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WEST AFRICAN JOURNAL OF MEDICINE

ORIGINAL ARTICLE

Giant Ameloblastoma and the Risk of Recurrence: Experiences from a Tertiary Hospital

L'Améloblastome Géant et le Risque de Récidive : Expériences d'Un Hôpital Tertiaire

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ABSTRACT

BACKGROUND: Ameloblastoma is an aggressive tumor of odontogenic epithelium that grows slowly with propensity for bone expansion. Sometimes it may grow to very large sizes also known as giant ameloblastoma (GA) which may affect function and even pose a threat to life.

OBJECTIVE: to present the pattern of presentation of GAs seen in a tertiary centre in Northern Nigeria.

PATIENTS AND METHODS: A retrospective study of patients seen with GA at the Oral and Maxillofacial Clinic of a tertiary health facility of Northern Nigeria between January 2006 to December 2019. All patients with complete documentation in the folder, theatre register and histopathologic records were recruited for the study. Data were analyzed using SPSS version 23.

RESULTS: GAs accounted for 30.2% (48) of all the ameloblastomas operated during the period with a male dominance of 62.5% (30), giving a ratio of 1.7:1(M:F). The age range was between 12 and 65 years with a mean age of 35.04years (±14.5) and the mandible was the most affected jaw compared to the maxilla (12.5%). Lesions with lowest and highest weight were found on the mandible (77g and 1640g respectively). The treatment most given was mandibulectomy (unspecified) with 20.0% followed by Rt and Lt mandibulectomies with 14.0% each.

CONCLUSION: GA was found to account for 30.2% of all lesions seen within the period under review, while the mandible was the most affected jaw bone. **WAJM 2022; 39(4): 350–354.**

Keywords: Giant Ameloblastoma, Risk of Recurrence, Experience.

RÉSUMÉ

CONTEXTE: L'améloblastome est une tumeur agressive d'épithélium odontogène qui se développe lentement avec une propension à expansion osseuse. Parfois, il peut atteindre de très grandes tailles aussiconnu sous le nom d'améloblastome géant (GA) qui peut affecter la function et constituent même une menace pour la vie.

OBJECTIF: Présenter le modèle de présentation des AGvu dans un centre tertiaire dans le nord du Nigeria.

PATIENTS ET METHODES: Une étude rétrospective des patients vu avec GA à la clinique orale et maxillo-faciale d'un tertiaire établissement de santé du nord du Nigéria entre janvier 2006 et Décembre 2019. Tous les patients avec une documentation complète dans le dossier, le registre des théâtres et les dossiers histopathologiques étaient recruté pour l'étude. Les données ont été analysées à l'aide de la version SPSS23.

RÉSULTATS: Les AG représentaient 30.2 % (48) de tous les améloblastomes opérés pendant la période avec un home dominance de 62.5% (30), ce qui donne un rapport de 1.7:1 (M:F).la fourchette se situait entre 12 et 65 ans avec un âge moyen de 35.04 ans(±14.5) et la mandibule était la mâchoire la plus touchée comparéeau maxillaire (12.5 %). Lésions de poids le plus faible et le plus élevé ont été trouvés sur la mandibule (77g et 1640g respectivement). Le traitement le plus administré était la mandibulectomie (non spécifiée) avec 20.0 %, suivis des mandibulectomies Rt et Lt avec 14.0 % chacun.

CONCLUSION: L'AG représentait 30.2 % de tous les lésions observées au cours de la période considérée, tandis que la mandibule était l'os de la mâchoire le plus touché. **WAJM 2022; 39(4): 350–354.**

Mots-clés: Améloblastome géant, Risque de récidive, Expérience.

