



www.bioinformation.net
Volume 22(9)



Research Article

Received September 1, 2026; Revised September 30, 2026; Accepted September 30, 2026, Published September 30, 2026

DOI: 10.6026/973206300226031

SJIF 2026 (Scientific Journal Impact Factor for 2026) = 8.478

2022 Impact Factor (2023 Clarivate Inc. release) is 1.9

Declaration on Publication Ethics:

The author's state that they adhere with COPE guidelines on publishing ethics as described elsewhere at <https://publicationethics.org/>. The authors also undertake that they are not associated with any other third party (governmental or non-governmental agencies) linking with any form of unethical issues connecting to this publication. The authors also declare that they are not withholding any information that is misleading to the publisher in regard to this article.

Declaration on official E-mail:

The corresponding author declares that lifetime official e-mail from their institution is not available for all authors

License statement:

This is an Open Access article which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly credited. This is distributed under the terms of the Creative Commons Attribution License

Comments from readers:

Articles published in BIOINFORMATION are open for relevant post publication comments and criticisms, which will be published immediately linking to the original article without open access charges. Comments should be concise, coherent and critical in less than 1000 words.

Disclaimer:

Bioinformation provides a platform for scholarly communication of data and information to create knowledge in the Biological/Biomedical domain after adequate peer/editorial reviews and editing entertaining revisions where required. The views and opinions expressed are those of the author(s) and do not reflect the views or opinions of Bioinformation and (or) its publisher Biomedical Informatics. Biomedical Informatics remains neutral and allows authors to specify their address and affiliation details including territory where required.

Edited by Vini Mehta

E-mail: vmehta@statsense.in

Citation: Aggarwal *et al.* Bioinformation 22(9): 6031-6035 (2026)

Comparative study of radicular cyst and dentigerous cyst: Clinical and histological correlation

Prerna Aggarwal¹, Kachan Malawat², Harveen Singh³, Astha Chaudhry⁴, Rahul Raviraj Shetty^{5,*}, Manpreet Kaur⁶ & Tanvi Hirani⁷

¹Department of Oral and Maxillofacial Pathology, Genesis Institute of Dental Sciences and Research, Ferozepur, Punjab, India;

²Department of Dentistry, Sardar Patel Medical College, Bikaner, Rajasthan, India; ³Department of Periodontology, Punjab Government Dental College and Hospital, Amritsar, Punjab, India; ⁴Department of Oral Medicine and Radiology, Faculty of Dental Sciences, SGT University, Gurugram, Haryana, India; ⁵Department of Oral Medicine and Radiology, Bharati Vidyapeeth (Deemed to be University) Dental College and Hospital, Navi Mumbai, Maharashtra, India; ⁶Department of Dentistry, Wellington Dental, Guelph, Ontario, Canada; ⁷Department of Periodontology and Implantology, Karnavati School of Dentistry, Karnavati University, Gandhinagar, Gujarat, India; *Corresponding author

Affiliation URL:

<https://www.bdsdental.in/blog/genesis-institute-of-dental-sciences-and-research-ferozepur>
<https://medicaleducation.rajasthan.gov.in/mcbikaner/>
<https://www.gdcamritsar.com/>
<https://sgtuniversity.ac.in/dental/about>
<https://bvp.bharativedyapeeth.edu/index.php/dental-college-and-hospital-navi-mumbai>
<https://wellingtondentalguelph.ca/>
<https://karnavatiuniversity.edu.in/>

Author contact:

Prerna Aggarwal - E-mail: aggarwalprerna94@gmail.com; Phone: +91 9780644108
P Kanchan Malawat - E-mail: kanchanpanwar15@gmail.com
Harveen Singh - E-mail: veenu61183@gmail.com; Phone: +91 9888813133
Astha Chaudhry - E-mail: astha.chaudhry@sgtuniversity.org; Phone: +91 9711807733
Rahul Raviraj Shetty - E-mail: drrahulrshetty@gmail.com
Manpreet Kaur - E-mail: smileslifetime@gmail.com
Tanvi Hirani - Email: tanvimehta@karnavatiuniversity.edu.in

