

Quality of life of patients surgically treated for ameloblastoma

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ABSTRACT

Background: The surgical management of ameloblastoma can have a profound functional and psychological effect on a patient's quality of life (QoL). The aim of this study was to compare the pre- and post-operative QoL outcomes of patients requiring surgical treatment for ameloblastoma. **Patients and Methods:** A total number of 30 patients were identified as fulfilling the criteria for this study. They included 18 males and 12 females, aged between 14 and 47 years with a mean of 27.3 years (standard deviation 10.2). Each patient completed a modified version of the University of Washington QoL questionnaire version 4, a day to surgery and postoperatively on the 7th day, 3 months, and 6 months. **Results:** Following surgical treatment of patients for ameloblastoma, the QoL decreased immediately after surgery. It then gradually improved over time and exceeded the preoperative value at 6 months postoperatively. When analyzed with respect to location, posteriorly placed tumors had the best postoperative QoL outcome. Patients expressed concern more about their appearance preoperatively while postoperative concerns were mostly focused on their ability to chew. **Conclusion:** Significant improvement occurred in QoL scores following surgical management of ameloblastoma. The small sample size utilized in this study limits a definitive conclusion. A larger multicenter study is therefore recommended.

Key words: Ameloblastoma, quality of life, surgical treatment

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INTRODUCTION

Ameloblastoma is a benign but locally aggressive odontogenic tumor formed from the epithelial remnants of tooth forming apparatus.¹ It is the most common, clinically significant, and potentially lethal of the odontogenic tumours.¹

Surgery is universally accepted as the best treatment option.² The various surgical techniques however have profound and long-term effects on the overall health, appearance, speech, breathing, and ability to masticate and swallow.³ Quality of life (QoL) is a measure that encompasses many of these variables and can be used as an outcome measure along with such factors as mortality, recurrence, and survival.³

The University of Washington QoL questionnaire (UW-QoL) has been used extensively in head and neck cancer research.⁴ It is reliable, has been validated, and reflects changes over time. It was originally developed for use in oral oncology but had also been modified and validated for use in benign jaw tumor research.³⁻⁵

The clinician and the patient often express differing viewpoints on therapeutic success in the management of ameloblastoma. Therapeutic success is often seen in terms of recurrence and survival for the clinician while patients may view it not only in terms of recurrence and survival but also as a return to a predisease state.^{6,7} QoL studies help

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the clinician to bridge this gap. QoL measures the effects of disease or illness on the well-being of the individual by going beyond the physician-dominated indicators of the patient's progress.⁶⁻⁸ Despite its benefits, however, QoL has not previously been evaluated in patients with ameloblastoma particularly from Africa.

The aim of the present study therefore was to compare the pre- and post-operative QoL of this group of patients and also to determine the effects of tumor location or site of jaw resection on the postoperative QoL outcome.

PATIENTS AND METHODS

This was a prospective, cross-sectional study of patients treated for ameloblastoma at Aminu Kano Teaching Hospital (AKTH) over a 2-year period (May 2011–April 2013). All consenting subjects who presented at the oral and maxillofacial surgery clinic with histologic diagnosis of ameloblastoma and who were subsequently treated at the hospital were recruited for the study. Patients were required to complete two questionnaires. The first questionnaire obtained sociodemographic and clinical data from the patients. Data recorded included age, sex, and tumor location within the jaws. The second questionnaire was a modified version of the UW-QoL questionnaire version 4. Replacing the word “cancer” with the phrase “jaw resection” modified the questionnaire [Appendix]. A Hausa translation of the questionnaire was used for patients not conversant with English language. Hausa language is the predominant local language spoken in Northern Nigerian.

The UW-QoL questionnaire has 12 domains: Pain, appearance, activity, recreation, swallowing, chewing, speech, shoulder, taste, saliva, mood, and anxiety. In addition, there are three global questions, a section for listing of three most important domains and a section for free-text comments by the patients. For the purpose of this study, the three global domains were excluded from the analyses to simplify the study.