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INTRODUCTION

Ameloblastoma accounts for approximately 1% of jaw tumors. It is the most common benign odontogenic tumor, and is also known to be locally aggressive.[1,2] The peak age of occurrence of jaw ameloblastoma is in the 3rd and 5th decades of life.[3,4] It has an equal sex or gender distribution pattern.[4]The most common site of involvement is the mandible in 80% of cases while the maxilla is affected in 20% of cases. Ameloblastoma may present as a small incipient lesion detected on radiological examination or as a large tumor producing mass effect.[5]

Ameloblastoma has varying clinical manifestations ranging from just an asymptomatic cystic swelling to an aggressive mass with attendant disfiguration, local invasion into surrounding vital organs, malnutrition or even death.[6,7] It is agreed by surgeons that inadequate treatment of ameloblastoma can lead to recurrence.[8]

A few cases of ameloblastoma may grow into a very large or giant size which may result in a grotesque presentation by the patients.[7] Other reported findings in patients with giant ameloblastoma include metabolic derangement like hypoproteinemia,[9] hypercalcemia, leukocytosis, elevated tumor markers via production of parathyroid hormone, and granulocyte colony-stimulating factor.[10] These giant ameloblastomas (GAs) may be more difficult to manage.

We present our experiences gained from the management of a large series of giant ameloblastoma in a tertiary health institution in Northern Nigeria with the aim to establish a possible relationship between giant forms of Ameloblastoma and recurrent disease.

PATIENTS AND METHODS

A retrospective review of cases of ameloblastoma seen at the oral and maxillofacial surgery clinic of a tertiary health care center between January 2006 and December 2019 was carried out. Information retrieved from the patients' case folders and operation notes were patients' biodata, clinical and medical histories, duration of presenting complaints, site and surgical procedures performed. Dimensions and histological variants were also retrieved from the relevant histopathological reports. For the purpose of the study, giant ameloblastoma was defined using Kanoi, *et al's*[11] definition as tumours resulting in a post-surgical defect >7 cm in length after segmental resection and the bone defect involving central mandibular segment. In this study, we define GA in the maxilla lesions with 6 x 6 x 6cm, that is, a volume of 216cm^3 and above. Excluded from the study were lesions with positive margins. We did not carry out frozen section in this study.

Data were recorded in a personal computer and analyzed using IBM SPSS statistics version 23(Illinois, USA). Absolute numbers and simple percentages were used to describe categorical variables. Quantitative variables were described using mean (with standard deviation), median and range. Categorical variables were compared using chi square test and numeric variables compared using student t-test. Differences were considered significant if $p<0.05$. The study is part of the research protocol approved by the Ahmadu Bello University Teaching Hospital Health Research Ethical Committee (ABUTHHREC) with reference code: ABUTHZ/HREC/W36/2020.

RESULTS

GA constituted 48(30.2%) out of 159 (100%) ameloblastomas operated within the period. More males (30;62.5%) presented with GAs than females (18;37.5%); male to female ratio was 1.7:1. The ages of the patients managed for GA ranged from 12years to 65years with a mean age of 35.04years (±14.5). The sites of affectation were the maxilla with 6 (12.5%) and mandible with 42 (87.5%) cases respectively. The dimensions of lesions located in the maxilla ranged from 216cm^3 to 768cm^3 with a mean of 382.67cm^3 (±293.48cm^3) and weights of 18g to 291g with a mean of 143g (±107.32g) while lesions located in the mandible had dimensions ranging from 156cm^3 to 7,038cm^3 and a weight ranging from 77g to 1640g and an average weight of 363±320.4 (see Table 1). The mean duration of presenting complaint was 5 years (±3.5) with a range of 4 months to 16 years for mandibular lesions (Table 1) and 3.75years(±1.7) for maxillary lesions with a median of 3.5 years and a range of 2 to 6 years.

Table 1 is the descriptive statistics for the mandibular lesions. On the maxilla, the mean age was 49.83(±18) years with a range of 26 to 72 years. The mean volume was 416(±293.4)cm^3 and the range was 84 to 768cm^3. Meanwhile the mean weight was 143.16(±107.32)gm with 18 to 291gm as range. For the duration of symptom, the range was 2 to 6 years with a mean of 3.75(±1.7)years.

Table 2 is the distribution of patients based on gender and age with mandibular GA lesions. On the maxilla, 67% are above 46 years (100% females and 50% males) and above and 33% between 19 and 45 years.

