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Malignant Orofacial Tumors in Children and Adolescents: A Clinicopathologic Review of Cases Treated in a Teaching Hospital Northwest Nigeria

Olatunde Oluleke Omisakin
Department of Surgery, Dental/Maxillofacial Unit,
Barau Dikko Teaching Hospital, Kaduna State University, Kaduna, Nigeria

ABSTRACT

Background study: Orofacial tumors in children and adolescents are relatively uncommon. Malignant variants of these tumors are rare, but they are life threatening. There are few studies on the clinico-pathological review of these malignant tumors in children and adolescents in Nigeria, therefore this review is essential to give information on the diagnosis of these tumors by dentists. Objective: To give overview of our management protocol for these tumours in North-West, Nigeria. Materials and Methods: This was a retrospective study of the children and adolescents aged ≤19 years who were presented to Barau Dikko Teaching Hospital, Kaduna, Nigeria with malignant tumors in the orofacial region. The study reviewed cases within fourteen years from January, 2009 to December, 2022. Information was extracted from patients' case files, histopathology records and slides. Data collected includes: the age of patient at presentation, gender, location of tumor, clinical features, histopathology, treatment and complications. Results: The mean age (S.D) of patients was 11.3 (±4.9) years (range, 3.5 – 19 years). Male-to-female ratio was 1.64:1.00. The total number of patients seen during this period was 6500, of which 215 adolescents aged ≥19years had tumors and tumor-like lesion of the orofacial region. Out of these, 37 (17.22%) were malignant tumors. Sarcomas (n= 15, 40.54%) were the most common malignant tumors, followed by lymphomas (n=13, 35.13%) and then carcinomas (n=7, 18.92%), Neuroblastoma (n=2, 5.41%) was the least seen tumor. Osteosarcoma and rhabdomyosarcoma were the most common sarcomas. Carcinoma affected children in first, second decade of life; surface mucosa and glandular tissues were mostly affected. The treatments for these tumors were: surgical excision, chemotherapy and radiotherapy. Complications after treatments includes: tumor recurrence, resistant of the tumor to both chemotherapy and radiotherapy, tumor distant metastasis and death. Conclusion: Our findings established the frequent occurrence of malignant orofacial tumors in children and adolescents, with sarcomas being the most common and most life threatening in North-west, Nigeria. Further studies of these tumors would provide information and help in their diagnosis.

Keywords: Malignant, orofacial, tumor, children, adolescents.

INTRODUCTION

Children and adolescents constitute about a third of the world's population and their health status is important for every country.[5] Healthy growth of these children should be paramount to any ideal society. Health care needs of these children should be an integral part of government policies.

Many authors have reported that malignant orofacial tumors are rare in children and adolescents when compared to the adult population in Nigeria**.** These tumors when neglected causes facial disfigurement and destruction of facial bones with compromise to the airways and digestive system as well as adjacent structures such as blood vessels. Severe haemorrhage have been reported from these malignant tumors. Several of the affected children have been found to be severely malnourished, anaemic and wasted.

Environmental factors such as viral infections, chronic malnutrition, trauma, alcohol and tobacco intake have been fingered in the aetiopathogenesis of the orofacial tumors.[3-5] However, genetic predisposition has been documented for some oral tumors.[4] Malignant tumours in children have been classified into Lymphomas, sarcomas, carcinomas, and other malignant peripheral nerve sheath tumor. Lymphomas are malignant lesions that can arise from any type of lymphocyte but arise mostly from B-cells. They comprise Hodgkin's and non-Hodgkin' lymphoma. Several African authors[3-6] have reported Burkitt's lymphoma to be the most common malignant childhood tumor in the tropics.[3] It is predominantly extranodal and Epstein bar virus has been implicated in it's aetiology.[4] Its onset is in childhood and the jaw is the single most common initial site.[4-6] Sarcomas are malignant connective tissues tumors which affects orofacial tisusues and other body tissues. Osteogenic sarcoma, rhabdomyosarcoma, fibrosarcoma, and Ewings sarcoma were the common types that affects children and adolescent. They present as rapidly growing tumor of both hard and soft tissues. Carcinomas in children affects surface mucosa like tongue and glandular tissue like salivary glands.

However, the clinical features of these malignant tumors includes: presence of sores on the oral tissue, nodular growth on the oral mucosa, dental anarchy, and facial disfigurement, rapidity of growth, bleeding from the tumor which could be provoked or spontaneous, high rate of recurrence, associated pains, weight loss, obstruction of the oral cavity and airway by the tumor. The diagnosis of the tumor is based on good history taking about the time of onset of the tumor, any associated pains, bleeding from the tumor, and clinical examination of the consistency and margins of the tumor, nature of the overlying mucosa, any sore on the tumor, any lymph node affectation, and any distant metastasis.

