

**Original Article**

# The Spectrum of Inflammatory and Developmental Odontogenic Cysts

Shagufta Naeem, Noor Khan Lakhnana, Toqueer Iqbal, Shabana Naz, Ahmareen Khalid, Irfan Hassan.

**Objective:** To study the spectrum of inflammatory and developmental odontogenic cysts.

**Introduction:** Epithelial lined cysts of the oral cavity are among the most commonly encountered oral diseases from both the clinicians and pathologists perspective. To reach a specific diagnosis a multi team approach is necessary which includes radiologists, surgeons and pathologists.

Two major categories of cysts exist; odontogenic and non-odontogenic. The most commonly encountered odontogenic cysts are radicular or periapical cyst; which may occur in any age group but common in 3<sup>rd</sup> and 4<sup>th</sup> decade. The second common type is dentigerous cyst that accounts for 17% of all the odontogenic cysts. Keratocysts account for 10% of all odontogenic cyst and can have more chances of recurrence.

**Materials and Methods:** 60 cases sent to the Pathology Department during Sept. 2006 to Dec 2009 were included in the study, after observing inclusion and exclusion criteria. After gross examination the sections were routinely processed and slides stained with H& E. All the slides were thoroughly examined by two consultant histopathologists and postgraduate pathology resident.

**Results and conclusions:** 50% were radicular cysts, 36% were dentigerous cysts, keratocysts and eruption cysts accounted for 8% and 5% respectively. In one case of dentigerous cyst ameloblastoma was diagnosed and one case was diagnosed at maxillary antrum, an unusual site for dentigerous cysts.

**Key Words:** Oral cavity, cystic lesions, odontogenic cysts, non-odontogenic cysts.

## Introduction

The jaws give beauty to our face but at the same time they are host to a wide variety of pathological lesions i.e. cysts and neoplasms<sup>1</sup>, which leads to disfigurement. Published studies show that odontogenic cysts account for 0.8 - 49% of all submitted specimen. For the proper management of these lesions complete history, thorough physical and radiological examination are of prime importance. Although odontogenic cysts are relatively common and pose no diagnostic challenge, they are misdiagnosed due to clinical and radiological similarities. Histopathology continues to be the mainstay for the diagnosis of these lesions, as immunohistochemistry and molecular techniques have had, as yet, little impact in this area.<sup>1</sup>

For the better understanding of the pathology of odontogenic lesions it is important to have proper knowledge of histology and development of normal tooth. In the earliest stage of tooth development, projection of dental lamina forms invaginations into underlying ectomesenchyme. These cells differentiate into a layered cap with an inner and outer enamel epithelium, which contain inner stratum intermedium and stellate reticulum layers. Changes also occur in the underlying ectomesenchyme forming dental follicle and dental papillae. Mesenchymally derived odontoblasts form along the dental papilla and secrete dentin, which induces the inner enamel epithelium to become ameloblasts.

Ameloblasts are responsible for enamel production and eventual crown formation. The penetration of these cells through the Herwig's sheath at the edge of the enamel organ give rise to epithelial rests of Malassez within the periodontal ligament. The odontogenic cysts are believed to arise from these rests.<sup>2</sup> (Figure 1) The enamel organ then involutes to a monolayer, which becomes squamoid and ultimately fuses with the gingiva during eruption.<sup>3,4</sup> Cementoblasts and fibroblasts from the dental follicle mesenchyme, deposit cementum on the root surface and form the periodontal membrane, respectively. Cysts are classified as follows:

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### Correspondence Address

*Dr. Irfan Hassan*

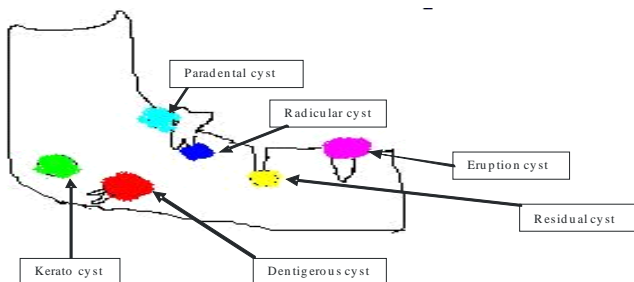
*Department of Pathology . Ayub Medical College  
Abbottabad*

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### Cysts of developmental origin