Table 1: The Descriptive Statistics for the Mandibular Lesions

Variables	N	Min.	Max.	Mean	Std. Deviation
Age (years)	43	12	69	32	13.1
Dimensions of Surgical Specimen (cm^3)	43	182	8,211	1,157	1,340.2
Weight (g)	43	15	1,640	363	320.4
Duration of Lesion (years)	39	0	16	5	3.5

Table 2: Age and Gender Distribution of Patients with Mandibular GA

Gender	Age (years)			Total
	≤ 18	19 – 45	46+	
Male	4	19	4	27
Female	2	13	1	16
Total	**6**	**32**	**5**	**43**

Table 3 shows a weak correlation (p=0.256) between gender and volume of surgical specimen of patients. In the maxilla, 50% (all of whom are males) had a volume 300cm^3 and below while the remaining 50%(2 females and 1 male) had volumes of between 301 and 2,937cm^3. However, the relationship between gender and volume is not statistically significant (p=0.097) in patients with mandibular GAs.

Since p=0.001>0.05, the relationship between weight and volume is not statistically significant (p=0.001) in patients with mandibular GAs.

In the maxilla, 4 out of the 6 patients had a weight of ≤ 200gm, with 2 volumes ≤300cm^3 and 2 with volumes between 301–2,937cm^3. The last 2 had weights between 201 to 920gm, 1 with volume less than 300cm^3 and the other with volume between 301 and 2,937cm^3.

Table 5 shows the various treatments that the patients with GA underwent. While unspecified mandibulectomy was the highest form of treatment, total mandibulectomy was the least with 20 and 2% respectively.

Only 40% (19) of the patients had their radiological findings documented and they had multilocular radiolucencies (Figure 1).

The histological diagnosis of primary lesions included follicular Ameloblastoma (n = 8;16.7%) mixed type (n = 14; 29.1%), unspecified (n = 23;47.9%), acanthomatous (n=2; 4.1%), and plexiform (1; 2.0%) subtypes.

Treatments performed were resections with/out disarticulation in 19 cases (7;14% on the left and 7; 14% on the right, 3; 6.0% had temporal extension). The other treatment modalities employed are shown in Table 5.

Follow up was between 3 months and 4 years with a mean of 1.4 years.

The recurrences were 1 year for mandible while for maxilla it was averagely 3.5 years (4 years and 3 years). Two patients aged 52 and 72 years with lesions in the mandible presented with multiple recurrences associated with intracranial extensions in one while the other had invasion of the orbit and malignant degeneration to Ameloblastic carcinoma. The other patient was a female aged 41years.

Table 3: Comparison of the Volume of Resected GA across Gender on the Mandible

Gender	Volume of Surgical Specimen (cm^3)			Total
	≤ 300	301–2,937	≥2,938–5,574	
Male	6	21	0	27
Female	2	12	2	16
Total	**8**	**33**	**2**	**43**

Table 4: Cross Tabulation of Volume by Weight of GA on the Mandible

Volume of Surgical Specimen (cm3)	Weight		Total
	≤ 200	≥201	
≤300	7	1	8
301 – 2,937	9	24	33
≥2,938	0	2	2
Total	**16**	**24**	**43**

Table 5: Surgical Procedures of GA in Relation to the Gender on Both Jaws

Type of Surgery	Number			Percentages		
	M	F	T	M (%)	F (%)	T (%)
Rt maxillectomy	1	1	2	3.0	6.20	4.0
Lt maxillectomy	2	0	2	5.9	0.0	4.0
Unspecified maxillectomy	1	1	2	3.0	6.20	4.0
Rt mandibulectomy	6	1	7	17.6	6.20	14.0
Lt mandibulectomy	5	2	7	14.7	13.0	14.0
Ltmandibulectomy+ disarticulation	3	2	5	8.8	13.0	10.0
Lt temporal excision	2	1	3	5.9	6.20	6.0
Angle to angle resection	3	1	4	8.8	6.20	8.0
Subtotal mandibulectomy	3	0	3	8.8	0.0	6.0
Anterior resection	1	3	4	3.0	18.20	8.0
Total mandibulectomy	0	1	1	0.0	6.20	2.0
Unspecified mandibulectomy	7	3	10	20.5	18.70	20.0
Total	34	16	50	100	100.5	100.0

