

Enucleation with Peripheral ostectomy Alone & in combination with Chemical Fixation for the treatment of Luminal Unicystic Ameloblastoma

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Abstract

Objective: To compare the efficacy of enucleation with peripheral ostectomy alone & in combination with chemical fixation for the treatment of luminal unicystic ameloblastoma.

Methodology: This Randomized Controlled Trial study was conducted in the Oral and Maxillofacial Surgery Department / Dental Section, Aziz Fatima Hospital (AFMDC) Faisalabad in period of one year from March 2021 to March 2022. The study included 134 patients who had been diagnosed with unicystic ameloblastoma and were scheduled for surgery. To confirm the diagnosis of unicystic ameloblastoma, an incisional biopsy and clinical and radiographic evaluation were performed. All cases were given the same course of treatment, which included enucleation, peripheral ostectomy, and chemical cauterization using Carnoy's solution. Enucleation of the entire lesion was performed, then peripheral ostectomy was performed until good bleeding bone was found all around. The cavity was filled with gauze that had been soaked in Carnoy's solution, and it was left there for 5 minutes.

Results: The mean age of group A was similar to group B (26.097 ± 5.742 vs. 25.121 ± 5.112 , P-value > 0.05). Majority of the patients in both groups were in age group of 21-30 years (67.16% vs 62.69%). The most common site of the pathology was posterior mandible in both groups consisting of 68.66% patients in group A and 73.13% patients in group B (P-value > 0.05). The success rate in terms of no recurrence of combination group of enucleations with chemical fixation was significantly better with less rate of recurrence (16.42% vs. 31.34%, P-value = 0.043) in comparison to enucleation alone group.

Conclusions: Enucleation followed by the application of Carnoy's solution is a good conservative treatment for Unicystic Ameloblastoma. Surgery outcomes and other potential problems are improved by prompt intervention, peripheral ostectomy, and use of Carnoy's solution.

Key words: Unicystic Ameloblastoma, Enucleation along with carnoy's solution

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Introduction

Unicystic ameloblastoma is defined as a cystic lesion that exhibited clinicoradiographic or gross characteristics of an odontogenic cyst but revealed histopathologically an atypical ameloblastomatous epithelial lining with or without luminal or mural tumour development. Early on, unicystic ameloblastoma develops slowly with few

symptoms, but later stages may result in tooth loss, root resorption, and movement in the affected area. It is thought to be less aggressive than ameloblastoma tumours that are solid or multicystic.¹

The cystic lesions exhibiting clinical and radiographic features of an odontogenic syst is termed as unicystic ameloblastoma. But it divulges typically as an

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ameloblastomatous epithelium lining upon histologic examination, with or without luminal and mural tumor proliferation. The most common type of unicystic ameloblastoma is mandibular with a ratio of 13:1 to maxillary multicystic ameloblastoma.^{2,3}

Onset at early age, unilocular appearance on radiographic examination, cystic shape on macroscopic view and better response on conservative treatment make this tumor type unique. The histological characteristics can divide unicystic ameloblastoma in different subtypes like luminal, mural and intraluminal which are very important for prognosis and therapeutic importance.⁴

Ameloblastoma, which develops from the dental epithelium, is a typical benign aggressive odontogenic tumour. They may develop from the dental lamina, the oral epithelium's basal cells, or cells that differentiate to resemble ameloblasts. They make up 13-58% of odontogenic tumours and 1% of tumours that damage the oral-maxillofacial complex. Ameloblastomas typically develop in the jaw, namely in the molar and ramus regions.^{5,6}

Numerous treatment approaches, such as enucleation, marsupialization, segmental resection, or marginal resection, are used; nevertheless, younger patients usually reported receiving more conservative therapies.⁷

Unicystic ameloblastoma is difficult to treat since conservative modalities increase the risk of recurrence while aggressive modalities increase the risk of abnormalities and deformity. A middle-ground treatment with low recurrence risk and positive results is enucleation combined with peripheral ostectomy. After the enucleation, a tiny portion of bone is removed from the cavity in peripheral ostectomy using a big round bur and a coolant.⁸ Following this, a chemical cauterization with Carnoy's solution was applied using cotton applicators for about three minutes, which produced a positive prognosis.^{9,10}

The objectives of the study were to determine the therapeutic outcome for enucleation with peripheral ostectomy alone & in combination with chemical fixation for the treatment of luminal unicystic ameloblastoma of the mandible.

Material and Methods

This was a randomized comparative trial conducted at the Oral and Maxillofacial Surgery Department / Dental

Section, Aziz Fatima Hospital (AFMDC) Faisalabad in period of one year from March 2021 to March 2022.