- **Odontogenic Cysts**
  - Gingival cyst of the newborn
  - Odontogenic Keratocyst
  - Follicular cyst (dentigerous cyst)
  - Eruption cyst
  - Lateral peridental cyst
  - Gingival cyst of adults
  - Glandular odontogenic cyst
- **Non-Odontogenic Cysts**
  - Nasopalatine cyst
  - Nasolabial cyst
- **Cysts of inflammatory origin**
  - Radicular cyst
  - ❖ Apical and lateral radicular cysts
  - ❖ Residual radicular cysts
  - ❖ Paradental cysts
  - ❖ Collateral mandibular infected buccal cysts<sup>5</sup>



**Figure 1: Odontogenic cysts of the jaw and their location in mandible.**

### Objective:

To determine the frequency and spectrum of odontogenic cysts presented at the two tertiary care hospitals

### Materials & Methods

**Setting:** This study was conducted in the Pathology Department of Pakistan Institute of Medical Sciences, Islamabad (PIMS) in collaboration with Oral and maxillofacial Surgery Deptt PIMS & Ayub Medical College, Abbottabad (AMC).

**Duration:** Samples were collected from Sept 2006----- Dec 2009.

**Sample size:** 60 cases were included in the study.

**Study Design:** Descriptive study.

**Inclusion Criteria:**

All patients diagnosed as having odontogenic cyst (inflammatory and developmental)

**Exclusion criteria:**

Non-odontogenic cysts were excluded.

**Methodology:**

60 cases were selected after informed consent of the patients, attending the Dental Department of both hospitals. History, clinical and radiological findings were recorded on a proforma of each patient. All the biopsies were sent in 10% formalin. After gross examination adequate representative tissue was taken and processed in the automatic tissue processor. All slides were stained by hematoxylin and eosin (H&E) and then examined by two consultant histopathologists and a postgraduate pathology resident. The diagnoses were arrived with consensus.

### Results

Among the 60 cases 41 were male while 19 were female patients. The mean age group for each of the cysts was recorded (Table 1).

The most commonly encountered cysts were radicular cyst and dentigerous cyst (Figure 1).

Maxilla was most commonly involved by radicular cysts while mandible was common site of involvement of dentigerous cysts, odontogenic keratocyst and eruption cysts.

**Table 1: Mean age and male/female ratio of the study patients (n=60).**

| Type of cyst           | Mean age of Patients(years) | Male/female ratio |
|------------------------|-----------------------------|-------------------|
| Radicular cyst         | 37.5                        | 1:1               |
| Dentigerous cysts      | 26                          | 4:1               |
| Odontogenic Keratocyst | 30.5                        | 2.1:1             |
| Eruption cysts         | 8                           | 1:1               |

**Table 2: Site distribution of cysts. (n= 60)**

| Type of cyst           | Mandible | Maxilla | Total |
|------------------------|----------|---------|-------|
| Radicular cysts        | 12       | 18      | 30    |
| Dentigerous cysts      | 17       | 5       | 22    |
| Odontogenic Keratocyst | 5        | 0       | 05    |
| Eruption cysts         | 3        | 0       | 03    |
| Total                  | 37       | 23      | 60    |

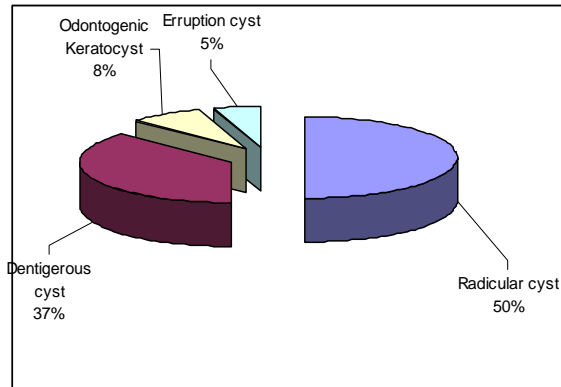


Figure 2: Frequency distribution of odontogenic cysts

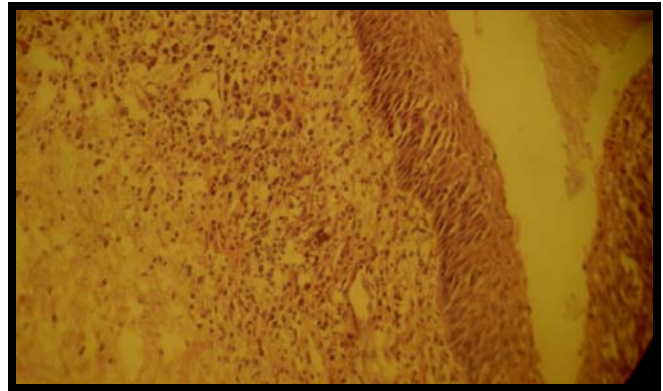


Figure 5: Dentigerous cyst lined by stratified squamous epithelium (H&E x 100.)

