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Original Article

Unicystic ameloblastoma – use of Carnoy's solution after enucleation

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Abstract

Aims & Objective: The aim of this study was to review a consecutive series of unicystic ameloblastoma with particular reference to prevalence of the different histological subtypes, and to evaluate the effectiveness of a specific conservative surgical treatment regime involving the use of Carnoy's solution.

Materials and methods: 20 case of unicystic ameloblastoma were reviewed where the patients had undergone surgical enucleation of the cystic lining, followed by application of Carnoy's solution on 18 of the patients.

R**esults:** 90% of the cases were seen in mandible especially in the posterior region. 90% of the cases were classified under Ackermann's type 3 unicystic ameloblastoma. Recurrence of ameloblastoma after treatment was recorded in 10% of the cases.

Conclusion: Use of Carnoy's solution after enucleation of unicystic ameloblastoma with mural envasion results in recurrence rate lower than currently published figures and may be suggested as a standard treatment for unicystic ameloblastoma.

Key words: Unicystic ameloblastoma, Carnoy's Solution, Enucleation

Introduction

Unicystic ameloblastoma, described by Robinson & Martinez[1] in 1977 is one of three clinical variants of ameloblastoma, the other two being the more common intraosseous solid or multicystic (conventional) ameloblastoma, and the rarely encountered peripheral ameloblastoma. Unicystic ameloblastoma has become established as a distinct clinicopathological entity on the general basis of its unicystic radiographic appearance, histologic findings, association with an unerupted tooth, occurrence in the mandible of younger patients, and a recurrence rate after conservative surgical treatment lower than that of its conventional counterpart[2,3].

Ackermann et al[4], in 1988 reclassified unicystic ameloblastoma into three types with prognostic and therapeutic implications. Type 1 consisted of unilocular cystic lesions lined by epithelium exhibiting features of ameloblastoma. Type 2 showed epithelial nodules arising from the cystic lining and projecting into the cyst lumen. These nodules comprised epithelium with a plexiform or follicular pattern resembling that seen in intraosseous ameloblastoma but often in focal areas, and there is no evidence of infiltration of the fibrous tissue wall by ameloblastoma. Type 3 is characterized by the presence of invasive islands of ameloblastomatous epithelium in the connective tissue wall of the cyst, and these islands may or may not be connected to the cyst lining (Fig 1). The use of Carnoy's solution for this specific purpose in relation to unicystic ameloblastoma was initially suggested by Stoelinga & Bronkhorst[5,6] in 1987.

Aims & Objective

The aim of this study was to review a consecutive series of unicystic ameloblastoma with particular reference to prevalence of the different histological subtypes, and to evaluate the effectiveness of a specific conservative surgical treatment regime involving the use of Carnoy's solution.

Materials and methods

Since 2005, the treatment of unicystic ameloblastoma in the different hospitals was done under general anaesthesia, biopsies were taken to confirm the

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diagnosis of unicystic ameloblastoma. Enucleation of the lesion was carried out application of Carnoy's solution to the bony cavity was done in 18 patients. Long-term clinical and radiological follow-up was also done for each patient.

During enucleation of the lesion, the teeth directly related to the periphery of the tumour were extracted before proceeding with the enucleation. If the inferior alveolar nerve was exposed during the enucleation procedure, the cystic tumour was carefully stripped from the nerve which was preserved. The bony cavity was then examined for any remaining tumour tissues which, if found, were removed. Carnoy's solution was applied to the bony cavity for 3 minutes using cotton applicators, ribbon guaze soaked with Carnoy's solution was avoided as far as possible. This was followed by copious irrigation with normal saline. Bismuth iodoform paraffin paste (BIPP) impregnated guaze was then inserted into the bony defect and the wound was kept open over the guaze pack. Postoperatively, the BIPP guaze was replaced periodically until secondary healing was complete, Clinical and radiological follow-up was carried out indefinitely.

