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Retrospective Evaluation of Clinicopathologic Parameters on Various Ameloblastomas - An Eight Year Study (Original Research)

Dr Navajeevraj M N[1], Dr Bijumon CB[2], Dr. Shameena .P .M[3]

[1]Assistant Professor, Oral and Maxillofacial Pathology, Govt. Dental College, Kozhikode, India
[2]Assistant Professor, Pedodontics. Govt. Dental College, Kozhikode, India
[3]Professor, Oral and Maxillofacial Pathology, Govt.Dental College, Thrissur, India

Abstract: ***Ameloblastoma may occur centrally within bone or peripherally without an intra-osseous component in the soft tissue overlying the alveolar ridge. These lesions are characterized by a slow growing painless swelling causing expansion of cortical bone, perforation of the cortical plates and infiltrarion of the soft tissues. The polymorphic nature of ameloblastoma is reflected by the variety of recognized histologic patterns in which they may appear. The follicular and the plexiform are the main histologic types. Variations in histomorphologic pattern do not appear to have a significant bearing on the biologic behavior or prognosis of these tumors with the exception of the unicystic and desmoplastic types. The purpose of this study is to determine the incidence of ameloblastomas with respect to clinical features and compare them with other reported series and to compare and correlate the histopathologic feature in various forms of ameloblastoma. The present study was conducted to analyse the clinical and pathological features of Ameloblastoma. The study population consisted of 34 histologically diagnosed cases of Ameloblastoma. They were then grouped into three namely conventional, unicystic and malignant type based upon the histological patterns. Clinical data were retrieved from the relevant files.***

Keywords: Clinicopathologic Parameters, Ameloblastoma

1. Introduction

The origin of ameloblastoma is not known with certainty, but in agreement with the concepts of neoplasia in general, it is likely the result of alteration or mutation in the genetic material of cells that embryologically are preprogrammed for tooth development. Environmental factors and individual patient variables (e.g. General health status, nutritional status) also has a likely role in modulating the incidence of the disease [1]. As seen with nearly every odontogenic neoplasm, the ameloblastoma may occur centrally within bone or peripherally without an intra-osseous component in the soft tissue overlying the alveolar ridge [2]. These lesions are characterized by a slow growing painless swelling causing expansion of cortical bone, perforation of the cortical plates and infiltrarion of the soft tissues [4].

The polymorphic nature of ameloblastoma is reflected by the variety of recognized histologic patterns in which they may appear [1]. The follicular and the plexiform are the main histologic types [3]. Variations in histomorphologic pattern do not appear to have a significant bearing on the biologic behavior or prognosis of these tumors with the exception of the unicystic and desmoplastic types[1].

Reports from various parts of the world indicate that there are differences in the incidence of ameloblastoma as well as the frequency of particular histologic types [3, 1]. They also attribute varying levels of prognosis for the different histologic types.
This varied reports and different prognosis of the histologic types ameloblastoma persuade us to take this study.

2. Aims and Objectives

The purpose of this study is:

1. To determine the incidence of ameloblastomas with respect to clinical features and compare them with other reported series.
2. To compare and correlate the histopathologic feature in various forms of ameloblastoma.

3. Materials and Methods

This study was conducted in the department of Oral & Maxillofacial Pathology and Microbiology, Govt. Dental College, Calicut. The material for the study comprised of 34 cases diagnosed histopathologically as Ameloblastomas during the period 2001 to 2008 from the department files.

The clinical details of the each patient were noted from the files. Age, sex, site, clinical and roentenographic findings were noted.

The paraffin blocks of the cases were cut with the help of a rotary microtome and two sections of 4-6 μm thickness and 2 μm thickness were taken for the haematoxylin and eosin staining. These sections were then examined under light microscope and the histopathologic features were recorded in the proforma.

4. Results and Observations

The clinical and histological features of ameloblastoma, the comparison of the features in the conventional, unicystic and malignant types were done. The results pertaining to the study are described below.
Age distribution:

It was found that both conventional and unicystic occurred over a wide age range and the peak incidence in the 3rd decade (35%) followed by 4th decade (18%), 6th decade (15%) and 2nd & 5th decades (12%). Among the two cases of malignant ameloblastoma, one case was of 28 years of age and other was 55 years of age at the time of presentation.

Sex distribution:

The study population comprised of 20 males (59%) and 14 females (41%). Of these, 15 males (44%) and 10 females had conventional ameloblastoma. Four males (12%) and 3 females (9%) had unicystic ameloblastoma. Both the malignant cases presented in females (6%).