Sample size calculation was done with the help of efficacy in terms of recurrence rate in both groups, which was noted 30.5% after enucleation alone; 16% after enucleation followed by application of Carnoy's solution. A total of 134 patients were included in the study which were divided into two equal groups of 67 each. The sample size calculation was done 80% power of test, and 5% level of significance.¹⁰ Sample selection was done with the help of a predefined inclusion and exclusion criteria. Patients diagnosed as unicystic ameloblastoma histopathologically by incisional or excisional biopsy will be included by nonprobability consecutive sampling method, and patients exempted from surgery due to lack of fitness will be excluded.

To confirm the diagnosis of unicystic ameloblastoma, an incisional biopsy and clinical and radiographic evaluation were performed. After describing the treatment method and the likelihood of recurrence, consent was obtained. In treatment group all the cases were treated with enucleation and peripheral ostectomy in combination with chemical cauterization with the help of Carnoy's solution, even when lesion was close to lower border of mandible, perforation in one of the cortices or root resorption of the involved teeth. General anesthesia was used to carried out the procedure and access the lesion. Buccal decortication was done by raising mucosal flaps. Enucleation of the entire lesion was performed, then peripheral ostectomy was performed until good bleeding bone was found all around. The cavity was filled with gauze that had been soaked in Carnoy's solution, and it was left there for 5 minutes. In order to fabricate the surgical obturator, elastomeric base impressions were acquired after the cavity had been properly irrigated with normal saline. The cavity was filled with ribbon gauze that had been dipped in sofradex (Framycetin sulphate, Gramicidin), and a temporary closure using stay sutures was made. After 48 hours following surgery, obturator was administered, filling two-thirds of the defect.

A brief medical history, clinical examination, panoramic image of the patient's jaw, and a standard photograph were all taken as part of the evaluation process. All this information along with demographic information was recorded on a predesigned performa.

All the collected data was entered and analyzed by using SPSS v. 25. All the quantitative data was presented in the

form of mean and standard deviation and qualitative data in the form of frequency and percentages. Independent sample test was applied to compare quantitative variables and chi-square test was applied to compare qualitative variables between both groups. P-value ≤ 0.05 was considered significant.

Results

In this randomized controlled trial study a total of 134 patients of luminal unicystic ameloblastoma and were divided into two equal groups on the basis of procedure adopted for their treatment. In Group A patients were treated with enucleation with peripheral ostectomy alone and in group B the patients were treated with enucleation with peripheral ostectomy in combination with Chemical Fixation. Female patients were in dominance in our study samples of both groups but there was no significant (P-value > 0.05) difference in both groups. The mean age of group A was similar to group B (26.097 ± 5.742 vs. 25.121 ± 5.112), without statistically significant difference. Majority of the patients in both groups were in age group of 21-30 years, consisting of 67.16% patients in group A and 62.69% patients in group B as elaborated in table I.

Characteristics	Group A (n=67)	Group B (n=67)	P-value
Gender of the patients			
Male	24 (35.82%)	28 (41.79%)	0.478
Female	43 (64.18%)	39 (58.21%)	
Age of the patients			
Mean + SD	26.097 ± 5.742	25.121 ± 5.112	0.300
Age distribution of the patients			
11-20	9 (13.43%)	12 (17.91%)	0.097
21-30	45 (67.16%)	42 (62.69%)	
31-40	13 (19.40%)	4 (5.97%)	

The most common site of the pathology was posterior mandible in both groups consisting of 68.66% patients in group A and 73.13% patients in group B followed by 16.42% patient of group A and 13.43% patients of group B of anterior mandible. There was also no significant (P-value > 0.05) difference between both groups on the basis of site of the pathology. In group A 43.28% patients had impacted teeth and 40.30% patients in group B had impacted teeth without any statistically significant (P-value > 0.05) difference between both groups.

Main bulk of the patients in both groups had medium (2x2-4x4 cm) size of lesion, (46.27%) patients in group A and (52.24%) patients in group B presented with medium size of lesion without showing any significant (P-value > 0.05)

difference in both group on the basis of size of the lesion as elaborated in table II. According to the results the success rate in terms of no recurrence, the results of combination group of enucleations with chemical fixation had better results and a significantly less rate of recurrence (16.42% vs. 31.34%, P-value = 0.043) was noted in this group in comparison to enucleation alone group as shown in figure I.

Table II: Distribution of Site and Size of lesion and Impacted Teeth in both groups

Characteristics	Group A (n=67)	Group B (n=67)	P-value
Site of Pathology			
Posterior Mandible	46 (68.66%)	49 (73.13%)	0.638
Anterior Mandible	11 (16.42%)	9 (13.43%)	
Anterior Maxilla	4 (5.97%)	6 (8.95%)	
Posterior Maxilla	6 (8.95%)	3 (4.48%)	
Impacted Teeth			
Yes	29 (43.28%)	27 (40.30%)	0.726
No	38 (56.72%)	40 (59.70%)	
Size of the Lesion			
Small (2x2 cm)	22 (32.83%)	19 (28.36%)	0.779
Medium (2x2 - 4x4 cm)	31 (46.27%)	35 (52.24%)	
Large ($> 4 \times 4$ cm)	14 (20.89%)	13 (19.40%)	