Scoring of the UW-QoL questionnaire was scaled so that a score of 0 represented the worst subjective function and a score of 100 represented no subjective deficit. Each domain (pain, appearance, activity, etc.,) was scored separately. Each question had 3–5 options depicted as A through E. The five-option questions (pain, appearance, activity, recreation, and mood) were scored as follows A = 100, B = 75, C = 50, D = 25, and E = 0. The four-option questions (speech, shoulder, taste, saliva, and anxiety) were scored as A = 100, B = 66.6, C = 33.3, and D = 0. While the three-option question (chewing) was scored as A = 100, B = 50, and C = 0. The mean score per patient was obtained by finding the average of the 12 functions. All respondents' scores on a particular domain were added and the mean was calculated to obtain the domain score. All domain

scores were added together and divided by the number of domains to obtain the composite score.⁵ The questionnaire was administered to the respondents by the researcher and a trained research assistant (a maxillofacial nurse) on a day to their surgery and postoperatively on day 7, 3 months, and 6 months.

Tumor location within the jaw was categorized as bilateral anterior, unilateral posterior, unilateral anteroposterior, and bilateral anteroposterior. Lesions located anterior to the mesial surfaces of the first molars and crossing the midline were designated bilateral anterior lesions; lesions with their most anterior extent posterior to the mesial surface of the first molars were designated posterior lesions; lesions with their most anterior extent posterior to the mandibular symphysis but with their most posterior extent distal to the mesial surface of the first molars were designated unilateral anteroposterior lesions; lesions with their most anterior extent crossing the mandibular symphysis and with their most posterior extent distal to the mesial surface of the first molars were designated bilateral anteroposterior lesions.

Each patient had jaw resection done via combined intra- and extra-oral incisions, followed by immediate reconstruction with either a reconstruction plate (2.4 mm reconstruction plate, S. H. Pitkar Orthotools Pvt. Ltd., India.) alone or in combination with a nonvascularized iliac crest bone graft.

Statistical analysis was done using SPSS software version 16. (SPSS for Windows, Version 16.0. SPSS Inc. Released 2007, Chicago) The paired *t*-test was used to determine significant differences in QoL mean scores. Significant differences in QoL mean scores between the various tumor sites were analyzed using repeated measures analysis of variance. A confidence interval of 95% was used in this study and a $P < 0.05$ was considered statistically significant. Ethical approval for the study was obtained from the Research and Ethical Committee of AKTH.

RESULTS

A total of 30 patients (18 males, 12 females) aged between 14 and 47 years (mean 27.3 years, standard deviation [SD] 10.2) at the time of surgery were treated during the study period. They underwent a total of 33 surgeries. The tumor was located in the mandible in 29 patients (96.7%) of the patients and maxilla in 1 patient (3.3%). The clinical characteristics of patients are presented in Table 1. Twenty-six patients had discontinuity resection of the jaws (25 in the mandible and 1 in the maxilla) followed by immediate reconstruction either with reconstruction plate alone (13 cases) or with reconstruction plate and iliac crest bone graft (12 cases), whereas the single case of maxillary ameloblastoma was rehabilitated with obturator

prosthesis. Three cases were treated by enucleation and curettage while the remaining case was treated by marginal or continuity resection. In addition, there were two additional surgeries for removal of fractured plates and loosened screws and another for in-setting of deltopectoral flap for a patient who had composite resection of the jaw because the tumor had involved the lower lip.

The mean QoL score of all patients recorded on a day to surgery was 82.80 (SD 6.84), and this decreased to 79.65 (SD 8.90) by the 7th postoperative day; however, the decrease was not statistically significant ($P = 0.055$) as illustrated in Figure 1. By the 3rd month after surgery, the mean QoL score increased to 91.33 (SD 6.28). This increase when compared to the preoperative value of 82.80 was statistically significant ($P \leq 0.001$). There was a further increase on the final postoperative day (6 months) to 95.00 (SD 4.24), and this was found to be statistically significant when compared to the preoperative value ($P \leq 0.001$).