It was seen that for the conventional ameloblstoma there was marked male predilection while for the unicystic variant the sex distribution was almost equal.
Site distribution:

Considering the site wise distribution, mandible was seen to be the most common site of involvement with 29 cases (85%) of the series being studied. Among these 29 cases, 22 were that of conventional ameloblastoma, 5 of unicystic and 2 of the malignant variant.

Five cases (5%) were reported in the maxilla, with 3 being of the conventional type and two unicystic type. No malignant type was seen in the maxilla.

Location wise, mandibular molar-ramus area was the site most commonly involved with 24 of the cases being located there while only 5 cases were seen in the anterior mandibular region. Of the 24 cases in the posterior mandible, 18 were conventional, 4- unicystic and 2 of malignant forms. In the anterior mandible 3 cases were of conventional type and one was the unicystic variant. Though not statistically significant, both the cases of malignant ameloblastoma were seen in mandibular molar-ramus region.

In the maxilla, anterior region was more commonly involved with 3 from a total of 5 cases seen there. Of the 5 cases, 3 were of conventional type and two were unicytic. In the anterior maxilla, two cases of conventional and one case of unicystic ameloblastoma was seen.

Clinical presentation:

Clinical presentation in all of the cases was that of swelling. Two cases presented with pain and three cases (9%) presented with pus discharge.

Four of the cases were that of reccurence with a mean recurrence period of 7 years from the time of initial surgery.

Radiographic features:

Correlating the radiographic presentation with the histologic types, it was seen that out of 25 cases of conventional ameloblastoma, 17 presented with a multilocular appearance, 4 cases presented as unilocular while 4 cases were seen with a moth-eaten radiolucent radio-paque appearance. Both the malignant ameloblastoma cases presented as multilocular radiolucency.

17 cases (50%) had associated displacement of adjacent teeth and root resorption was present in 9 cases (26%). The desmoplastic variant presented with a moth eaten pattern. Three cases of (9%) unicystic ameloblastoma and one case (3%) of malignant form showed root resorption.

Histopathologic findings:

Histologically, the cases were categorized into various forms based on the predominant pattern and cellular arrangement. Follicular comprised of 12 cases (35%), Plexiform -7 cases (24%), Unicystic-7 cases (21%), Acanthomatous-2 cases (6%), Desmoplastic-1 case (3%), Clear cell-1 case (3%), Keratoameloblastoma - 1 case (3%), Granular cell - 1 case (3%) and Malignant – 1 case (3%).

The histologic features were studied under 2 broad groups, namely epithelium and connective tissue.

1. Epithelium

The various parameters studied in the epithelium included -

Peripheral cells

Peripheral cells in the epithelal component of tumor were columnar in 15 cases (44 %). The cells had a cuboidal appearance in 9 cases (26%) of which majority were of the plexiform type. Both columnar and cuboidal types of cells were noted in 10 cases (29%).

Stellate reticulum like areas

Most of the central portion of the epithelium of the tumor showed stellate reticulum like areas – 32 cases (94%). It was more conspicuous in follicular variant.

Squamous metaplasia

Squamous metaplasia was noted in 15 cases (44%) with majority being the follicular type (5 cases). Out of these, only 2 cases (6%) were fully acanthomatous. Cystic degeneration

It was noted in 29 cases (79%). It was seen that the degeneration in follicular type was occurring in central portion of epithelial islands whereas in plexiform this was seen mostly in the connective tissue stroma. The epithelial cells in the cystic areas showed degenerative changes accompanied by a flattening of the cells lining these cystic areas. Of the 5 cases of plexiform, showing cystic degeneration, one case showed this feature within the tumor epithelium rather than within the connective tissue, as is usually seen in plexiform ameloblastoma.

Basal cytoplasmic vacuolation

Histologically, basal cytoplasmic vacuolation (Vickers-gorlin) in the tumor epithelium was seen in 16 cases (47%). Thirteen of these were of the conventional type and 3 unicystic types. No case of malignant ameloblastoma showed this feature.

Granular cell and clear cell changes

Only one case (3%) showed granular change in the odontogenic epithelium and one case was with a clear cell change in the islands of tumor and was considered as clear cell ameloblastoma.

2. Connective tissue

In connective tissue the parameters counted were – cellularity in the stroma, desmoplasia, inductive change, increased vascularity and inflammatory component.

Cellularity

Most of the cases were presented with a fibrocellular stroma- 23 cases (67%) and 11 cases (23%) had fibrous stroma. Of the 23 cases with fibro-cellular stroma, 10 cases were of the follicular type, 5 plexiform type and 2 malignant type. Majority of the cases showing a fibrous stroma were of the follicular type.

