Pattern of maxillectomies: an analysis of 44 cases in a tertiary referral hospital, Sokoto, Northwest Nigeria

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Background
The maxilla occupies a prominent and crucial position in the facial structure. Maxillectomy is an ablative surgical resection of the maxilla with attendant serious cosmetic deficit. There is paucity of data on the indications and pattern of maxillectomy in our centre. This study would help in better management of patients requiring this treatment.
Aim
The aim of this study was to determine the pattern of presentation of patients for maxillectomy at Usmanu Danfodiyo University Teaching Hospital, Sokoto, Nigeria.
Patients and methods
This study was a retrospective review of theatre records of the hospital between January 2007 and March 2017. Patients data were collected for sociodemographics (age and sex), indication(s), clinical presentations, diagnosis/histologic subtypes, and type of maxillectomy performed.
Result
During the 11-year study period, a total of 44 patients underwent maxillectomy, aged 4–77 years (mean±SD=37.6±19.6 years) with a modal age of 31–40 years [11 (25.0%)]. There were 26 (59.1%) male and 18 (40.9%) female patients (male : female=1.8 : 1). Overall, benign lesions accounted for 12 (27.3%) cases and malignant lesions for 32 (72.7%) cases. There was statistical difference between the ages of benign (mean±SD=24.9±16.2 years) and malignant lesions (mean ±SD=42.3±18.8 years) (t=–2.83, $d.f.$=42, P=0.0071). Benign lesions [11 (25.0%)] were commonly detected in those aged 40 years and younger, whereas malignancies [16 (36.4%)] were equally distributed across both divide. Total maxillectomy [34 (77.3%)] was the major surgical resection carried out, followed by subtotal maxillectomy [6 (13.6%)].
Conclusion
There is urgent need to focus on the prevention of orofacial malignancy to avoid surgery and complex rehabilitative expenses.

Keywords:
maxillectomy, orofacial malignancy, squamous cell carcinoma

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Introduction

The midface with complex anatomical landscape and components majorly occupies the middle third of the face [1]. It partakes in activities such as aesthetics, phonation, olfactory, breathing, mastication and swallowing [1,2]. These are crucial to the attainment of high quality of life and socioeconomic and psychological wellbeing. Anatomically, the maxilla is the largest and most prominent bone of the midface [1]. Together with the alveolus and teeth, it is often referred to as upper jaw. It bilaterally engages central position articulating in various directions with other contiguous bones and structures [1,3,4]. It also houses and supports delicate tissues and organs such as the eyes with other orbital contents: nasal cavity, the maxillary teeth and drainage channels such as nasolacrimal duct [3,4]. The paranasal sinuses are air filled epithelial-lined structures in the skull, of which the maxillary antrum is the largest and occupies a large central portion of the maxilla [1,3,4].

Primary benign and malignant tumours of the maxilla are not uncommon and are often the cause of partial or complete surgical removal of the maxilla [3–7]. These lesions could arise from the skin, nasal cavity, the maxillary sinus, oral mucosa, periodontium, minor salivary gland, bone, muscle, connective tissue, odontogenic epithelial remnants and others [3–5]. Secondary lesions could emerge as a result of

metastasis from other parts of the body such as breast, ovaries, uterus, prostate and others [8]. Maxillary tumours frequently remain asymptomatic, and hence late presentation persists, especially in low-income countries, with Nigeria inclusive [3–5,7,8].

Maxillectomy is an ablative surgical resection of the maxilla with or without removal of allied anatomic structures [3,7,9]. It results in significant compromise of sociopyschological status and functional issues such as sight, cosmetic, speech and mastication [3,4,10,11], and thus present tremendous prosthetic and reconstructive challenges [3,4,7,9–12].

There are various conflicting classifications and terms for maxillectomy, which include medial, low, high, limited, subtotal, total, hemi, extended, radical and others [3,4,7,9,12–17]. These classifications used several criteria – for instance, the nature of the maxillary lesion, site of maxilla involved, surrounding anatomical structures affected and prosthetic/reconstructive hurdles [9].

There is paucity of data on this pertinent topic in Nigeria, especially in North West region. Therefore, the aim of this study was to describe the pattern of maxillectomy at Usmanu Danfodiyo University Teaching Hospital, Sokoto, Nigeria.

Patients and methods

This was a retrospective study of clinical, theatre and histopathological records of the hospital between January 2007 and March 2017. Patients' data were collected for sociodemographics (age and sex), indication(s), clinical presentations, diagnosis/histologic subtypes and type of maxillectomy performed. Those with incomplete clinical and histological records were excluded from the study.