The following criteria were used for making the diagnosis of unicystic ameloblastoma:

- a single cystic cavity was seen on an OPG radiograph and also during the operation.
- histological confirmation of unicystic ameloblastoma based on examination of the enucleated specimen which matched or satisfied the cytologic criteria for ameloblastomas by Leider et al[7].
- histological sub-typing based on the classification by Ackermann et al.[1]

All 20 patients with the confirmed final diagnosis of unicystic ameloblastoma were recalled for a fresh clinical and radiological examination to determine the presence or absence of tumour recurrence. The follow-up period ranged from 2 to 5 years.

Results

There were 12 males and 8 females (M:F ratio 1.4:1) with an age range of 18-50 years (median age 23 years).

The majority of patients (72%) presented with asymptomatic bony swelling of the jaw, 14% presented with pain, and 10% were incidental findings during routine dental examination.

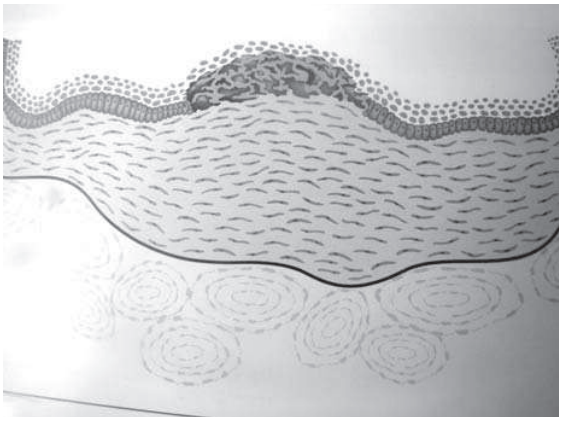
A unilocular radiolucency was the most common (90%) radiological presentation. One patient presented a bilocular radiolucency and two patients showed a multilocular appearance on radiographs. Root resorption was noted in 70% of patients, the remaining cases involving root displacement without resorption.

Most of the lesions (90%) occurred in the mandible, and of the two lesions in the maxilla, one presented in the posterior maxilla with an impacted 3rd molar and the other in the canine region. Over half of the mandibular lesions were also in the posterior region near the angle and ascending ramus, 24% occurred in the body of the mandible, and 7% occurred in the anterior region of the mandible.

Association of the lesion with an impacted tooth was evident in 40% of patients, mostly the third molar and almost exclusively in the mandible. One patient had a maxillary lesion associated with an impacted third molar, and another was associated with an impacted mandibular canine.

Histopathological subtypes

All the twenty patients fulfilled the above mentioned criteria for the diagnosis of unicystis ameloblastoma in this study.



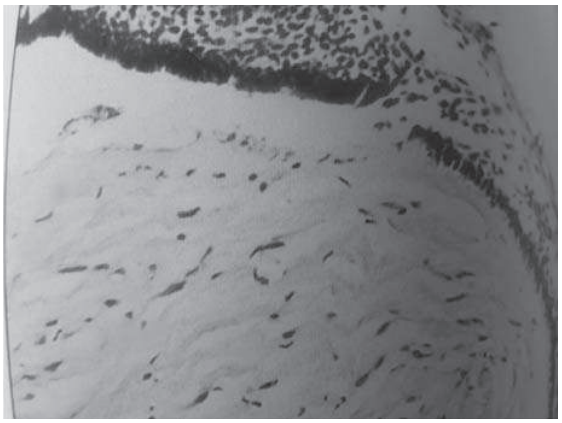


Fig 1 & 2: Mural ameloblastoma developing in and limited to the epithelial lining of the cyst

Fig 3: OPG View- Unilocular radiolucency extend from the crown of 3rd molar

Fig 4: Enucleation of the tumor

Table 1: Recurrence rates after non-resection treatment of unicystic ameloblastomStudy

Study	Number of patients in the series	Treatment method	Recurrence rate (%)
Robinson & Martinez	8	Curettage	25
Gardner & Corio	28	Enucleation	10.7
Leider et al.	33	Enucleation Curettage	18
Reichart et al	73	Not Stated	13.7
Li et al.	29	Enucleation Curettage	35
Rosenstein et al.	21	Enucleation	43
		Curettage	
Current Study	20	Enucleation Carnoy's	10

Of these, 90% showed invasion of ameloblastoma epithelium into the fibrous tissue wall and were classified as Ackermann type 3 unicystic ameloblastoma (Fig.1). Only two cases were classified as type 1, the luminal type.