Abstract:

Radicular and dentigerous cysts are common odontogenic cysts with overlapping clinical and radiographic features that may complicate diagnosis. This comparative study evaluated 150 histopathologically confirmed cases, including 90 radicular and 60 dentigerous cysts, for their clinical, radiographic and histopathological characteristics. Radicular cysts predominated in the third to fifth decades and showed hyperplastic non-keratinized stratified squamous epithelium with dense inflammation, whereas dentigerous cysts occurred more often in younger patients and commonly involved mandibular third molars. A significant correlation was observed between radiographic appearance and histopathological features. These findings emphasize integrated clinical, radiographic and histopathological assessment for accurate odontogenic cyst diagnosis and appropriate treatment planning.

Keywords: Radicular cyst, dentigerous cyst, odontogenic cysts, histopathology, clinicopathological correlation, jaw lesions

Background:

Odontogenic cysts are a large part of the cystic lesions of the maxillofacial region and are formed from remnants of odontogenic epithelium involved in tooth formation. Of these lesions, the most common entities that are seen in oral and maxillofacial pathology practice are radicular cysts and dentigerous cysts. Radicular cysts are inflammatory odontogenic cysts that develop secondary to pulpal necrosis and chronic periapical inflammation, while dentigerous cysts are developmental odontogenic cysts that develop around the crown of an unerupted or impacted tooth [1]. Both lesions have different etiopathogenesis but can have similar clinical and radiographical characteristics and require histopathological diagnosis for accurate diagnosis [2]. The radicular cysts are formed by the proliferation of epithelial rests of Malassez in the periodontal ligament due to chronic inflammatory stimulation by necrotic pulp tissue. These cysts are the most frequent odontogenic cysts, constituting almost 52-68% of all jaw cysts. They are typically found in non-vital teeth and primarily in the anterior maxillary area due to increased susceptibility to dental caries and trauma [3]. In clinical practice, radicular cysts are frequently not clinically apparent unless secondarily infected, but larger cysts may show swelling, pain, cortical expansion and displacement of adjacent teeth [4]. The second most common odontogenic cysts are dentigerous cysts which are developmental in nature. The lesions occur due to the build-up of fluid between the thin enamel epithelium and the crown of an unerupted tooth. The dentigerous cysts are commonly seen in

association with impacted mandibular third molars, maxillary canines and mandibular premolars [5]. Most lesions are found by chance when routine radiographs are taken, as they do not cause symptoms until they have grown to a significant size. If the cysts are large, they can lead to facial asymmetry, tooth displacement, root resorption and thinning of the cortices [6]. Radiographically, radicular cysts typically are unilocular radiolucencies that surround the apex of non-vital teeth, while dentigerous cysts are well-circumscribed unilocular radiolucencies that surround the crown of an impacted tooth at the cemento-enamel junction. But atypical radiographic presentations can cause diagnostic confusion [7]. There have been several reports of dentigerous cysts being confused with radicular cysts, especially in mixed dentition or in the presence of impacted teeth. Advanced imaging modalities like cone-beam computed tomography (CBCT) give better delineation of the extent of the lesion and the anatomical relationship with adjacent structures [8]. Histopathologically, radicular cysts are lined by non-keratinized stratified squamous epithelium with variable thickness, inflammatory cell infiltrate, cholesterol clefts, Rushton bodies and arcing epithelial proliferation. Dentigerous cysts typically have thin (2-4 cell thick) non-keratinized epithelium that resembles reduced enamel epithelium, a fibrous connective tissue wall and a minimal inflammatory infiltrate, unless infected secondarily. Histological analysis is thus the definitive diagnosis and differentiation from other odontogenic cysts and tumors and is the gold standard [9, 10]. Epidemiological studies have always shown that the most