Maxillectomy was classified using Durrani *et al.*'s [12] classification.

(1) Alveolectomy involves removal of alveolar bone alone with no oronasal or oroantral fistula.
(2) Subtotal maxillectomy involves resection of the maxilla sparing the orbital wall of the maxilla but causing oronasal and oroantral fistula.
(3) Total maxillectomy involves complete removal of the maxilla, including the orbital wall, with preservation of the orbital contents.
(4) Radical maxillectomy involves complete removal of the maxilla and orbital contents.
(5) Composite maxillectomy involves removal of the facial skin, soft palate and/or any other part of oral cavity in addition to maxillary resection.

Data collected were entered into Microsoft Excel and subjected to statistical analysis using Analyze-it version 2.25 Excel 12+ (Microsoft Office, Washington, USA) (2013) and presented in frequencies and tables. χ^2-Test was applied to determine the differences between categorical variables. Paired *t*-test was used to check mean differences between the groups and *P* value 0.05 or less was regarded as statistically significance. Ethical clearance was obtained from Usmanu Danfodiyo University Teaching Hospital's Research and Ethics Committee.

Results

During the 11-year study period, a total of 44 patients underwent maxillectomy, aged 4–77 years (mean ±SD=37.6±19.6 years), with a modal age of 31–40 years [11 (25.0%)]. There were 26 (59.1%) male and 18 (40.9%) female patients (male : female=1.8 : 1) (Table 1). There was no sex difference in terms of age (*P*=0.9343). Many patients [43 (97.7%)] primarily presented for treatment at 6 months and above after the initial onset of the lesion.

Forty-three (97.7%) patients presented with swelling as the key primary clinical feature; however, a lot of patients had constellations of findings such as headache, pain, epistaxis, nasal obstruction, proptosis and visual loss. Others include malocclusion, limited mouth opening, dysphagia, bleeding, epiphoria and hyposuria.

Overall, benign lesions accounted for 12 (27.3%) cases and malignant lesions 32 (72.7%) cases (Fig. 1). There was statistical difference between the ages of benign (mean±SD=24.9±16.2 years) and malignant lesions (mean±SD=42.3±18.8 years) (*t*=−2.83, *d.f.*=42, *P*=0.0071). Benign lesions [11 (25.0%)] were commonly detected in those aged 40 years and younger, whereas malignancies [16 (36.4%)] were equally distributed across both divide (Table 2).

Table 1 Age and sex distributions of patients who underwent maxillectomy

Age groups (years)	Sex [*N* (%)]		Total [*N* (%)]
	Female	Male	
0–10	3 (6.8)	3 (6.8)	6 (13.6)
11–20	1 (2.3)	3 (6.8)	4 (9.1)
21–30	2 (4.5)	4 (9.1)	6 (13.6)
31–40	4 (9.1)	7 (15.9)	11 (25.0)
41–50	3 (6.8)	3 (6.8)	6 (13.6)
51–60	4 (9.1)	3 (6.8)	7 (15.9)
61–70	0 (0.0)	3 (6.8)	3 (6.8)
71–80	1 (2.3)	0 (0.0)	1 (2.3)
Total	18 (40.9)	26 (59.1)	44 (100)

χ^2=5.35. d.f.=7. *P*=0.6173.

Ossifying fibroma was the most prevalent benign histopathological finding [6 (13.9%)]. The prime malignancies were salivary gland lesions [12 (27.3%)] (mucoepidermoid and adenocystic carcinomas) and squamous cell carcinoma [11 (25.0%)] (Table 2). Total maxillectomy [34 (77.3%)] was the major surgical resection carried out, followed by subtotal maxillectomy [6 (13.6%)] (Table 3).

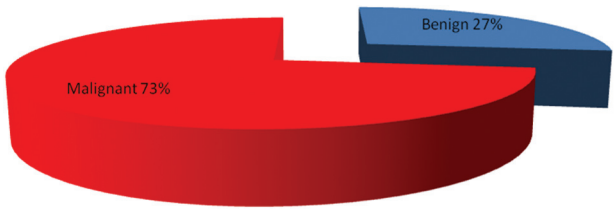
Discussion

The present study revealed a marginal male preponderance in concordance with earlier works from Lagos and Kaduna [4,18]. It, however, contradicts the findings of Eziyi *et al.* [7] from Ile-Ife that showed female dominance.

