P < 0.05$ (0.000)

Table 8. Correlation between social habit of patients and site of lesion

Site of lesion	Stage II	Stage III	Stage IV	Total
Supraglottic	3	20	12	35
Glottic	9	0	0	9
Subglottic	0	9	0	9
Transglottic	0	25	15	40
Total	12	54	27	93

And the site of lesion $P < 0.05$ (0.000)

Table 9. Correlation between the clinical stages of the tumour

8. Conclusion

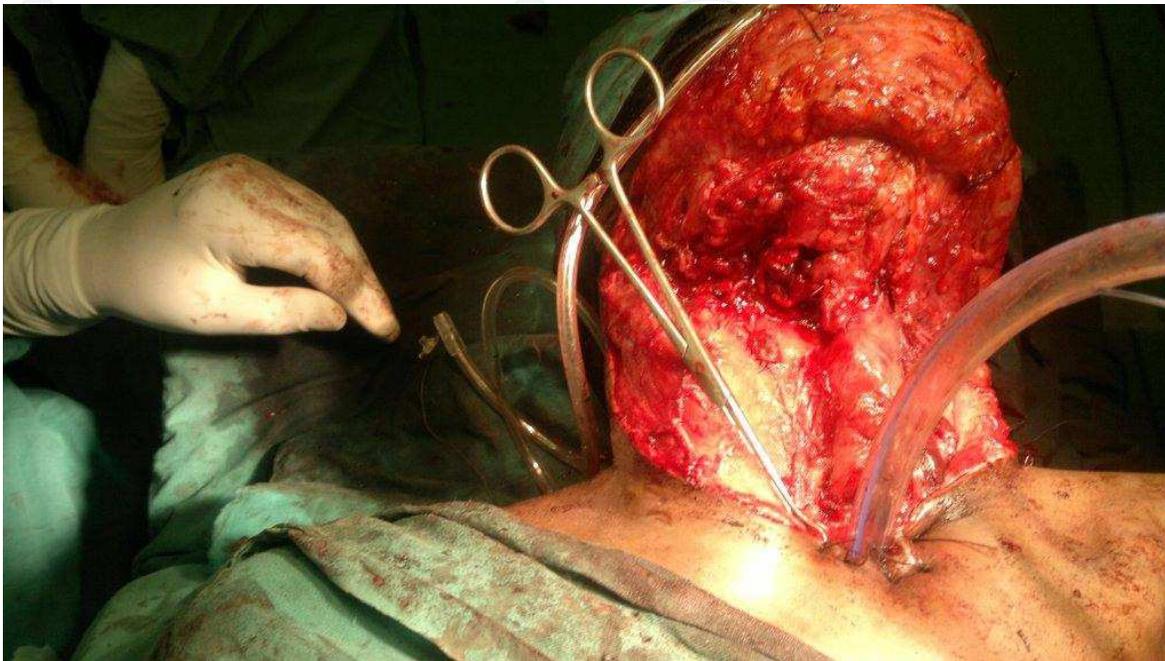
In conclusion black African patients in our study typically present late which accounts for the higher number of transglottic and supraglottic cancers. Among some of the reasons for late presentations are lack of affordability and accessibility by most patients to tertiary health facility in developing countries like Nigeria. The national health insurance scheme covers less than 10% of the population of 150million Nigerians thus living the majority to pay an exorbitant fee for health care services. Another reason is the absence of radiotherapy centers in most tertiary health facility in developing countries such that patient have to travel a long distance with their relatives to access such services further increasing the cost of treatment and delay before presentation.

Finally there is a need to educate the general public and especially health care providers to promptly refer patients with hoarseness of more than 2 weeks duration for direct laryngoscopy and biopsy by an otolaryngologist.

Most countries in sub-Saharan Africa are now emerging democracies, and thus the challenges of infrastructural development and health care reforms are central to effective governance.

In Nigeria for instance in the last ten years about 20 tertiary health centers are established by the governments and the existing teaching hospitals are completely overhauled to improve service delivery particularly in the area of cancer management, new radiotherapy centers are established to complement the old existing ones, which are also upgraded. Also most states in Nigeria have upgraded some of their secondary health centers to specialist tertiary health care centers while the existing secondary health centers are renovated and equipped with modern facilities. Personnel are also trained to reduce the doctor to patient's ratio and also to manage the new and modern equipments, for example a decade ago there are about 30 trained ENT surgeons practicing in Nigeria but with better facilities and more training centers there are now about 350 ENT surgeons in Nigeria. Patients are now seeking prompt medical consultations to find solutions to their health problems, this is partly made possible by continuous health education through both electronic and prints media. However there are some problems militating against improved health care services particularly in cancer management, these are, paucity of clinical pathologist, lack of regular maintenance of medical hardware's partly because of lack of spare parts and the technical knowhow in sub-Saharan Africa.