Treatment and outcome

Out of the total of 20 patients. 2 patients were treated by enucleation alone without the use of carnoy's solution. One patient had been treated by resection and reconstruction with bone plate and screws. The remaining 17 patients were treated according to our usual protocol employing enucleation of the lesion and application of carnoy's solution to the bony cavity.

Recurrence of the ameloblastoma after initial treatment was recorded in 4 patients within 6 months to 1 year. Among these 2 patients had been treated by enucleation alone without the use of carnoy's solution and the other 2 patients (recurrences involved Ackerman type 3 lesion) were treated by enucleation of the lesion and application of carnoy's solution to the bony cavity without extraction of related teeth in the body of the mandible. 2 patients recurred 3-4 years after treatment. Out of 20 patients treated according to our standard protocol. A recurrence rate of 10%. No recurrence were recorded in our patient who underwent resection.

Discussion

The clinical presentation and radiological features of unicystic ameloblastoma in our study are generally in line with the studies of Leider et al[7] & Li et al[8]. However, the relative prevalence of various histological subtypes is documented only in Rosenstein et al's[9] study. One unexpected finding in our study was the predominance (93%) of Ackermann type 3 lesions with invasion of the fibroustissue wall.

It is generally believed that the presence of tumour cells in fibrous capsule of unicystic ameloblastoma, like in type 3 lesions, predisposes to recurrence after enucleation. It is also assumed that the behaviour of unicystic ameloblastoma with mural invasion is similar to that of its intraosseous counterpart. However, no study

has clarified whether mural invasion can extend to the full-thickness of the fibrous capsule and beyond it into adjacent cancellous bone.

It is impossible to rule mural invasion with one incisional biopsy of the lining of a unicystic ameloblastoma because of the potential for taking a non-representative tissue sample. In unsuspected cases where a biopsy is not taken and uncystic ameloblastoma with mural invasion detected after primary conservative treatment, there is a dilemma whether the patient should receive further treatment to eliminate possible residual ameloblastoma tissue in the surrounding cancellous bone or be regularly observed with radiographs for possible recurrence but without necessarily any additional intervention unless and until a recurrence is detected.

In the literature, recurrence after conservative (non-resection) treatment of conventional ameloblastoma ranges from 50% to 90% [10]. Recurrence after conservative treatment of unicystic ameloblastoma however is reported to be between 10 and 25%[11] (Table 1), but these reports do not specify the histological subtypes of the primary lesion. More recently, a recurrence rate of 35-43% has been reported mainly for lesions with mural invasion[10]. Our series, with 93% prevalence of mural invasion in unicystic ameloblastoma should be expected after conservative treatment to result in a recurrence rate higher than the generally reported 10-25% (Table 1), and more like 35-45%[12,13]. The result of the current study, therefore, suggests that either the follow-up period is too less, the protocol employing Carnoy's solution is effective in diminishing expected recurrence, or a combination of these factors. It is likely that the use of Carnoy's solution does contribute towards the favourable result although it is recognized that the current study does not unequivocally prove this notion.

More aggressive primary surgery in the form of resection would basically eliminate the risk of recurrence, but this cannot be justified for unicystic ameloblastoma in view of the inevitable morbidity. A primary treatment option with minimal morbidity but which can adequately or sufficiently control the risk of recurrence is, therefore highly desirable[5,2]. The use of Carnoy's solution for this specific purpose in relation to unicystic ameloblastoma to diminish the recurrence risk after conservative treatment[13].