Desmoplasia

The only case which had showed desmoplasia was grouped as the desmoplastic variant.
Inductive change

Inductive change was seen in five cases (14%), mostly seen in the connective tissue stroma juxtaposed to the tumor epithelium. Follicular ameloblastoma was the one showing these changes in majority of the observed cases.

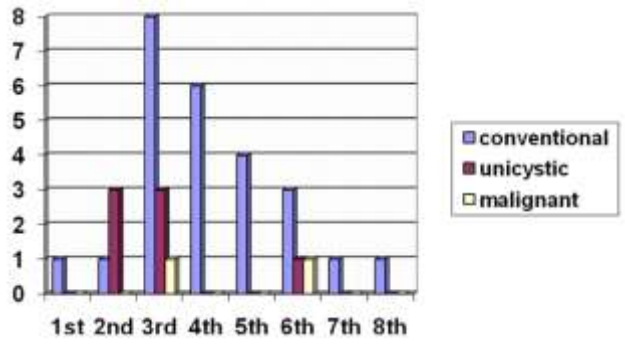
Increased vascularity and inflammation

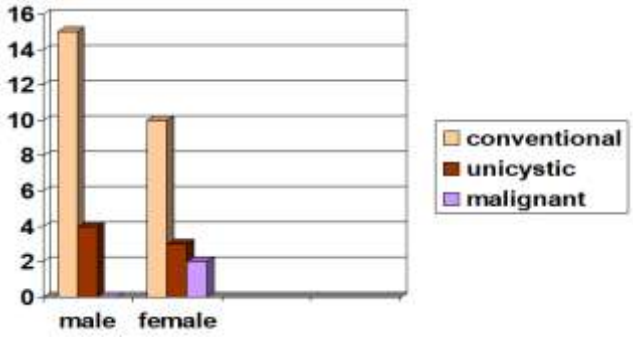
Vascularity was increased in 15 cases (44%) and majority of these were seen with plexiform pattern (33%). Inflammatory component increased in 13 cases (38%).

Statistical analysis

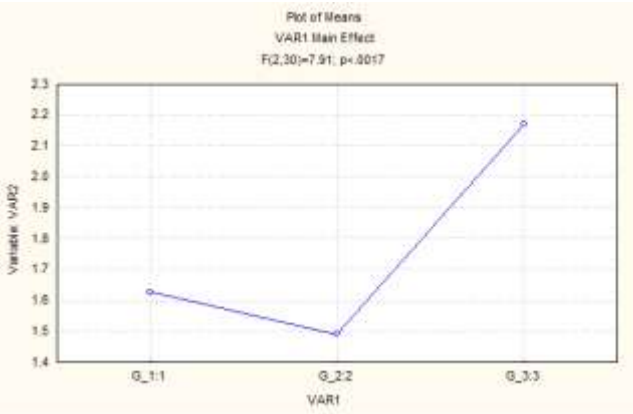
Statistical analyses was done using 'ANOVA' test (analysis of variance). The differences in the values of groups were found to be significant. Since 'P' value was significant in ANOVA, a POST HOC test was carried out. The results showed variance between group l (conventional ameloblastoma) and group lll (malignant type), group lI (unicystic ameloblastoma) and group lll to be highly significant. The variance between l and ll was not significant.

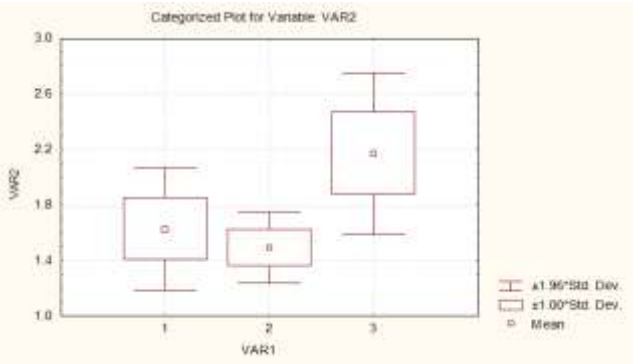
Age and Gender Variations





Statistical analysis by ANOVA and POST HOC





Hisopathologic Findings

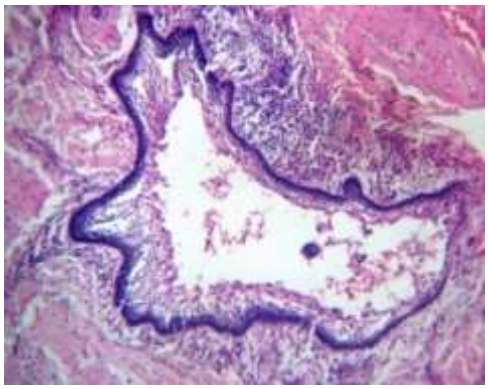


Figure 3: Photomicrograph of follicular ameloblastoma shows cystic degenerative changes in the centre of the follicle (H & E 10x)