When each domain score preoperatively was compared to the score on the final postoperative day (6 months), there was significant improvement in the domains of pain ($t = 0.023$), appearance ($t \leq 0.001$), recreation ($t \leq 0.001$), and mood and anxiety ($t \leq 0.001$). There was a decrease in the domain

for chewing postoperatively, but the decrease was not significant ($t = 0.11$). Table 2 shows the mean QoL scores of subjects in each domain at pre- and post-operative periods.

Within the jaws, the most frequent tumor location was in the bilateral anteroposterior region of the jaw (36.7%), and the posterior location was the next with 26.7%. In 23.3% of the patients, tumor was located in the unilateral anteroposterior region of the jaws. Bilateral anterior location was the least frequent location with 13.3% of the patients. Patients with tumors located in the posterior aspect of the jaw had the best QoL outcome (mean score 98.44 SD 2.20), whereas patients with tumors those located in the unilateral anteroposterior aspect had the least score 93.2 (SD 5.32). The difference was found to be statistically significant ($P = 0.040$). A comparison of the domain scores of the various tumor sites identified the domain of chewing as the most important determinant of QoL outcome. Subjects with tumors located in the posterior aspect of the jaws scored significantly higher in the domain of chewing ($P = 0.002$) compared with those at the other sites.

Table 1: Clinical characteristics of participants

Variables	Frequency (n=30)	Percentage (100%)
Sex, n (%)		
Female	12	40
Male	18	60
Tumor location		
Mandible	29	96.7
Maxilla	1	3.3
Tumor site		
Posterior	8	26.7
Bilateral anterior	4	13.3
Anterior-posterior (unilateral)	7	23.3
Anterior-posterior (bilateral)	11	36.7

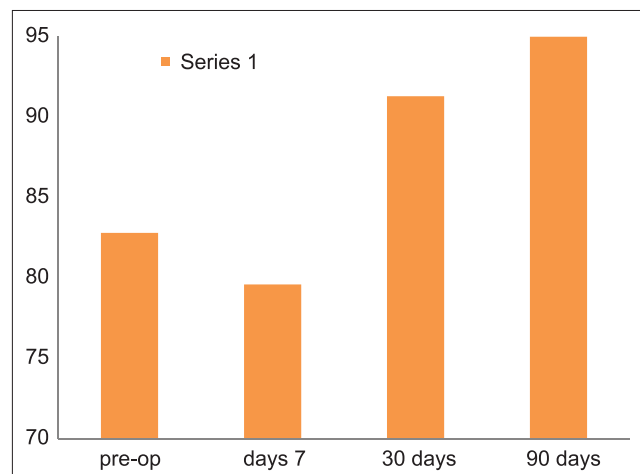


Figure 1: Mean QoL scores from Preoperative to final postoperative periods

Table 2: Mean quality of life scores of subjects in each domain at pre- and post-operative periods

Domains	Preoperative	7 th day postoperative	Mean scores		
			3 month postoperative	6 months postoperative	P
Pain	89.17	70.00	91.67	97.50	0.023
Appearance	46.67	65.00	81.67	88.33	0.000
Activity	98.33	75.83	94.17	99.17	0.66
Recreation	61.67	73.33	91.67	99.17	0.00
Swallowing	100	92.21	98.89	100	-
Chewing	78.33	36.67	60.00	68.33	0.11
Speech	98.89	77.74	89.98	94.43	0.103
Shoulder	100	100	100	100	-
Taste	100	92.22	100	100	-
Saliva	96.66	94.43	97.77	97.77	0.662
Mood	58.33	81.67	91.67	95.00	0.000
Anxiety	65.53	96.66	98.89	98.89	0.000

Each P value is a comparison of the preoperative and 90th day postoperative value

In the patients response to issues of most importance preoperatively, most (76.3%) patients were concerned about their appearance, 7.89% were concerned about pain and anxiety, 5.2% were concerned about recreation, and 2.6% were bothered about their mood [Figure 2]. Following surgery, however, most patients (64.8%) expressed concerns about their inability to chew properly, whereas the number was bothered about their appearance decreased to 21.6%.

