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ORIGINAL ARTICLE

Incidence of Different Clinical & Histopathological Types of Ameloblastoma in Southern Punjab

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ABSTRACT
Background: Second-most common odontogenic tumor is ameloblastoma. This is because to its high tumor recurrence rate, poor treatment options, clinical features, and prevalence.
Objective: To examine the occurrence rates and offer clinical and pathological insights into the different histological types of ameloblastoma in Southern Punjab.
Method: This retrospective study was conducted at CIMS Dental College Multan within a duration of 16 months from Dec 2022 to March 2024. Clinico-pathological data for biopsy-proven 31 cases of ameloblastoma reported from different areas of Southern Punjab were analyzed anthropologically and descriptively over 16 months. Descriptional statistical analyses were performed on the data that was obtained using the statistical software programme known as SPSS version 20.0. The threshold for determining the level of significance was established at $p<0.05$.
Results: Ameloblastoma was more common in southern Punjab in the fourth to fifth decade, peaking in the fifth with a wider age range of 16–63 years. All described patients had unicystic or multicystic mandible involvement and complained of progressively increasing, painless lower jaw enlargement. Fourteen patients had unicystic while 17 were having multicytic appearance. Radiographically, 17 cases had multilocular radiolucency (54.84%), and 14 unilocular radiolucencies (45.16%) were reported. Histopathologically, the Follicular ameloblastoma (61.3%) was the most prevalent pattern, followed by plexiform type (16.13%), Acanthomatous (9.68%), desmoplastic (9.68%) and Granular Cell type (3.3%).
Conclusion: This study describes clinical/radiological and histopathological types of ameloblastoma in Southern Punjab. This study provides pathologists and clinicians with Clinico-Pathological insights into all documented cases since these variations have different biological characteristics.
Keywords: Ameloblastoma, Clinico-Pathological, Mandible, Follicular, Odontogenic

INTRODUCTION

Ameloblastoma is a tumor that grows in odontogenic epithelium, which is tissue of the enamel organ type that has not yet hardened[1]. Typically, it shows up in the skeleton. What is the origin of the epithelium? The epithelium of odontogenic cysts, basal cells of the surface epithelium, developmental disturbances in the enamel organ, cell remains of the enamel organ, or even heterotropic epithelium from other parts of the body could be the culprit, according to certain views[2]. One third of ameloblastoma tumors are mural proliferations near the reduced anamel-forming epithelium of dentigerous cysts, which provides clinical support for the idea that these tumors have an odontogenic origin[3]. The tumor is also frequently found in the tooth bearing area.Many biochemical and immunohistochemical experiments have been performed to identify growth factor receptor expression and metalloproteinase activity.3 Ameloblastoma can be classified histopathologically into two main kinds: follicular and plexiform. These subtypes are among many more[4]

There are three radiological forms of ameloblastomas: unicystic, multicystic, and peripheral. The four primary forms of ameloblastomas, according to histopathological variations, are follicular, plexiform, acanthomatous, and granular cell types. Some of the less prevalent variations are clear cell types, basal cell ameloblastoma, and desmoplastic.These forms of ameloblastoma are classified based on parameters such as age of presentation, clinical behavior, radiological characteristics, and prognosis[5]. Two possible sites for ameloblastoma development are the alveolar mucosa and gingiva (peripheral) and the jaw bone (intraosseous)[6] The former does not involve the underlying bone and is instead characterized by a sessile or pedunculated mass that is slowly expanding[7]Follicle cell, plexiform, acanthomatous, desmoplastic, and basal cell pattern are some of the possible histological subtypes of ameloblastoma. Any one of these histological kinds could be present in the lesion, or it could be a mixture of several odontogenic tumor forms. All of these combinations are possible outcomes. Tumor removal surgery is the treatment of choice for ameloblastoma patients. There is a spectrum of invasive to non-invasive surgical procedures that could be considered for this issue[7]. The recurrence probability after radical surgery is 15-25%, but the recurrence probability after conservative surgery is 75-90%[8]. This points to a connection between the two methods. Meloblastoma affects a much smaller percentage of North Americans than it does of Asians and Africans[11].