prevalent odontogenic cysts in the world are radicular cysts, followed by dentigerous cysts. Geographic and demographic differences in prevalence, age distribution and anatomical location have emerged from large clinicopathological analyses of thousands of jaw cysts [11]. The clinico-histological correlation is of paramount importance, since the treatment, prognosis and recurrence rates vary considerably between inflammatory and developmental odontogenic cysts. Enucleation is the treatment of choice for most lesions, but larger cysts may need to be marsupialised or decompressed prior to definitive surgery. Early diagnosis helps to prevent pathological fracture, secondary infection and conversion to more aggressive lesions [12]. Therefore, it is of interest to compare the clinical, radiographic and histopathologic features of both types of cysts and to make clinico-histological correlation in 150 cases.

Materials and Methodology:

This retrospective comparative observational study was conducted in the Department of Oral Pathology and Microbiology in collaboration with the Department of Oral and Maxillofacial Surgery at a tertiary care dental teaching institution over a period of five years. Ethical clearance for the study was obtained from the Institutional Ethics Committee prior to commencement of the study. A total of 150 histopathologically confirmed odontogenic cyst cases were included in the study. Among these, 90 cases were diagnosed as radicular cysts and 60 cases were diagnosed as dentigerous cysts. The sample size was determined based on the availability of archived biopsy specimens and clinical records fulfilling the inclusion criteria.

Inclusion criteria:

- [1] Histopathologically confirmed cases of radicular cyst and dentigerous cyst.
- [2] Availability of complete clinical, radiographic and histopathological records.
- [3] Adequate tissue sections for microscopic examination.

Exclusion criteria:

- [1] Recurrent cystic lesions.
- [2] Cases with inadequate biopsy material.
- [3] Syndromic odontogenic cysts.
- [4] Odontogenic keratocysts and other developmental cysts.
- [5] Detailed demographic and clinical information was retrieved from departmental archives and patient case records. Parameters recorded included age, gender, presenting complaints, duration of lesion, anatomical location, associated teeth, and presence of swelling, pain, cortical expansion, tooth displacement and root resorption.
- [6] Radiographic evaluation was performed using orthopantomograms, intraoral periapical radiographs and cone-beam computed tomography scans wherever available. Lesions were assessed for size, border characteristics, locularity, cortical expansion, relation to adjacent teeth and association with impacted teeth.

Histopathological slides stained with haematoxylin and eosins were reviewed independently by two oral pathologists under light microscopy. Histological parameters evaluated included:

- [1] Nature and thickness of epithelial lining.
- [2] Presence of keratinization.
- [3] Arcading epithelial proliferation.
- [4] Inflammatory infiltrate.
- [5] Cholesterol clefts.
- [6] Rushton bodies.
- [7] Hyaline bodies.
- [8] Connective tissue characteristics.
- [9] Presence of mucous or ciliated metaplasia.
- [10] Giant cells and hemosiderin deposition.

Radicular cysts were diagnosed based on identification of non-keratinized stratified squamous epithelial lining associated with chronic inflammatory infiltrate and relation to non-vital teeth. Dentigerous cysts were diagnosed by the presence of thin epithelial lining attached at the cemento-enamel junction of impacted teeth. The collected data were tabulated and statistically analyzed using SPSS software version 25. Descriptive statistics including frequency distribution, percentage, mean and standard deviation were calculated. Chi-square test and Student's t-test were used to compare clinical and histological variables between the two cyst groups. A p-value less than 0.05 were considered statistically significant. Clinico-histological correlation was established by comparing clinical and radiographic diagnosis with final histopathological diagnosis. Diagnostic concordance and discrepancies were analyzed to determine the reliability of clinical and radiological evaluation in differentiating radicular cysts and dentigerous cysts.