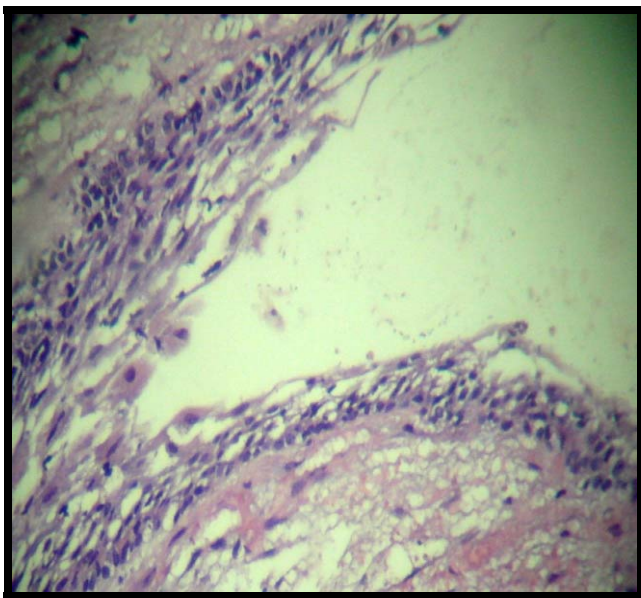


Figure 3: Radicular cyst lined by stratified squamous epithelium (H&E x 200 )

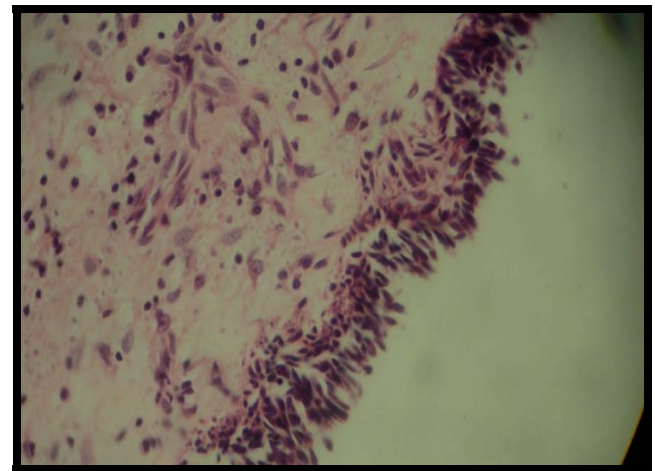


Figure 6: Dentigerous cyst lined by columnar epithelium (H&E 200.)

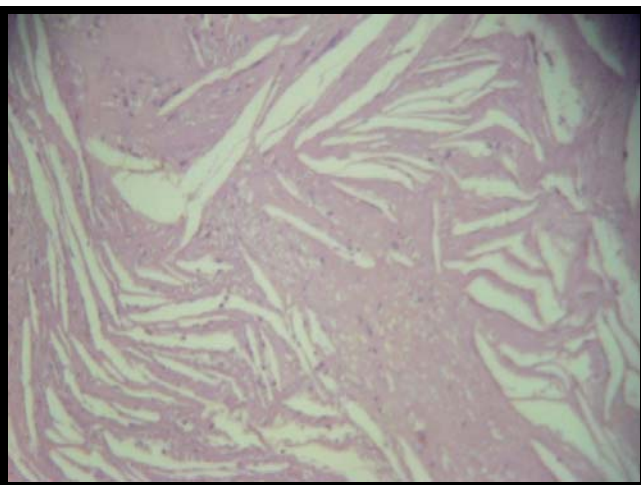


Figure 4: Numerous cholesterol clefts are seen in the cavity of radicular cyst (H&E x 200.)