The World Health Organization (WHO) updated the category of meloblastoma in 2017[12] Conventional, peripheric, and unicystic ameloblastoma subtypes were reported by Cadavid et al. (2019) in their study on the most recent WHO classification of ameloblastomas[13]. Granular, plexiform, acanthomatous, desmoplastic, and basal cell histologies are commonly used. Unicytostic kinds might be intraluminal, luminal, or mural. Conventional ameloblastoma is the most frequent OT, and studies show that it is both locally aggressive and extremely impactful, potentially leading to patient illness or death. The plexiform pattern is second most prevalent, after the follicular pattern.In addition, the recurrence rate for unicystic ameloblastoma is less than 30%, although it can reach 30% in follicular type[15] Research out of the Mayo Clinic in the US indicates that aggressive ameloblastomas cause swelling and pain by pressing into the jawbone as they grow. Aggression is more prominently shown by the maxilla than the mandible[16]

No comprehensive study has compared data obtained on ameloblastoma in Southeast Asia to data gained on other odontogenic tumors, despite the fact that there are obvious variances. The purpose of this research is to determine how common various types of ameloblastoma are in the people living in Southern Punjab of Pakistan.

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METHOD

This study was conducted at CIMS Dental College Multan after getting approval on 7th Dec 2022 with reference no 786/CDC/IRB/12-02 within a duration of 16 months Dec 2022-March 2024. In this retrospective study 31 patients were included. People from the target population were chosen using a non-probability sampling method that is purposeful. Over the specified time frame, we perused the patient records kept by the oral and maxillofacial surgery department. The histological variations, site, and gender of each patient were documented. We have collected demographic and radiological data from the patients and obtained biopsy samples. Biopsies were taken after a thorough examination of each sample using standard staining techniques such as Haematoxylene and Eosin.

In our procedure, each jaw's site distribution was divided into two halves, one starting at the midline and ending at the canine's distal surface and the other beginning at the first premolar's mesial surface and ending at the mandible's ramus and the maxilla's tuberosity. Lesions that included the entire mandible or maxilla, the coronoid or condylar process, or the entire left or right side of the jaw and maxilla were classified as having a specific anatomical distribution. Additionally, the recorded instances of ameloblastoma have their corresponding histological variants.

Tables and figures were generated from the data after it was entered into SPSS version 20, analyzed with descriptive statistics, and finally displayed.

RESULTS

Presented cases had mean age 45.81 years. Significant male was higher in numbers with male to female ratio of 23:8 (M 74.2% : F 25.8%).(figure 1)

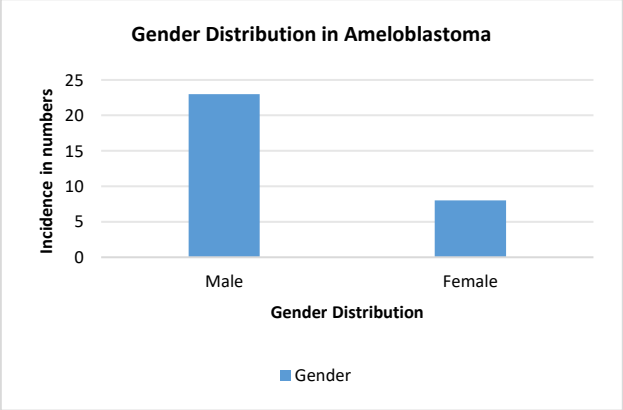

Figure-1: Gender distribution

All of the cases presented with painless slow growing swelling affecting mandible with particular preference for posterior mandible (100%) in ramus area, while no case was reported involving maxilla (0%).Overall prevalence (based upon histopathological sub types) may be regarded in descending order as : Follicular (61.3%) > Plexiform (16.13%) > Acanthomatous (9.68%) = Desmoplastic (9.68%) > Granular cell (3.3%). (Table 2)

Table 2: Histopathological Variants of Ameloblastoma among the study population of Southern Punjab (n=31)

Histopathological Variant	Gender		Incidence (n)/ Percentage (%)
	M	F	
Follicular Amelobastoma	14	5	19 (61.30%)
Plexiform Amelobastoma	3	2	5 (16.13%)
Acanthomatous Amelobastoma	2	1	3 (9.68%)
Granular Amelobastoma	1	0	1 (3.3%)
Desmoplastic Amelobastoma	3	0	3 (9.68%)

We found that majority of the cases 22 (70.96%) were non non-recurrent and 9 (29.04%) cases were recurrent.(table 2)