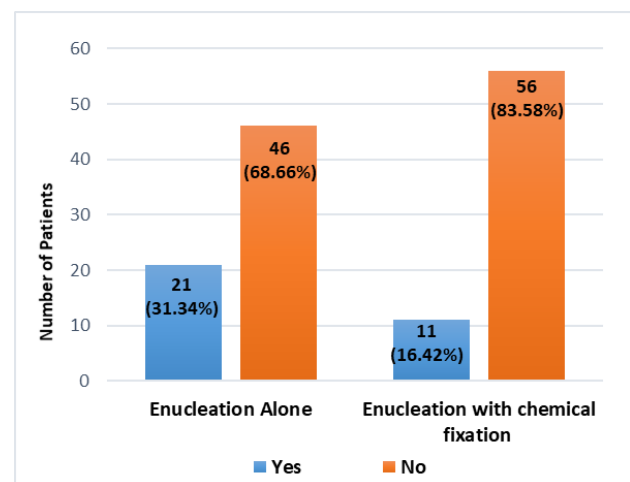


Figure I: Comparison of success rate between both groups

Discussion

The World Health Organization describes ameloblastoma as a benign lesion with a fibrous stroma and a follicular or plexiform appearance. It is typically described as a benign ectomesenchymal-free odontogenic epithelial tumour. Additionally, it exhibits invasive local behaviour and recurs frequently. Ameloblastoma does not differentiate between sexes, but it is more common in patients between the ages of 30 and 40.^{11,12}

Studies showed an average age of conventional ameloblastoma presentation to be 33.2 years for Brazilian, 30.4 years for African and 42.3 years for European populations.¹³ Also, there was an equal sex distribution seen in our study. These findings are all consistent with current literature.¹⁴ The results of this present study are in agreement with these findings. The mean age of group A was similar to group B (26.097 ± 5.742 vs. 25.121 ± 5.112), without statistically significant difference. This mean age shows that in our population this disease is more prevalent at lower age as compared to other studies. But the findings of no significant relationship of disease with gender is also parallel to our results.

This tumour can be a major challenge for clinicians due to its biological invasive behavior, available treatment approaches, reconstructive complexities, requirement for long term follow-up, and patient compliance.¹⁵ It is generally accepted that the first operation affords the best chance of cure. Both primary and recurrent ameloblastomas are treated by either conservative or radical surgery. Conservative procedures include enucleation, curettage, cryotherapy or marsupialization, which are used for intraluminal unicystic ameloblastomas and in children or medically compromised patients, as it preserves patient's normal tissues, minimises facial disfiguration and supports adequate quality of life after surgery. However, the disadvantage of conservative procedures is a higher recurrence rate, especially in conventional ameloblastomas and the mural unicystic type.¹⁶

In this study, the posterior part of the mandible is by far the most damaged area, and although there is occasionally a little female preponderance, men and women do not vary significantly in the majority of the series.^{6,10} Similar findings were obtained in earlier research.¹⁷ Patients affected by ameloblastomas often exhibit a wide age range with a peak incidence in the third and fourth decades of life. The surgical treatment of ameloblastomas is complicated since it must be vigorous and invasive to prevent recurrence. Enucleation or curettage may be used in the conservative method, which is occasionally followed by marsupialization. Unsolved is the issue of the rate of recurrence following conservative therapy.¹⁸

The results of this present study support that enucleation with chemical fixation has significantly better outcomes as

compared to enucleation alone. The success rate in terms of no recurrence of combination group of enucleations with chemical fixation had a significantly less rate of recurrence (16.42% vs. 31.34%, P -value = 0.043) in comparison to enucleation alone group. These findings are quite consistent with other researches, such as study conducted by Blanas et al, showed that enucleation along with the application of Carnoy's solution is a least invasive procedure having lowest recurrence rate. It is recommended that application of Carnoy's solution for five minutes in the cavity of cyst can significantly reduce the recurrence rate.¹⁹ Gosau et al²⁰ claim that the administration of Carnoy's solution in addition to enucleation decreased the recurrence rate compared to simple enucleation also corroborated this. The goal of utilizing Carnoy's solution is to completely remove any epithelial residues that could lead to recurrences.²¹

Conclusion

It may be concluded that all subtypes of unicystic ameloblastoma like mural subtypes can be treated conservatively with significantly increased success rate with bone curettage along with Carnoy's solution application. This surgical procedure has shown improved or similar results as compared to other more aggressive techniques. Conservative therapy in combination with Carnoy's solution and timely intervention can significantly improve outcome and other potential complication of the surgery. Longer follow-up times and larger investigations are necessary to corroborate this finding. Additionally, additional research may be done to demonstrate how this conservative strategy affects the traditional kind of ameloblastoma.

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