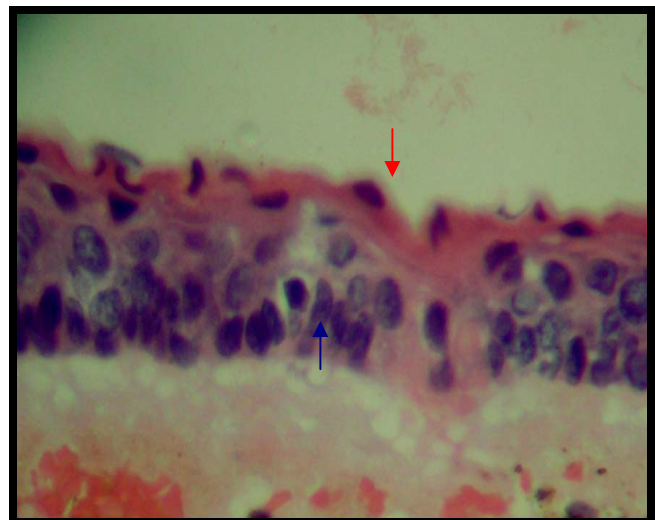
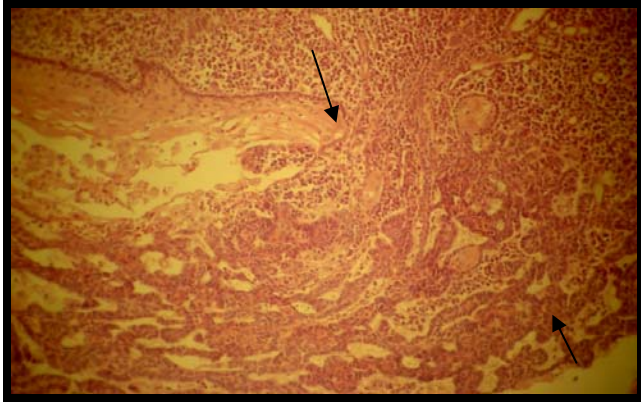


Figure 7: Histologic section of keratocyst odontogenic tumor. Note the corrugated parakeratosis (upper arrow) and palisading of the basal layer (lower arrow) (H&E x 400)



**Figure 8: Ameloblastoma (lower arrow) arising from the lining of the dentigerous cyst upper arrow) (H&E x100.)**

## Discussion

Most studies on odontogenic cysts and odontogenic epithelial tumors studies tend to be small<sup>6-9</sup>. They do however focus on clinicopathological and radiological features. Knowing the incidence and spectrum of these cysts and their commonest site of presentation will help the clinicians to make a likely clinical diagnosis. In our study, radicular cysts were most common type, accounting for 50% of all the lesions. This frequency is lower than reported by study carried out by Rug and Pindberg(66.5%)<sup>10-14</sup>. The reason may be small study sample. There was no sex predilection and the mean age of patients was 37.5 years. The most common location was maxilla (60%) and mandible was involved in 40% of the cases which is comparable with study carried out by Jones(52.8%)<sup>11</sup>. Dentigerous cyst accounted for 36% of the cases with male: female ratio of 4:1 and mean age of 26 years. Similar frequencies were reported by Mosqueda (33%).<sup>7</sup> Mandible was the site of presentation but in one case it arose in the maxillary antrum, which is an unusual site and only few cases have been reported. Ameloblastoma can arise in the lining of dentigerous cyst as was the case in one of our case. Odontogenic keratocysts accounts for 8% of the cases. These cysts were previously classified as para- and orthokeratinized variants. WHO guidelines of 2005 reclassified<sup>12</sup>, these as keratocystic odontogenic tumor and jaw cyst with keratinization respectively. The former has an aggressive behavior including high rates of recurrence, rapid growth, and extension into adjacent tissues. But to make comparison with other studies possible, previous classification has been used. All the cysts were noted in the mandible, male:female ratio was 2.1:1 with a mean age of 30.5 years which is almost similar to that mentioned by Woogler et al (21-50 years)<sup>13</sup> Only three eruption cysts

were diagnosed with mean age of 8 years. However, it is likely that these cysts are more common than reported, as they tend to rupture following eruption of the teeth.

## Conclusion

The frequency and age distribution of the cystic lesions was same as in other international studies. Needless to say that all the cystic lesions of the oral cavity should be biopsied and sent for histopathological examination. The diagnosis of these lesions is a multistep procedure involving close liaison between the clinician, radiologist and histopathologist. This team work is important for the proper diagnosis and management of the patients.

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