Table-2: Ameloblastoma categorization based on biological behavior

Variables	Frequency/percentage
Recurrent Biological Behavior	
Yes	22 (70.96%)
No	9 (29.04%)

As per clinical outcomes, multi-cystic ameloblastoma was found in 54.87% and uni-cystic ameloblastoma was found in 45.16%.(figure 2)

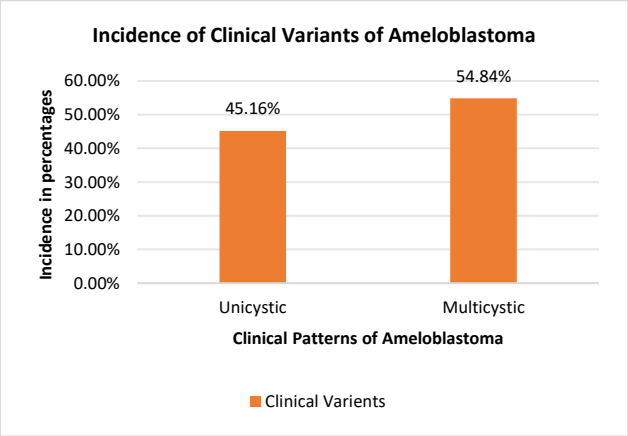

Figure-2: Clinical variants of ameloblastoma

Radiographically, 17 patients were having multilocullar presentation(54.84%) while 14 were with unilocular appearance (45.16%).(figure 3)

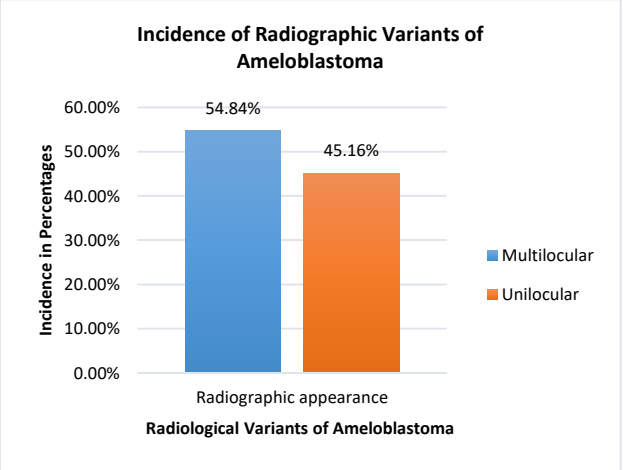

Figure-3: Radiographic variants

HISTOPATHOLGY: 窗体底端

Histologically, ameloblastoma consists of two cell types: the peripherally located "basal cells," similar to ameloblasts, and the suprabasal "epithelial cells," located centrally showing resemblance to stellate reticulum.

These basal cells demonstrate hyperchromatic, columnar morphology in a palisaded order with vacuolated cytoplasm, and nuclei pushed away from the basement membrane (the reversal of polarity). Conversely, the epithelial cells show a bland cytological appearance with minimal mitotic figures, stipulating their slow growth rate.

For the typical type of ameloblastoma (formerly categorized as solid/multicystic ameloblastoma), the two cell types are structured into two distinctive patterns: the plexiform and the follicular. The plexiform pattern has epithelial cells that are merged in an interlacing network abutting the connective tissue ; while in follicular pattern,they are arranged in the form of clusters or islands or follicles which are infact encompassed by the connective tissue .At times, ameloblastomas may display both histological types in varying degrees within the single tumor. Several more histological types of multicystic ameloblastomas are documented as acanthomatous, desmoplastic, granular cell, basal cell and the keratopapillary types. These patterns overlay either of the typical primary features but not signifying any divergence in the tumor behaviour, excluding the desmoplastic varient, which might display relatively aggressive nature

Diagnosing unicystic ameloblastoma often poses a challenge for pathologists because classical diagnostic features are frequently not apparent. In such cases, solid tissue is not present, but the membranous fragments of the cystic wall being retrieved. The basal cells exhibit limited and restricted elongation, and the typical nuclear palisading is confined to a limited cluster of cells. While the suprabasal cells on occassions stratify being similar to stellate reticulum, they can also exhibit inflammation superimposed on them.