M, Male; F, Female; T, Total

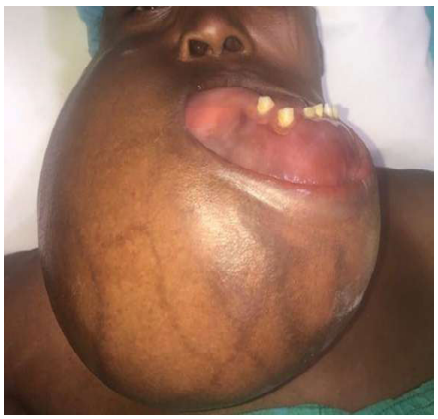

Fig.1: Female Patient with Giant Ameloblastoma of the Mandible

The recurrences had histological diagnosis of plexiform and unspecified ameloblastoma for maxillary lesions and follicular variant for mandibular lesions.

The treatment for recurrence was resection without disarticulation for mandible and maxillectomies for maxilla.

DISCUSSION

Giant Ameloblastomas (GA), are lesions or tumors that leave a mandibular bone defect of >7 cm.[11] In this study, we defined GA of the maxilla as lesions creating defects ≥6cm and above while 8 x 6.5 x 3.5cm (182cm^3) and above on the mandible (Figure 2).

Fig. 2: CT Scan of a Patient with Giant Ameloblastoma showing Multilocularity.

GA constituted (Figure 1) 30.2% of all ameloblastoma surgical specimens within the period of study. This was higher than the 9.1% reported by Escande, *et al.*[12]

There were more males (30; 62.5%) than females (18; 37.5%) in the ratio of 1.7:1(M:F). This is contrary to Kanoi, *et al*[11] who had more females than males. Adebayo, *et al*[13] recorded an equal sex ratio. From this study, there were no significant correlations between the gender and weight of the lesion and between gender and volume of the lesion. The mean age was 35.0(±14.5) years and the range was 12 to 72 years. This is lower than the mean of 44.2 years (range 19 to 73 years) obtained by Adebayo, *et al.*[13] From Table 2, more patients were found in the age bracket of 19 to 45 years (19; 70.4% of males and 13; 81.25% of females). This was however contrary to maxillary lesions where the majority was found above 45 years (2; 50% of males and 2; 100% of females).

Ameloblastoma has been documented to be more common in the mandible than the maxilla.[14] This study recorded 87.5% of ameloblastoma in the mandible which is comparable to the 96.8% recorded by Olaitan, *et al*[8] being the most common site of involvement.

GA has been mostly referred to in the literature to be present in the mandible and with various dimensions. We identified some lesions of 6cm or more in the maxilla with the largest being 768cm^3 with 3 recurrences. Two of the patients (a male and a female) had 2 recurrences each originating from the mandible. Escandre, *et al*[12] in their series had 7 (6.5%) on the maxilla but they did not state how many were GA for comparison. Also, Ajike, *et al*[15] in their series on 21 cases of maxillary ameloblastoma, mentioned the fact that the lesions were grotesque but gave no information as regards to their volume.

The mean duration of symptoms was 5 ±3.5 years with a range of 4/12months to 16 years. This was lower than the 12.5 years recorded by Adebayo, *et al.*[13] There is a paucity of documented literature on GA for in-depth comparison. Acharya, *et al*[9] and Adebayo, *et al*[13] found the plexiform subtype to be the predominant form of GA but our study found the mixed subtype was predominant (14 cases, 29.1%) while other subtypes were less common. However, 23 cases had unspecified histological subtyping.

Large lesion dimensions did not necessarily correlate with weight as seen in our cases. We recorded the greatest volume of 8,211cm^3 with a weight of 692gm and the heaviest lesion weighed 1,640gm with volume of 3,952cm^3 in the mandible. While on the maxilla, the most voluminous at 588cm^3, weighed 80gm and the heaviest lesion with 291gm had a volume of 280cm^3. A search in the literature did not reveal any study for comparism.