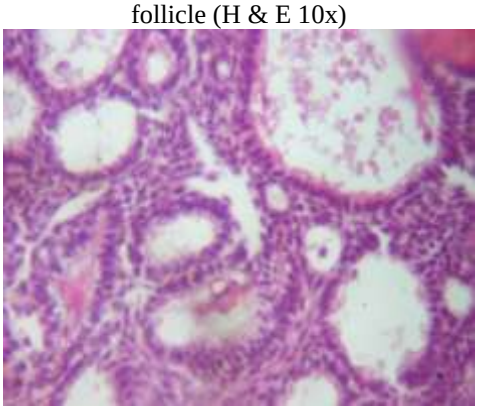


Figure 4: Photomicrograph shows plexiform pattern with anastomosing cords and strands of the tumor cells (H & E 40x).

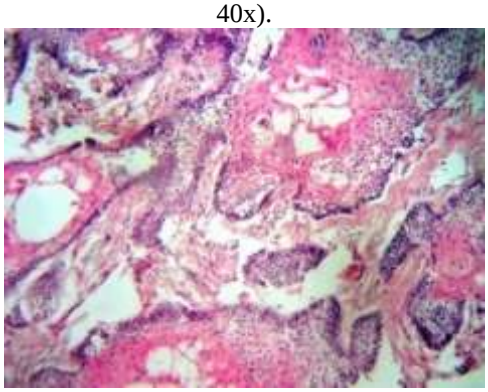


Figure 5: Photomicrograph showing squamous metaplasia in acanthomatous ameloblastoma (H & E 10x).

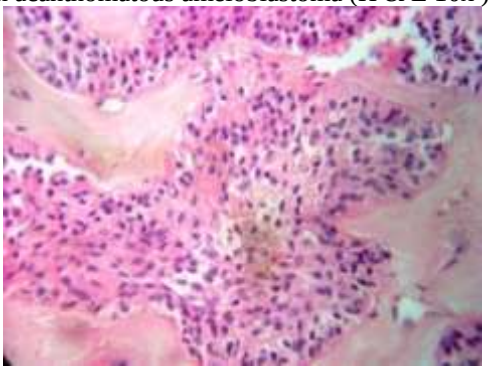


Figure 6: Photomicrograph showing eosinophilic granulation of cytoplasm in granular ameloblastoma (H & E 40x)

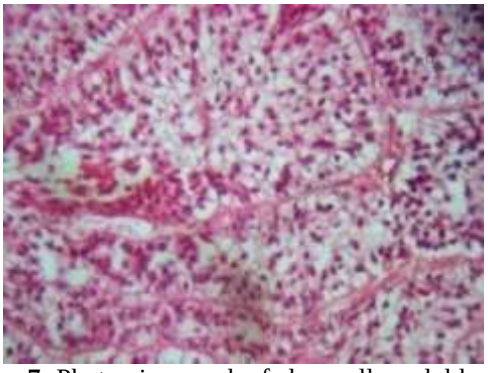


Figure 7: Photomicrograph of clear cell ameloblastoma demonstrating tumor islands with a clear cytoplasm and peripheral columnar differentiation (H & E 10x).

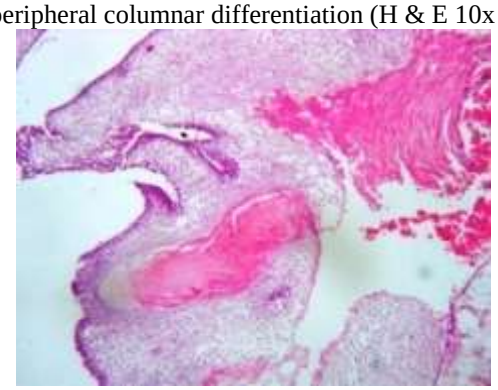


Figure 8: Photomicrograph showing keratoameloblastoma with lamellar stack of parakeratin extruding directly into the connective tissue stroma (H & E 40x).