Therefore, this study was carried out to report the clinical features, the pathology and treatments of orofacial malignant tumors in children and adolescents and to compare with findings of previous with reports from other Centers around the world.

MATERIALS AND METHODS

This was a retrospective study of the children and adolescents aged ≤19 years who presented to Barau Dikko Teaching Hospital, Kaduna, Nigeria with malignant tumors in the orofacial region. The study reviewed cases a period fourteen years from January 2009 to December 2022. Information were retrieved from patients' case files, histopathology records and slides.

Information such as age of patient at presentation, gender, location of tumour, clinical features, histopathology diagnosis, treatment, and complications were retrieved.

Ethical approval was obtained from the hospital ethical committee, and with the assistant of record department; outpatient clinic register, ward register and theatre register were used to trace the records of the children diagnosed with these malignancies.

The data collected was analyzed using the software SPSS for Windows (version 12.0: SPSS, Chicago, IL). For analysis, Simple percentage Charts, descriptive statistics, and test of significance were used. A level of $P < 0.05$ was considered to be statistically significant.

RESULTS

A total of 215 tumors and tumor-like lesion of the orofacial region were seen in patients' ≤19 years during the period of the study. Of these, 37 (17.22%) were malignant tumors. The mean age (S.D) of patients was 11.3 (±4.9) years (range, 3.5 – 19 years). Male-to-female ratio was 1.64:1.00. Majority of the patients were in the second decade of life at the time of diagnosis (Table 1). Sarcomas (n= 15, 40.54%) were the most common malignant tumors, followed by lymphomas (n=13, 35.13%) and then carcinomas (n=7, 18.92%), Neuroblastoma (n=2, 5.41%) was the least. Carcinomas exclusively affected patients in the 2nd decade of life and were predominantly glandular and mucosa carcinomas. Osteosarcoma and rhabdomyosarcoma were the most common sarcomas. The most common site of occurrence of orofacial tumours in children was the mandible (n=16, 43.42%), followed by the maxillae (n=12, 32.43%) (Table 2).

Table 1: Age Distribution of Orofacial Malignant Tumors

Histologic Types	Age (Years)		Total
	0 – 9	10 – 19	
Sarcomas			
Embryonal Rhabdomyosarcoma	4	1	5
Osteosarcoma	2	5	7
Fibrosarcoma	0	2	2
Ewings Sarcoma	0	1	1
Lymphomas			
Non-Hodgkin Lymphoma	4	7	11
Hodgkin Lymphoma	0	2	2
Carcinomas			
Squamous Cell Carcinomas	0	3	3
Mucoepidermoid Carcinoma	1	2	3
Adenocarcinomas	0	1	1
Neuroblastoma	2	0	2
Total	13	22	37

Table 2: Site and Gender Distribution of Patients

Histologic Types	Gender[a]		Site distribution[b]									
	M	F	Man	MX	M/M	Palate	TG	FL	Ck	Pr	Neck	Total
Sarcomas												
Rhabdomyosarcoma	1	4	1	1	0	0	0	0	1	1	1	5
Osteosarcoma	5	2	4	2	0	1	0	0	0	0	0	7
Fibrosarcoma	0	2	1	1	0	0	0	0	0	0	0	2
Ewings Sarcoma	0	1	1	0	0	0	0	0	0	0	0	1
Lymphomas												
Non-Hodgkin Lymphoma	8	3	6	3	2	0	0	0	0	0	0	11
Hodgkin Lymphoma	2	0	2	0	0	0	0	0	0	0	0	2
Carcinomas												
Squamous Cell Carcinomas	2	1	1	0	0	0	1	1	0	0	1	3

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Mucoepidermoid Carcinoma	2	1	0	2	0	0	0	0	0	1	0	3
Adenocarcinomas	0	1	0	1	0	0	0	0	0	0	0	1
Neuroblastoma	2	0	0	2	0	0	0	0	0	0	0	2
Total	23	14	16	12	2	1	1	1	1	2	2	37

[a] M: male; F: female.
[b] Man: mandible/gingivae; Max: maxilla; MM: mandible-maxilla; Pr: parotid; FL: floor of the mouth, CK: cheek; TG: tongue1

Sarcomas

There were 15 patients in this group, constituting 40.54% of the malignant tumors. Sarcomas predominantly occurred in the 3.5 -19 years age group (Table 1) and the male-to-female ratio was 1:1.5 (Table 2). Osteosarcoma and rhabdomyosarcoma were the most frequent lesions in this group. Osteosarcomas was exclusively seen in the second decade while rhabdomyosarcoma occurred with equal ratio in the first and second decade of life (Table 1). Histologic variants of the rhabdomyosarcoma were embryonal (three cases) and alveolar (two cases). Ewings sarcoma was the least in occurrence.