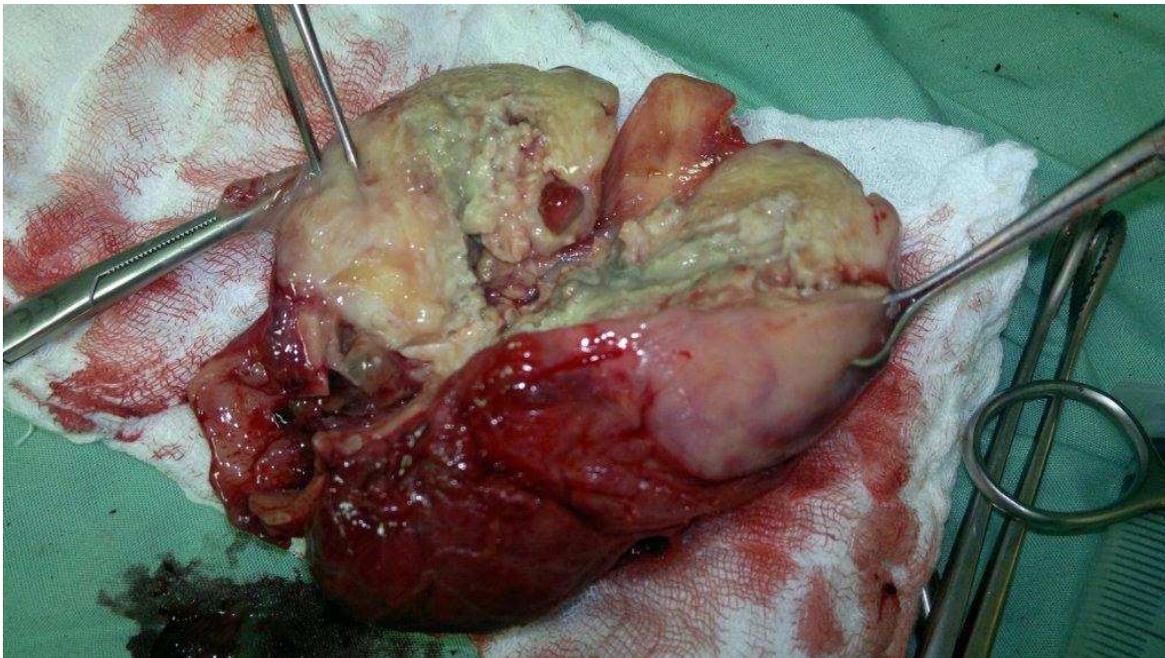
The future direction in head and neck cancer management in Africa is promising because both governments and non-governmental organizations are establishing various cancer treatment centers to complement the existing centers. Through the non-governmental organizations doctors and other health care workers all over the world are visiting and assisting African patients from all field of medical specialty.



Picture 1. Gluck Sorenson incision and flap Secured to the chin, with tracheostomy Pre-operatively done to relieve airway obstruction.



Picture 2. A complete surgical specimen of the larynx with hyoid bone.



Picture 3. A Longitudinal cut through laryngeal specimen showing the Transglottic spread of the tumour

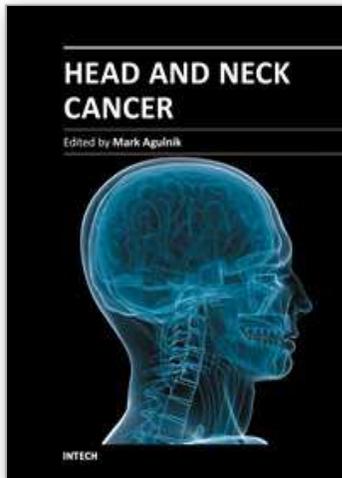
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Head and Neck Cancer provides an interesting and comprehensive overview of all aspects of head and neck cancer including overviews of the disease, basic science aspects pertaining to the disease, diagnosis, treatment and outcomes for patients with this disease. The chapters written by world renowned experts cover the entire discipline of head and neck oncology and include discussions of regional disparity is, advances in basic science understanding, advances in her radiotherapy, chemotherapy and targeted agents as well as a focus on reconstruction, prostheses, and aspects of quality of life and health outcomes. The book is designed to be both practical and comprehensive for every physician treating his complex disease.

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