Results:

A total of 150 histopathologically confirmed odontogenic cyst cases were analyzed in the present study. Among them, 90 cases (60%) were diagnosed as radicular cysts and 60 cases (40%) as dentigerous cysts. Comparative evaluation of demographic distribution, clinical presentation, radiographic findings and histopathological characteristics was performed to establish clinico-histological correlation between the two lesions. Radicular cysts predominantly affected older individuals with a significantly higher mean age compared with dentigerous cysts ($p < 0.001$). Pain was significantly more common in radicular cysts (67.8%) owing to chronic inflammatory pathology. Dentigerous cysts showed significantly greater association with impacted teeth, tooth displacement and root resorption ($p < 0.001$). Male predominance was observed in both groups, although the difference was not statistically significant (Table 1). Radicular cysts showed predominant involvement of the anterior maxilla, whereas dentigerous cysts commonly involved the mandibular posterior region, especially impacted mandibular third molars. Both lesions mainly presented as unilocular radiolucencies with corticated borders. Larger lesion size (> 3 cm) was significantly more frequent in dentigerous cysts (51.7%), reflecting their expansile developmental nature (Table

2). Radicular cysts exhibited significantly greater epithelial hyperplasia, arcading proliferation, inflammatory infiltrate, cholesterol clefts and Rushton bodies compared with dentigerous cysts ($p<0.001$). Dentigerous cysts predominantly

Table 1: Demographic and clinical characteristics of radicular and dentigerous cysts

Parameter	Radicular Cyst (n=90)	Dentigerous Cyst (n=60)	p-value
Mean age (years)	34.6 ± 11.2	22.8 ± 8.4	<0.001*
Male patients	58 (64.4%)	42 (70.0%)	0.462
Female patients	32 (35.6%)	18 (30.0%)	0.462
Swelling	72 (80.0%)	46 (76.7%)	0.631
Pain	61 (67.8%)	18 (30.0%)	<0.001*
Cortical expansion	48 (53.3%)	39 (65.0%)	0.168
Tooth displacement	19 (21.1%)	31 (51.7%)	<0.001*
Root resorption	16 (17.8%)	27 (45.0%)	<0.001*
Associated impacted tooth	6 (6.7%)	60 (100%)	<0.001*
Associated non-vital tooth	90 (100%)	11 (18.3%)	<0.001*

Table 2: Anatomical distribution and radiographic characteristics

Variable	Radicular Cyst (n=90)	Dentigerous Cyst (n=60)	p-value
Maxillary anterior region	52 (57.8%)	8 (13.3%)	<0.001*
Mandibular posterior region	21 (23.3%)	41 (68.3%)	<0.001*
Maxillary canine region	9 (10.0%)	7 (11.7%)	0.742
Unilocular radiolucency	84 (93.3%)	56 (93.3%)	1.000
Corticated border	71 (78.9%)	52 (86.7%)	0.219
Ill-defined border	19 (21.1%)	8 (13.3%)	0.219
Associated with crown of impacted tooth	5 (5.6%)	60 (100%)	<0.001*
Periapical relation	90 (100%)	9 (15.0%)	<0.001*
Lesion size >3 cm	29 (32.2%)	31 (51.7%)	0.017*

Table 3: Histopathological characteristics of radicular and dentigerous cysts

Histopathological Feature	Radicular Cyst (n=90)	Dentigerous Cyst (n=60)	p-value
Hyperplastic epithelial lining	76 (84.4%)	18 (30.0%)	<0.001*
Thin epithelial lining	11 (12.2%)	49 (81.7%)	<0.001*
Arcading pattern	63 (70.0%)	9 (15.0%)	<0.001*
Dense inflammatory infiltrate	79 (87.8%)	21 (35.0%)	<0.001*
Cholesterol clefts	41 (45.6%)	8 (13.3%)	<0.001*
Rushton bodies	27 (30.0%)	2 (3.3%)	<0.001*
Hemosiderin deposits	22 (24.4%)	4 (6.7%)	0.006*
Mucous metaplasia	9 (10.0%)	5 (8.3%)	0.729
Odontogenic epithelial rests	16 (17.8%)	26 (43.3%)	0.001*