Lymphomas

Lymphomas constituted 35.13% of the malignant tumors. Of these, 11 (84.62%) were non-Hodgkin's lymphomas. Only 2 (15.38%) cases of Hodgkin's lymphomas were diagnosed. Lymphomas predominantly occurred in the 0-9years age-group (Table 1). Ten (90.10%) of the 11 cases of non-Hodgkin's lymphomas were Burkitt's lymphoma.

Carcinomas

There were seven patients with histologic diagnosis of carcinomas, constituting 18.92% of all the malignant tumors. The cases occurred at first and second decade of life (range, 9-15 years). Both girls and boys were affected. Squamous cell carcinoma occurred on the dorsum of the tongue of a 12-year-old-girl. Mucoepidermoid carcinoma occurred in the maxillae of two boys. Adenocarcinoma occurred in the mandible of a girl.

Neuroblastoma

This occurred in two male patients between the ages of 6 to 9 years. The two cases affected only the maxillae.

Clinical Features:

Sarcomas: All the sarcomas presented as a rapidly growing tumor involving both jaws and soft tissues, with marked facial disfigurement. The tumor often obstructed the oral cavity, caused weight loss, pains and occasional profuse bleeding. The treatment that was administered to the patients include: surgical excision of the tumor with tracheostomy being performed for general anesthesia, followed with chemotherapy and radiotherapy. The complications experienced were: high rate of tumor recurrence, resistance of the tumor to chemotherapy and radiotherapy, death was the ultimate calamity.

Lymphomas: They presented as rapidly growing jaw tumors with dental anarchy, foetor oris, and weight loss. Chemotherapy was the major modality employed with average good prognosis. Resistance to chemotherapy was encountered in few patients. Death was an ultimate complication.

Carcinomas: Mucoepidermoid carcinoma presented as maxillary tumors, with facial disfigurement. Excision of the tumor was the treatment. Tumor recurrence was the common complication. Squamous cell carcinoma of the tongue presented as an ulcerative painful lesion of the dorsum of the tongue**.** Radiotherapy was the treatment of choice.

Neuroblastoma: This presented as tumor of the maxillae with obvious facial disfigurement. Excision of the tumor was done. The two patients treated did not come for regular follow up, therefore it was difficult to assess any tumor recurrence.

DISCUSSION

Malignant orofacial tumors are life threatening. Oral and pharyngeal malignant tumors were the sixth most common malignancy in the world.[1] They were reported to affect all age groups and both genders.[2] However, a considerable proportion of these tumors were reported to affect adult population, and only about 3–5% of head and neck tumors occur in children.[2] Several studies on the epidemiology of malignant lesions among children and adolescents have been conducted worldwide.[5,11,16] The aetiology of most orofacial tumors remains obscure. Genetic predisposition has been suggested while environmental factors such as viral infections, dietary deficiencies, trauma, alcohol, and tobacco intake have been implicated.[11] Most of our patients in this study could not explain how the tumour started, but few cases of sarcoma were attributed to trauma. Most of the cases of Burkitt's Lymphoma in this study occurred in children of low socioeconomic class with obvious evidence of malnutrition. Heidary et al.[19] noted poverty as a risk factor in human cancers drawing their conclusion from an Iranian population affected with different cancers. Oyedeji GA [20] studied the socioeconomic and cultural background of hospitalized children in Ilesha, Nigeria, concluded that majority of children hospitalized were from low socioeconomic status.

Orofacial malignant tumors in children and adolescents accounted for 17.2% of all tumors and tumor-like lesions seen in all age groups in this study. Ajayi et al.[5] reported that they represent 3.3% in their study done in Lagos, Nigeria. Arotiba et al.[10] and Aregbesola et al.[8] reported a prevalence of 40.2% and 51%, respectively. However, Bhaskar et al.[6] examined 293 cases of orofacial tumors among American children and reported that only 9% were malignant. These differences could be due to environmental factors and cultural belief by few Nigerians that cancer cannot be treated.

However, in this present study malignant tumors affected more males than females in the ratio of 1.64 to 1.00. Previous studies [6-10] on malignant tumors attest to this fact of male predominance. Ajayi et al[5] reported male to female ratio of 3:1. Also Aregbesola et al.[11] reported a male-to-female ratio of 2.5:1 in their study. The mandible was the commonest site of occurrence of these tumors in children and adolescents in this study; in contrast to most studies that reported maxillae being most affected.[8-10] The tongue, floor of the mouth, palate, parotid glands, and cheek were least affected.