Free-text comments were made by only seven of the patients. Three of them expressed satisfaction with the treatment but would be happier if their lost teeth could be replaced to improve their chewing efficiency. The only patient who had maxillectomy complained about epiphora and wanted it treated. Two patients had complaints about lip numbness while the last patient was happy but concerned about the fact that he was asked to come back regularly for reviews as the tumor could recur.

DISCUSSION

Various studies^{3,5,9-13} have commented on the trajectory of QoL from the preoperative period through the early to late postoperative period. They all upheld the fact that QoL tended to drop significantly in the immediate postoperative period and thereafter rise slowly until about a year when it may equal or exceed the preoperative value. This trend was also demonstrated in this study (although the review period was short and inadequate to observe further changes in QoL as reported in other studies) as the mean QoL score dropped on the 7th postoperative day ($P = 0.055$). This trend is expected as surgical intervention in itself is accompanied by morbidities such as pain, swelling, limitation of mouth opening, and neurosensory disturbances which tend to decrease the QoL in the immediate postoperative period.¹³ Nevertheless, there was a significant improvement in QoL by 3 months and 6 months after surgery ($P \leq 0.001$ and $P \leq 0.001$, respectively) as effects of surgical morbidities wane and patient continued to heal.

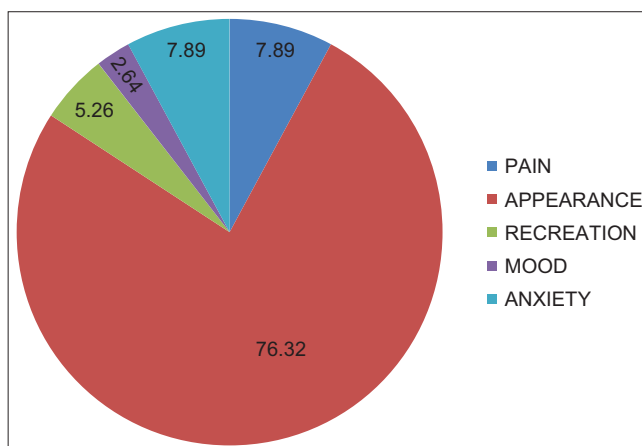


Figure 2: Most important preoperative issues

A notable exception to this trend was reported by Schliephake *et al.*,¹⁴ who reported a continuous increase in QoL without a temporary decrease in the immediate postoperative period. In a later study, Schliephake and Jamil⁹ explained that this earlier trend may have been due to the use of general cancer questionnaire which was less responsive compared to domain-specific questionnaires such as the UW-QoL questionnaire as used in this study. The changes in the pre- and post-operative QoL scores were statistically significant in the domains of pain, appearance, recreation, mood, and anxiety. Improvement in the domain of pain postoperatively as observed in this study was not surprising as many of the patients presented with infected tumors preoperatively. Surgical removal of the tumor coupled with perioperative antimicrobial therapy might have been responsible for the reduction in the level of pain as reported by many of the patients postoperatively.

Segmental resection of the jaw for the treatment of jaw tumors followed by reconstruction either with reconstruction plate alone or with reconstruction plate plus bone graft [Figures 3-5] has been reported by many workers as helping to improve patients appearance postoperatively.^{3,5,15} This was also observed in this study as most of the patients evaluated that their appearance as being far better than it was preoperatively ($P \leq 0.001$). A good appearance is an important tool for recreation, which in turn can facilitate wide social interaction with its well-known ability to positively influence the mood of the patient.¹⁶ This relationship between good appearance, recreation, and mood might be responsible for the trend observed in this study. Expectedly, the level of anxiety was observed to be very high among the patients a day to surgery. The level of anxiety decreased significantly on the final postoperative day as patients were no longer anticipating surgery that could raise their level of anxiety.