Discussion:

Odontogenic cysts are one of the most common cystic lesions of the jaws and are an important part of the practice of oral pathology. In the present study, the inflammatory odontogenic cysts (60%) were more common than dentigerous cysts (40%). This finding is consistent with that of Brown *et al.*, who described the radicular cyst as the most common odontogenic cyst because of its close association with pulpal necrosis, chronic periapical inflammation and untreated dental caries [1]. This was also confirmed in systematic reviews and large epidemiological studies, which reported that radicular cysts were more common than developmental cysts like dentigerous cysts [5, 11 and 12]. In the present study, age distribution revealed that the radicular cysts were more common in older patients and dentigerous cysts were more common in younger patients. The difference may be attributed to the etiopathogenesis of both lesions. The radicular cyst typically

demonstrated thin epithelial lining and odontogenic epithelial rests. These findings confirmed the inflammatory nature of radicular cysts and the developmental origin of dentigerous cysts (Table 3).

occurs as a result of long-standing pulpal infection and periapical inflammation, which are more common in adults. However, dentigerous cysts are developmental cysts that are associated with impacted or unerupted teeth and are therefore more common in children, adolescents and young adults. In the present study, dentigerous cysts were found in children during the radiographic assessment of delayed eruption or impacted teeth, as reported by Langă *et al.* and Kiani *et al.* [3, 10]. There was a male predominance in both the radicular and dentigerous cyst groups. This is a pattern that has been observed in previous studies and could be explained by the fact that males are more likely to suffer from trauma, caries, poor oral hygiene and delayed dental consultation, but gender predilection alone is not diagnostic and cyst diagnosis should always be made based on a combination of clinical, radiographic and histopathological evaluation. The incidence of pain was significantly higher in the radicular cysts than in dentigerous cysts. This is a logical finding as the radicular cysts are formed in response to inflammatory stimulation from necrotic pulp and chronic periapical infection. Developmental cysts (dentigerous) are usually painless unless they become secondarily infected or grow large. Aldelaimi *et al.* also noted that most dentigerous cysts are found incidentally, while larger cysts may cause swelling, expansion of the cortex and displacement of adjacent teeth [4]. Radicular cysts occurred most frequently in the anterior maxilla and dentigerous cysts occurred most frequently in the posterior mandible, particularly impacted third molars. The tendency of radicular cysts to occur in the anterior maxilla may be due to the higher incidence of trauma and caries in anterior teeth. The dentigerous cysts are usually located around the crown of impacted third molars of the mandible or around the maxillary canine, as reported by Langă *et al.* and Aldelaimi *et al.* [3, 4]. Radiographically, both lesions frequently presented as well-defined unilocular radiolucencies, although the relationship with teeth varied greatly. The apices of non-vital teeth were associated with radicular cysts, while the crowns of impacted teeth were surrounded by dentigerous cysts at the cemento-enamel junction. The diagnostic overlap of the cone beam computed tomography and the dentigerous cyst with the radicular cyst in children is the reason for Mahesh *et al.* to stress the need for a correlation of vitality testing, tooth eruption status and imaging findings before final diagnosis [9]. Histopathologically, the radicular cysts were characterized by hyperplastic non-keratinized stratified squamous epithelium, arcading epithelial proliferation, dense chronic inflammatory infiltrate, cholesterol clefts and Rushton bodies [13]. In contrast, dentigerous cysts typically had a thin non-keratinized epithelial lining similar to reduced enamel epithelium, a relatively fibrous cyst wall and little inflammatory infiltrate, consistent with the descriptions of Brown *et al.* [1]. Secondarily inflamed dentigerous cysts, however, may exhibit epithelial hyperplasia and inflammatory changes that may make