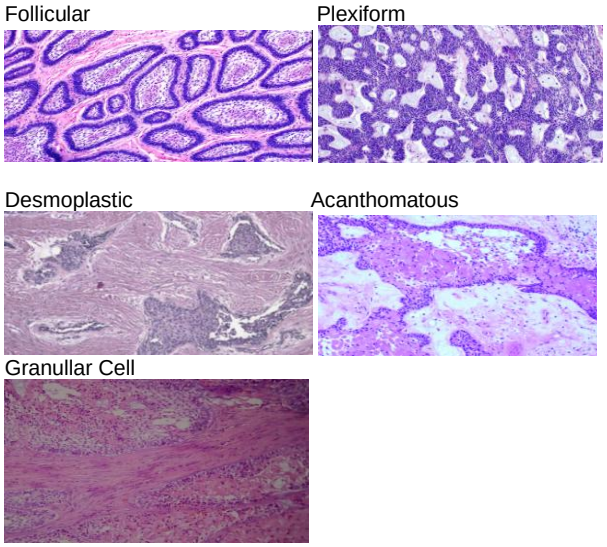

Figure-4: Microphotographs of histopathological variants

DISCUSSION

Ameloblastoma is a common type of odontogenic tumor with benign yet locally aggressive nature. There are a few possible origins for this type of epithelium, which typically manifests in bone. These include cell remnants of the enamel organ, the epithelium of odontogenic cysts, disruptions to the developing enamel organ, basal cells of the surface epithelium, or even heterotropic epithelium from other areas of the body. Ameloblastoma distribution and presentation have been studied across different regions of the world in various aspects and among various ethnic groups through numerous investigations[15-17]

The current study aims to provide data regarding the prevalence and frequency distribution of various variants of ameloblastoma observed within the population of Southern Punjab Since all the clinical, pathological & radiographic types of ameloblastoma vary in their biologic attributes, Regarding the histopathological varients, follicular type was the most common one with 61.3%, followed in sequence by the plexiform pattern with 16.13% of the studied population. Adebiyi et al. In 2006, they also noted the same prevalence aspects in their studies as follicular ameloblastoma(64.9%) being the frequently occuring pattern,the plexiform (13%) type being next in order followed by, desmoplastic (5.2%) and the acanthomatous (3.9%)[14] The slight variation in their occurrences can be attributed to geographical disparities and sample size variation. This is also simialr with study conducted by Simon et al. They quoted follicular type as the most common 51.6% and the plexiform type , the enxt common with 23.6%[15] Similar findings were found in study by Gardener et al stating follicular type at top with 33.9% and plexiform to be next at 30.2% [16]. An Iranian study conducted by Saghravanian et al reported the findings contrary to the current as well as several other studies. They rated plexiform as the most common with 46.4% and follicular as 26.8%, followed by acanthamatous type with 7.1%.[17] As per Worth, 1975, the most frequent radiographic presentation of ameloblastoma being multilocular radiolucency having corticated margins, often displaying the irregular scalloping[18,20] The same was concluded in our study with 100 percent presentation in mandible. At the same time, it may also occur in the maxilla as per the vast literature available. In the current study, the multilocular to unilocular ratio is (54.84%:45.16%). According to Aregbesola B et al, 53% of the total cases exhibited a multilocular appearance, while 47% displayed a unilocular appearance[19]

The majority of cases (70.96%) in our study were non-recurrent ameloblastomas. Previous research in both rich and developing nations has consistently found this. Case in point: ameloblastoma rates in Iran were 96.6% and in Kenya they were 84.8% non-recurrent.referenced in[21,22] It is clear from these results that ameloblastoma is typically a tumor that does not return. But why ameloblastoma turns aggressive is a mystery. Previous research has pointed to a number of potential causes for the tumor's development and locally invasive modifications. These include the tumor's solid/multicystic form, its placement in the maxilla, and apoptotic changes in its peripheral basal layer. Molecular factors that contribute to the progression of ameloblastoma include matrix metalloproteinases. These enzymes break down the matrix as the tumor grows, invades, and induces angiogenesis[23]

CONCLUSION

Our study results report follicular ameloblastoma was most prevalent in population of Southern Punjab followed by Plexiform, Acanthamatous, Granular and desmoplastic ameloblastoma respectively. Significant male gender was higher among presented cases.

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