There was however a significant relationship(p=0.001) between volume and the weight of the lesions in this study and we could not find any literature to compare.

The mean volume in our study was 1,157 ±1,340.2 cm^3 with a range of 182 to 8,211cm^3 on the mandible while on the maxilla it was 416cm^3 with a range of 84 to 768cm^3. These dimensions are lower than the 3,624.4 cm^3 recorded by Adebayo, *et al.*[13] Also, in Table 3, there was no statistically significant (p=0.7035) correlation between the gender and volume of resected GA. Adebayo, *et al*[13] had previously reported a similar absence of statistically significant relationship between the mean volume of GA and gender of patients. We could not find literature to compare our findings with.

The mean weight was 360(±320.4)g with a range of 15g to 1,640g for mandible and 143(±107.32)g with a range of 18 to 291g in the maxilla. Even though the lesion with the highest volume of 8,211cm^3 had a weight of 692g and the lesion with the highest weight of 1640g had a volume of 3,952cm^3, there was however a statistically significant correlation (p=0.001) between the weight and the volume of the specimen.

Escandre, *et al*[12] reported 24.7% of interrupted mandibulectomy (through and through), 8.3% of uninterrupted mandibu-lectomy(enbloc) and 82% of enucleation. Table 5 showed the treatment performed for GA included various forms of jaw resections with some extension to soft tissues of the face and scalp.

Dunn, *et al*[16] noted that recurrence is more likely in older patients and associated with tumor multilocularity especially soap bubble appearance. Citing Ueno, *et al,* they also stated that the average number of years for recurrence was 2.7 years with 78.5% occurring within 5 years. In this study, the recurrence in the mandibular case was 1 year and those of the maxilla were averagely 3years. Interestingly, Adebayo, *et al*[17] reported a recurrence after 21 years. CT scan of the recurrent maxillary lesion showed a multilocular radiolucency (Figure 2).

Recurrence is seemingly not related to tumor volume as evidenced by various reports. Sharma, *et al*[18] in their series of 5 GA had no recurrence within a 1 year follow up period. Hunasgi, *et al,*[19] reported no recurrence within a 2-year follow up. Though, Hughes, *et al*[20] reported tumor positive margins but no recurrence. Chaudhary, *et al*[21] also had no recurrence after 1year while Kanoi, *et al*[11] report no clinical or radiological evidence of tumor recurrence in 11 patients with followup period of 2–28 months. Dunn, *et al*[16] had no recurrence in a lesion of 17 x 15 x 13cm after 30 months. Hunasgi, *et al*[19] had no recurrence after 1 year in a case with 12 x 9 x 10cm. Finally, Nariai, *et al*[22] reported a case with 13.5 x 9 x 8cm with no recurrence for 9 years. In this study, 3 out of 48(6.25%) had recurrence; 2 on the maxilla (216 and 280cm^3) and 1 on the mandible (297.5cm^3) after a mean follow up period of 1.4 years.

Recurrence is also apparently not related to tumor weight as shown by several reports. Dunn, *et al*[16] had no

recurrence in a lesion weighing 1282g after 30 months. Hunasgi, *et al,*[19] had no recurrence after 1 year in a case with lesion weighing 1,200g. Lastly, Nariai, *et al*[22] reported a case weighing 437g with no recurrence after 9 years. The three cases of recurrence in this study weighed 153g for mandibular lesion and 291 and 61g respectively for maxillary lesions.

Clinical and radiological tumor margins in experienced hands often correlates with margins ascertained with frozen section studies, however the absence of frozen sections to determine tumor clearance or otherwise at the resection margins may create challenges in differentiating residual tumors from recurrent tumors. The absence of frozen section studies may constitute a limitation of the present study.

CONCLUSION

Since GAs account for about a third of all histopathological specimens during the period under review, early presentation should be encouraged to avoid individuals presenting with huge lesions. Recurrence in ameloblastomas is not a direct function of tumour size.

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