The location of ameloblastoma within the jaws or the site of resection appears to have some implications with tumors located in the posterior aspect of the jaws having the best QoL outcome and those located anteroposteriorly on one side and in the bilateral anterior regions of the jaws having the worst QoL mean scores. This finding is consistent with that of Young *et al.*³ and Simon *et al.*,¹⁷ who also reported that resections in the anterior region of the mandible (involving the symphysis and parasymphysis) have the most deleterious effect on QoL because of the negative effect on chewing, appearance, and lip support. The result of this study is however tentative and requires further evaluation in a study with larger sample size.

The result is however not consistent with that of Okoturo *et al.*,⁵ who reported that patients with resections involving the symphysis and parasymphysis have better QoL outcome than those with posterior resections. The difference from the report of Okoturo *et al.*⁵ may be accounted for by the fact that patients with posterior resection in their series were



Figure 3: Intraoperative image of iliac crest bone following resection of mandibular ameloblastoma



Figure 4: Preoperative appearance of left sided mandibular body ameloblastoma

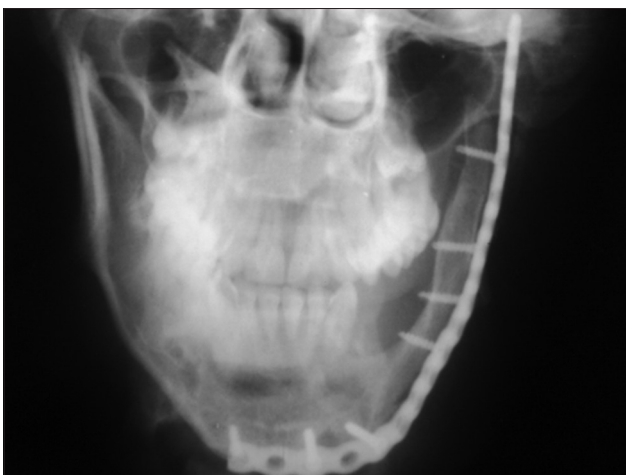


Figure 5: Postoperative radiograph after reconstruction with bone graft anchored on reconstruction plate

not reconstructed whereas patients those with anterior resection had spontaneous regeneration of the mandible which contributed to their improved QoL.

The study observed that subjects with resections in the posterior aspect of their jaws scored significantly higher in the domain of chewing than subjects with other types of resection ($P = 0.002$). This is consistent with reports^{3,17} in the literature that have similarly observed that patients with posterior resections of the jaw do better in the domain of chewing than those with anterior resection, which adversely affect chewing and lip support. Subjects with posterior resections may have scored higher in the domain of chewing because they could still chew on the other side of their jaw.

In the patients response to issues of most importance preoperatively, most of the patients (76.3%) were concerned about their appearance. This is expected as ameloblastoma is noted for growing large and causing facial disfigurement, usually without pain except when secondarily infected.¹⁸ Postoperatively, most patients (64.8%) were bothered with their inability to chew properly, and this is expected as none of the patients had final rehabilitation with dental prosthesis which might help to improve their chewing efficiency. This finding however contrast with that of Okoturo *et al.*⁵ and Young *et al.*,³ both of who reported the main concerns of patients to be appearance followed by chewing, mood, anxiety, pain, and swallowing in that order.

Free-text comments were made by seven of the patients (23.3%) largely in response to the head and neck questions; only two of the patients complained about lip numbness which was surprised since most of the patients had their mental nerve sacrificed. Marx and Stern¹⁹ pointed out that patient tends to tolerate the loss of mental nerve well, which may explain why only two patients are bothered with lip anesthesia.

CONCLUSION

There was significant improvement observed in QoL scores of the patients following surgical management for ameloblastoma. The small sample size utilized in this study however limits a definitive conclusion. A larger multicenter study is therefore recommended to validate the findings of the present study.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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APPENDIX

University of Washington quality of life questionnaire

This questionnaire asks about your health and quality of life over the past 7 days. Please answer all of the questions by checking one box for each question.