The fourth decade was the most predominant in this research, which does not resonate with earlier studies that showed that most lesions involving the maxilla occurred mostly among those above the age of 40 years [3–7,18–20]. This could be attributed to the fact that in this study those in this age group had a greater incidence of malignant salivary gland lesions such as mucoepidermoid carcinoma, which is more common in younger age bracket compared with Squamous cell carcinoma, which has a higher incidence in older age groups.

Studies have revealed that in developing countries a number of patients present late, making it challenging to ascertain the location of the initial site of origin of these maxillary lesions [3,4,7,20]. Hence, these lesions spread to adjoining anatomical sites such as orbit, nasopharynx, skull base and intracranium. Those located posterior tend to spread backward, and hence are not easily noticeable until clear signs such as nasal obstruction, epistaxis or visual impairments occur. In contrast, anterior lesions have propensity to grow forward involving the cheek and the oral cavity in many instances. Moreover, fast-growing lesions are aggressive and quickly expansile, thus becoming easily noticeable. In the present study, majority presented after 6 months, in agreement with various study across Nigeria and abroad [4,6–8]. In low-income sub-Saharan Africa, factors such as poor health-seeking behaviour, treatment default, preference for traditional care and poverty have previously been implicated [6,7,18]. Lack of information, poverty, inaccessibility to sound healthcare and inadequate manpower could also be contributory in perpetuating this scenario [18–20]. The literature has shown that as much 90% of those patients with malignancies presented at advanced stage of T3 and

Figure 1



Pie chart of tumour types detected

Table 2 Histopatholgic type and age category of patients who underwent maxillectomy

	Age category [*N* (%)]		Total [*N* (%)]
	≤40 years	>40 years	
Benign (*n*=12, 27.3%)			
Ameloblastoma	1 (2.3)	0 (0.0)	1 (2.3)
Ossifying fibroma	6 (13.6)	0 (0.0)	6 (13.6)
Dentigerous cyst	1 (2.3)	0 (0.0)	1 (2.3)
Neurofibroma	0 (0.0)	1 (2.3)	1 (2.3)
Pleomorphic adenoma	1 (2.3)	0 (0.0)	1 (2.3)
Osteolipoma	1 (2.3)	0 (0.0)	1 (2.3)
Rhinophycomycosis	1 (2.3)	0 (0.0)	1 (2.3)
Malignant (*n*=32, 72.7%)			
Non-Hodgkin's lymphoma	0 (0.0)	2 (4.5)	2 (4.5)
Olfactory neuroblastoma	1 (2.3)	0 (0.0)	1 (2.3)
Haemangiopericytoma	0 (0.0)	1 (2.3)	1 (2.3)
Osteogenic sarcoma	2 (4.5)	0 (0.0)	2 (4.5)
Mucoepidermoid	4 (9.1)	2 (4.5)	6 (13.6)
Burkitt's lymphoma	1 (2.3)	0 (0.0)	1 (2.3)
Rhabdomyosarcoma	1 (2.3)	0 (0.0)	1 (2.3)
Adenocystic carcinoma	4 (9.1)	2 (4.5)	6 (13.6)
Squamous cell carcinoma	3 (6.8)	8 (18.2)	11 (25.0)
Sinonasal carcinoma	0(0.0)	1 (2.3)	1 (2.3)
Total	27 (61.4)	17 (38.6)	44 (100.0)

χ^2=25.55. d.f.=16 *P*=0.0998.

Table 3 Distribution of sex and types of maxillectomy among patients

Types of maxillectomy	Sex [N (%)]		Total [*N* (%)]
	Female	Male	
Radical maxillectomy	1 (2.3)	3 (6.8)	4 (9.1)
Subtotal maxillectomy	3 (6.8)	3 (6.8)	6 (13.6)
Total maxillectomy	14 (31.8)	20 (45.5)	34 (77.3)
Total	18 (40.9)	26 (59.1)	44 (100)

χ^2=0.62. *d.f.*=2. *P*=0.7316.

T4 [4,7,8,18]. Sometimes regional lymph node metastases have been noticed in 3.3–26% of these patients [21].

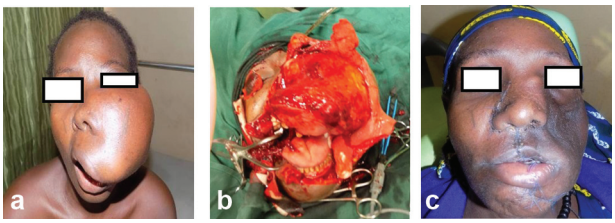
Swelling was the most common clinical finding in the current series. It is a distressing scenario that significantly attenuates aesthetics and could be linked to other clinical findings, including nasal obstruction, epistaxis, epiphoria, proptosis, malocclusion and others [4,6–8,20]. Anecdotally, many young patients, especially females found it quite depressing.