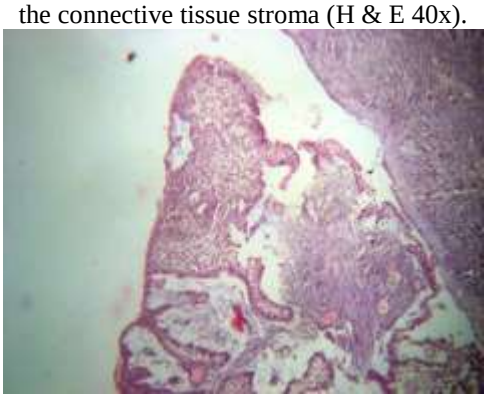


Figure 9: Photomicrograph of unicystic ameloblastoma with a epithelial lining and tumor mass protruding into lumen (H & E 10x).

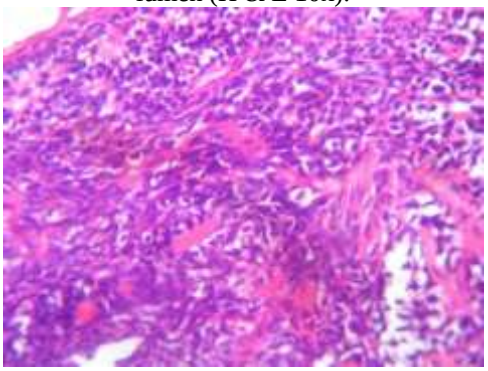


Figure 10: Photomicrograph of malignant ameloblastoma showing nuclear pleomorphism and mtotic figures (H & E 40x).

5. Discussion

The present study was aimed at studying the clinicopathologic variables in three broad categories of Amelobstoma, namely, Conventional, Unicystic and Malignant types.

Most of the previous literatures on the subject reports 4th decade as the most common age group for ameloblastoma[4,2,1]. However, our study shows a deviation from this with most of the cases being observed in the 3rd decade. Only two other studies, i.e. of Kim SG [8] and Sirichitra V [9], seem to have similar findings.

Various studies on Ameloblastoma show an equal predilection for either sex [3,5,1]. But we found a marked male predilection in our study sample, which is similar to the findings of Hatada et al [6]. The equal sex distribution seen in case of Unicystic Ameloblastoma is consistent with the reported literature

The most common presenting symptom in our study as well as previous ones [4,2,1] is that of a painless swelling of short duration, followed by pain and pus discharge. This may be attributed to most of the patients seeking treatment for an obvious swelling even in the absence of other symptoms, including pain. The presence of pus discharge seen in some cases may be due to secondary infection.

As seen in previous studies, the Mandible is the most common site for Ameloblastoma [6,1,2,4]. However, the predominant region of involvement in our sample was the Premolar-Molar area. The reviewed literature cites the molar-ramus area as the most common region for Ameloblastoma. Only the study by Kim et al is in agreement with our observations.

In the case of maxilla, the literature cites the posterior region as the predominantly involved site [4]. In contrast to this, our study results show a predilection for the anterior maxilla. Whether this finding can be considered a significant one cannot be ascertained because of the relatively smaller sample size.

In agreement with previous studies [6,1,2,] the most common radiographic appearance in our study was multilocular radiolucency followed by unilocular radiolucency and a mixed radio-opaque radiolucent pattern. Since comparison between the radiographic appearance and histologic pattern was beyond the original study design, it cannot be said with certainty which histologic type was associated with the mixed pattern.

The histopathologic categorization into different types was based on the criteria proposed by Vickers & Gorlin [10]. The predominant histologic pattern observed was the Follicular type as reported in the literature [2]. Our study sample also consisted of some relatively rare variants of ameloblastoma like Granular cell Ameloblastoma, Keratoameloblastoma, Desmoplastic ameloblastoma and Clear cell Ameloblastoma.

The cases of unicystic ameloblastomas in our study, all demonstrated a definite unicystic configuration with a fibrous connective tissue wall lined by ameloblastomatous epithelium. The incidence of Unicystic ameloblastoma in our study was seen to be higher than that reported by Kessler et al [1] and Neville [4].

This was also observed that in the majority of the cases of plexiform ameloblastoma in our study, the peripheral cells were cuboidal rather than columnar, whereas in follicular it was columnar.

Cystic degeneration was predominant in the follicular ameloblastoma and it was seen within the tumor follicles whereas in plexiform it is seen in stromal connective tissue. This is consistent with the previous studies [2].

34 cases of our series were distributed into three groups based on the histological characteristics: conventional ameloblastoma, unicystic ameloblastoma and malignant type.

The study showed that there is a significant statistical difference between conventional & malignant ameloblastomas and unicystic & malignant types and there was no significant differences between conventional and unicystic types.

6. Summary and Conclusion

- Analysis of the clinicopathologic characteristics showed variations form previous literature in the Age, Sex and Site of involvement for our sample.
- Clinicopathologic analysis utilizing a larger sample size will help in better characterization of Ameloblastoma in our population.

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