them histologically similar to radicular cysts [7]. The present study also confirms that clinicohistological correlation is important in differentiating radicular and dentigerous cysts. Hissariya *et al.* and Benzeer *et al.* reported cases in which the clinical and radiographic features of both types of cysts were similar, making it difficult to diagnose them. Therefore, histopathological examination is the gold standard for final diagnosis, particularly in cases with atypical presentation, secondary infection or unusual tooth association [6, 7]. The use of recent advances in AI and digital pathology can enhance the diagnostic accuracy of odontogenic cysts. Hosokawa *et al.* and Kaygısız *et al.* investigated the use of AI for the interpretation of jaw cysts on panoramic radiographs and automated detection models, respectively. These technologies are promising, but at this time should be considered as a complement to traditional histopathological evaluation [14, 15]. In conclusion, the results of the present study support the differences in age distribution, clinical symptoms, tooth association, anatomical location and histopathological characteristics between dentigerous cysts and radicular cysts. Sometimes, however, overlapping radiographic and inflammatory changes can lead to diagnostic uncertainty. Therefore, a comprehensive evaluation of clinical history, tooth vitality, radiographic appearance, surgical findings and microscopic features is necessary for accurate diagnosis.

Conclusion:

Radicular cysts were more common than dentigerous cysts, while dentigerous cysts predominated in younger patients and were significantly associated with impacted teeth, particularly mandibular third molars. Histopathology showed inflammatory epithelial hyperplasia in radicular cysts and a thin reduced enamel epithelium-like lining in dentigerous cysts. Integrating clinical, radiographic and histopathological findings remains

essential for accurate diagnosis and appropriate management of odontogenic cysts.

References:

- [1] Brown SJ *et al.* *Diagn Histopathol.* 2022 **28**:253. [DOI: 10.1016/j.mpdhp.2022.02.007]
- [2] Salihu B *et al.* *Saudi Dent J.* 2026 **38**:23. [PMID: 41762340]
- [3] Langă MC *et al.* *Medicina (Kaunas).* 2024 **60**:1133. [PMID: 39064562]
- [4] Aldelaimi AAK *et al.* *BMC Oral Health.* 2024 **24**:831. [PMID: 39044217]
- [5] Kokubun K *et al.* *BMC Oral Health.* 2026 **26**:424. [PMID: 41629916]
- [6] Hissariya N *et al.* *J Datta Meghe Inst Med Sci Univ.* 2024 **19**:358. [DOI: 10.4103/jdmimsu.jdmimsu_573_23]
- [7] Benzeer LF *et al.* *Health Sci Rep.* 2024 **6**:100094. [DOI: 10.1016/j.hmedic.2024.100094]
- [8] Rao RS *et al.* *Diagnostics (Basel).* 2021 **11**:2184. [PMID: 34943424]
- [9] Mahesh BS *et al.* *Int J Clin Pediatr Dent.* 2017 **10**:213. [PMID: 28890627]
- [10] Kiani MN *et al.* *J Rehman Med Inst.* 2025 **11**:171. [https://jrmi.pk/article/download/855/487/5209]
- [11] Mammadov F *et al.* *Georgian Med News.* 2024:107. [PMID: 39855173]
- [12] Gurbuz OF *et al.* *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2026. [PMID: 42045062]
- [13] Singh HP *et al.* *J Oral Maxillofac Pathol.* 2024 **28**:268. [PMID: 39157825]
- [14] Hosokawa N *et al.* *Diagnostics (Basel).* 2026 **16**:1096. [PMID: 41975807]
- [15] Kaygısız ÖF *et al.* *BMC Oral Health.* 2025 **25**:1518. [PMID: 41039467]

Caveat Emptor is applicable among the literate community where required and possible. The publisher, its journal, editors and the internal/external reviewers take adequate steps to check, evaluate, correct, edit, revise and improve content where possible and required.