The histological diagnosis for maxillary lesions varies from one centre to the other [3,4,6,7,18–20]. The majority of reports have malignant tumours [4,6,18,19]. An earlier study by Ibikunle *et al.* [6,7] from our centre highlighted that the maxilla was the second most affected site for oral and maxillofacial malignancies with squamous cell carcinoma, mucoepidermoid carcinoma and Burkitt lymphoma predominating. Overall, over 4/5th of lesions identified in this work were malignant. These include epithelial malignant lesions, salivary gland lesions, sarcomas and lymphoma. Alcohol, tobacco and human papilloma virus have been linked to squamous cell carcinoma occurrence [6]. Workers in sectors such as textile, construction, petroleum, mining, smelting and woodworking are reported to be at high risk [3,20,21]. Inhaling toxic substances such as wood dust, leather dust, formaldehyde, paints, hydrocarbon, nickel, chromium, cement and some oils have been associated with sinonasal malignancies [8,20,21].

Our result revealed that the malignant salivary gland lesions were most dominant. This is in sharp contrast with several studies that mentioned squamous cell carcinoma as the principal lesion implicated [3,4,18,22].

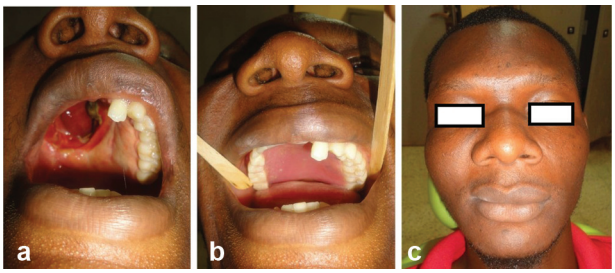
Ogunlewe *et al.* [4] from Lagos in a published series of 30 maxillectomy demonstrated that 26 (86.7%) were total maxillectomies; 10 maxillectomies were performed by Eziyi *et al.* [7] from Ife, six (60.0%) were total maxillectomies. The present study noted that 86.4% (*n*=38) of maxillectomies performed at least involved the total removal of the maxilla (Fig. 2a–c).

Figure 2



(a) Clinical photograph of a patient with maxillary tumour. (b) Intra-operative photograph exposing tumour for total maxillectomy. (c) Postoperative facial profile of patient

Figure 3



(a) Intraoral maxillary surgical defect. (b) Maxillary obturator *in situ* for oral rehabilitation. (c) Clinical photograph of patient after prosthetic rehabilitation

This is in accordance with earlier works from Lagos and Ile-Ife [4,7]. Costly prosthetic and surgical rehabilitation are often needed to restore aesthetics, function, confidence and quality of life of the patients. Controversies rages on whether prosthetic rehabilitation with obturator or reconstruction with microvascular flaps offers the patients the most benefits [23–25]. Our patients were provided with prosthesis (obturator) for rehabilitation and return to function (Fig. 3a–c). Surgical reconstruction of maxillectomy defects eliminates the need for engaging in lengthy fabrication processes of prostheses, which are often considered as bulky and cumbersome [9,10]. These prostheses may also be difficult to insert, especially in patients with trismus and may also be challenging to retain *in situ*. However, some authors have opined that surgical rehabilitation of maxillectomy defects is fraught with disadvantages such as the difficulty in monitoring of the surgical bed for recurrences and possibility of reduced drainage of fluids/mucus secretions [23–25]. Continuous accumulation of these secretions may result in emanation of unpleasant odours from the operative site [13]. Furthermore, surgically reconstructing the defect may entail having multiple surgeries, which may mean added costs and may necessitate the creation of multiple surgical sites [2,9,10].

Radiotherapy and local or systemic chemotherapy are often needed to increase the life expectancy to this group of vulnerable patients [4,7,8,21,22]. Many times the prognosis is guarded despite these treatments [4,22]. The availability and cost of these treatment modalities persistently challenge the healthcare system in Nigeria and other sub-Saharan African countries owing to chronic underfunding, lack of motivated manpower, corruption and others [3,4,22].

Conclusion

The present work showed a male preponderance, especially in the age group 31–40 years. Total maxillectomy was the most common surgical procedure performed. Therefore, this study highlights the importance of raising awareness about maxillary tumour and early diagnosis and create environment that will ensure prompt treatment and rehabilitation such as a national universal health insurance coverage. This will improve prognosis and reduce mortality.

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Conflicts of interest

There are no conflicts of interest.

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