Sarcomas were the most frequent malignant tumors in the present study, followed by lymphomas with Burkitt Lymphoma (BL) being most predominant, and then carcinomas, neuroblastoma being the least in occurrence. This is in slight variance to previous reports in the literature which reported Burkitt's Lymphomas to be the most predominant tumour. Burkitt's lymphoma accounted for 53% of the malignant tumors and 72% of all lymphomas.[7]

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Males were eight times more affected than females, and maxilla was the predominant site of occurrence.[8] This is consistent with previous reports from Africa.[7,8] Burkitt's lymphoma is a common childhood malignancy in a number of African countries. The Epstein-Barr virus is consistently found in tumor cells of Burkitt's lymphoma which is endemic in East and Central Africa where it is considered an aetiological factor with malaria also considered a pathogenic co-factor.[8,9] It is predominantly extranodal. It is unusual in that its onset is in childhood, in the maxilla and constitutes 89% of tumors seen in children and adolescents in their study. The mean age (8.0±2.6 years) of patients with Burkitt's lymphoma in the present study is similar to the 8.8±3.4 years reported earlier from Nigeria.[8,9] Burkitt's lymphoma is a common childhood malignancy in a number of African countries. This study showed Burkitt's lymphoma affected the maxillae more than the mandible which supports previous report.[11,12]

Rhabdomyosarcoma (RMS) and Osteosarcoma were the two predominant sarcomatous lesion in the present study. This agrees with the findings of Chidzonga et al.[3] and Aregesola et al.[6] Osteosarcoma is a highly malignant tumor and is the most common primary malignant neoplasm of bone though rare in the maxillofacial region. They are reported to affect a considerably younger age group than carcinomas.[12] In a recent report, about 30% of patients with Osteosarcoma were found below 18 years.[13] In contrast, RMS is an aggressive malignant skeletal neoplasm arising from embryonal mesenchyme. It was reported to account for 4-8% of all malignancies in children less than 15 years of age.[12] This tumor is more common in Caucasians and most studies show a slight predominance in males.[11-13] The most common site in children is head and neck region; oral cavity accounts for 10-20% of all head and neck RMS.[13] In the present study, RMS was seen in the first and second decade of life. Embryonal RMS being the commonest and can occur in all age groups, but it is reported to be primarily seen in the first and second decades of life with a peak incidence between 2 and 6 years.[9,10] Our study showed 3 years as the least age affected. Congenital presentation of RMS has also been reported.[14]

Fibrosarcomas are malignant neoplasms of the fibroblast cells, which often exhibit an aggressive and destructive behavior. The surface of the lesion is smooth and it often becomes ulcerated due to trauma. They are non-capsulated tumors, and they can be fixed to the underlying structures. Intraosseous lesion could occur in the periosteal or endosteal region. The patients are usually severely ill and exhibit marked deterioration of the general health.[14] It often arises from the cheek, tongue, gingiva, palate, floor of the mouth, maxillary sinus and the pharynx. Rafindadi et al.[15] in their study of oral tumors in Zaria, Nigeria reported 4 cases of fibrosarcoma in children and adolescents. This study reported 2 cases in females.

Carcinomas were among the least common malignant tumors seen in the children and adolescents in this present study. This was a common finding in most reports.[11-16] Tumor recurrence was a challenge in the management of this tumor in children. Oral carcinoma is considered the most common malignant tumor of the orofacial region in adults.[14] It is an age-related disease, and many researchers [6-10] have reported it to be rare in children under 18 years. However, previous authors have reported few cases in children below 10 years.[12] The least age affected in this study was 9years.

The treatments modalities for these oral tumours include: surgery for sarcomas, carcinomas and neuroblastomas, and chemotherapy for Burkitt's lymphomas. There were recurrences of

sarcomas, most of our patients had excision surgery twice in their course of treatment before eventually succumbing to the fatal blow of the tumor. Sarcomas were resistant to radiotherapy and chemotherapy. While Burkitt's lymphoma responded well to chemotherapy. Surgery was a successful treatment for neuroblastoma. Overall, these malignant tumors were life threatening.

CONCLUSION

Malignant neoplasm constituted 17.22% of orofacial tumors and tumor-like lesion in children and adolescents in this study. This agrees with previous reports from Africa. Malignant orofacial tumors pose great danger to the lives of children and adolescents alike. Therefore, more research is needed to get successful treatments for these ailments as the current treatment modalities are not sufficient.

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