1. Pain. (Check one box: ✓)
 - I have no pain.
 - There is mild pain not needing medication.
 - I have moderate pain – requires regular medication (codeine or nonnarcotic).
 - I have severe pain controlled only by narcotics.
 - I have severe pain not controlled by medication.
2. Appearance. (Check one box: ✓)
 - There is no change in my appearance.
 - The change in my appearance is minor.
 - My appearance bothers me, but I remain active.
 - I feel significantly disfigured and limit my activities due to my appearance.
 - I cannot be with people due to my appearance.
3. Activity. (Check one box: ✓)
 - I am as active as I have ever been.
 - There are times when I cannot keep up my old pace, but not often.
 - I am often tired and have slowed down my activities although I still get out.
 - I do not go out because I do not have the strength.
 - I am usually in bed or chair and do not leave home.
4. Recreation. (Check one box: ✓)
 - There are no limitations to recreation at home or away from home.
 - There are a few things I cannot do but I still get out and enjoy life.
 - There are many times when I wish I could get out more, but I am not up to it.
 - There are severe limitations to what I can do, mostly I stay at home and watch TV.
 - I cannot do anything enjoyable.
5. Swallowing. (Check one box: ✓)
 - I can swallow as well as ever.
 - I cannot swallow certain solid foods.
 - I can only swallow liquid food.
 - I cannot swallow because it “goes down the wrong way” and chokes me.
6. Chewing. (Check one box: ✓)
 - I can chew as well as ever.
 - I can eat soft solids but cannot chew some foods.
 - I cannot even chew soft solids.
7. Speech. (Check one box: ✓)
 - My speech is the same as always.
 - I have difficulty saying some words, but I can be understood over the phone.
 - Only my family and friends can understand me.
 - I cannot be understood.
8. Shoulder. (Check one box: ✓)
 - I have no problem with my shoulder.
 - My shoulder is stiff, but it has not affected my activity or strength.
 - Pain or weakness in my shoulder has caused me to change my work.
 - I cannot work due to problems with my shoulder.
9. Taste. (Check one box: ✓)
 - I can taste food normally.
 - I can taste most foods normally.
 - I can taste some foods.
 - I cannot taste any foods.
10. Saliva. (Check one box: ✓)
 - My saliva is of normal consistency.
 - I have less saliva than normal, but it is enough.
 - I have too little saliva.
 - I have no saliva.
11. Mood. (Check one box: ✓)
 - My mood is excellent and unaffected by my jaw resection.
 - My mood is generally good and only occasionally affected by my jaw resection.
 - I am neither in a good mood nor depressed about my jaw resection.
 - I am somewhat depressed about my jaw resection.
 - I am extremely depressed about my jaw resection.
12. Anxiety. (Check one box: ✓)
 - I am not anxious about my jaw resection.
 - I am a little anxious about my jaw resection.
 - I am anxious about my jaw resection.
 - I am very anxious about my jaw resection.

Which issues have been the most important to you during the past 7 days?

Check ✓ up to 3 boxes.

- Pain Swallowing Taste
- Appearance Chewing Saliva
- Activity Speech Mood
- Recreation Shoulder Anxiety

GENERAL QUESTIONS

Compared to the month before your jaw resection, how would you rate your health-related quality of life? (Check one box: ✓)

- Much better
- Somewhat better
- About the same
- Somewhat worse
- Much worse

In general, would you say your health-related quality of life during the past 7 days has been? (Check one box: ✓)

- Outstanding
- Very good
- Good
- Fair
- Poor
- Very poor

Overall quality of life includes not only physical and mental health but also many other factors such as family, friends, spirituality, or personal leisure activities that are important to your enjoyment of life. Considering everything in your life that contributes to your personal well-being, rate your overall quality of life during the past 7 days. (Check one box: ✓)

- Outstanding
- Very good
- Good
- Fair
- Poor
- Very poor

Please describe any other issues (medical or nonmedical) that are important to your quality of life and have not been adequately addressed by our questions (you may attach additional sheets if needed).