Carnoy's solution (chloroform 3 ml, absolute alcohol 6 ml, glacial actic acid 1 ml, ferric chloride 1 g) was described in 1933 as a sclerozing agent for the treatment of cysts and fistulae[2], and remains in use today as a fixative[10]. Marx et al.[13], in a small series showed that intraosseous ameloblastoma cells penetrated adjacent cancellous bone to a distance of between 2 to 8mm beyond the radiographic margin of the conventional intraosseous lesion. The equivalent information for unicystic ameloblastoma with mural invasion is not avaible as mentioned earlier. From the findings of the current study, it can be presumed that Carnoy's solution is probably able to fix residual ameloblastoma tissue after enucleation of unicystic ameloblastoma with mural invasion and diminish the risk of recurrence. It was surprising to find that both patients treated by enucleation, but without the application of Carnoy's solution experienced recurrence (100% recurrence). Although there may be other factors at play, this finding suggests that the true prevalence of mural invasion as seen from published studies is much lower than our study indicates, thus explaining a low (10%) recurrence rate after enucleation alone[7], or that high recurrence rates (35-43%) are to be expected if no additional means of control (like Carnoy's solution) is used[12,19]. In this regard, these recently published reports of recurrence in the region of 40% are more consistent with expectations. Even when Carnoy's solution is employed after enucleation, if teeth in close relation with the lesion are retained, recurrence is more likely to be encountered (2 out of 2 patients in this series). This is explained by the likely incomplete surgical elimination of pathology near tooth apices, and the inability of Carnoy's solution to compensate.

Conclusion

It may be concluded from this study that the use of Carnoy's solution after enucleation of unicystic ameloblastoma with mural invasion results in a recurrence rate lower than currently published figures and may be suggested as a standard treatment for unicystic ameloblastoma. However, this suggestion needs to be confirmed by larger studies targeted specifically at unicystic ameloblastoma with mural invasion. Further studies on the depth of mural invasion, possibly into adjacent bone, are needed to correlate with the use of Carnoy's solution and the duration of contact between Carnoy's solution and the bony cavity for effectiveness against residual pathology after enucleation of unicystic ameloblastoma

References

1. Robianson L, Martinez MG. Unicytic ameloblastoma: a prognostic distinct entity. Cancer 1977:40: 2278-2285.
2. Gardner DG, Corio RI. The relationship of plexiform unicytic ameloblastoma to conventional ameloblastoma. Oral Surg Oral Med Oral Pathol Oral Radial Endod 1983:56: 54-60.
3. Gardner DG, Pecak AMJ. The treatment of ameloblastoma based on pathologic and anatomic principles. Cancer 1980:46: 2514-2519
4. Ackermann GI, Altini M, Shear M. The unicystic ameloblastoma: a clincopathological study of 57 cases. J Oral Pathol 1988; 17: 541-546.

5. Stoelinga PJW, Bronkhorst FB. The incidence of aggressive cysts of jaws. J Craniomaxollofac Surg 1987:15: 184-195.
6. Rosenstein T, Pogrel MA, Smith RA, Regezi JA. Cystic ameloblatoma-behaviour and treatment of 21Cases. J Oral Maxillofac Surg 2001:59: 1311-1316.
7. Leider AS, Eversole LR, Barkin ME. Cystic ameloblastoma: a clinicopathologic analysis. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1985:60: 624-630.
8. Li TJ, Wu YT, Yu SF, Yu GY. Unicystic ameloblastoma- a clinicopathologic study of 33 Chinese patients. Am J Surg Pathol 2000:24: 1385-1392.
9. Ross RE, Rauhenheiner EJ, Van Heerder WFP. Clinicopathological study of 30 unicystic ameloblastoma. J Dent Assoc S Afr 1994:49: 559-562.
10. Gardner DG. A pathologist's approach to the treatment of ameloblastoma.J Oral Maxillofac Surg 1984; 42: 1 161-166.
11. Gardner DG, Corio RL. Plexiform unicystic ameloblastoma. A variant of ameloblastoma with low recurrence Rate after enucleation. Cancer 1984:53: 1730-1735
12. Korzhevskii DE. Silver nitrate impregnation of internuclear structures in nerve cells following fixation in Cornoy's medium. Morfologiia 2001: 119: 67-69.
13. Marx RE, Smith BH, Smith BR. Swelling of the retromolar region and cheek associated with limited opening.J Oral Maxillofac Surg 1993:51: 304-309.