

Clinical and radiographic characteristics of dentigerous cysts: a cluster case study of 31 cases

Thuc Xuan Nguyen^{1,2}, Son Manh Tu², Binh Huy Ngo², Hung Manh Tran¹, Hai Thanh Pham^{1*}

ABSTRACT

Objective: This study aimed to analyze the clinical and radiographic characteristics of dentigerous cyst (DC) patients came to the Department of Odonto-Stomatology, Bach Mai Hospital, focusing on demographics, symptom presentation and cyst features. **Subjects and Methods:** The study included 31 patients diagnosed with DC at the Department of Odonto-Stomatology, Bach Mai Hospital, Vietnam. Data on age, gender, clinical symptoms, cyst size, location, radiographic findings, and complications were collected and analyzed using SPSS 16.0. Statistical significance was set at $p < 0.05$. **Results:** The median patient age was 24.4 ± 11.7 years, with the highest prevalence in the 21–30 age group (41.9%). Males were more frequently affected (67.7%) than females. Common presenting symptoms included facial deformity (41.9%) and swelling/pain (25.8%). Most cysts were solitary (87.1%) and exhibited bone swelling (83.8%). Radiographically, central-type cysts predominated (67.6%), and 29.7% caused adjacent root resorption. Larger cysts (>5 cm) showed higher infection rates (66.7%). Fully developed teeth within cysts were observed in 51.4% of cases. **Conclusion:** DC predominantly affects young males, often presenting with asymptomatic bone expansion. Early diagnosis is crucial to give properly treatment to prevent complications such as infection and bone destruction. The study underscores the importance of radiographic evaluation in detecting DC and guiding treatment.

Keywords: *Dentigerous cyst, symptom presentation, clinical and radiographic characteristics*

¹ *Hai Phong University of Medicine and Pharmacy, Viet Nam*

² *Bach Mai Hospital, Hanoi, Vietnam*

* Corresponding author

Hai Thanh Pham

Email: pthai@hpmu.edu.vn

Received: May 22, 2024

Reviewed: May 26, 2024

Accepted: June 11, 2024

INTRODUCTION

Dentigerous Cyst (DC) originates from the reduced enamel epithelium, surrounding the crown of an unerupted tooth and attached to the neck of the tooth at the enamel-cementum junction. DC is only found in the jawbone and is a type of benign developmental odontogenic cysts, often starting at a young age, but due to its silent development and asymptomatic, by the time it is discovered, the cyst is often large, causing significant bone destruction. DC's

clinical manifestations are frequently unsatisfactory, discovered incidentally during a radiographic examination.

In 1778, DC was first described by Jourdain and nearly a century later the term Dentigerous Cyst was first used by Paget (1853) [2]. Since then, many authors have researched this issue. According to some authors Daley et al. (1994), Athanasios et al. (2005), DC accounts for about 20% of all true cysts in the jaws [3,4].

However, currently in Vietnam, research works to evaluate DC pathology are still

limited, including some topics such as "Large jaw cyst due to teeth" - Thesis of resident doctor at Hanoi Medical University by Le Van Son, "Molar jaw cyst due to teeth" - Master's thesis of medicine at Hanoi Medical University (1997) by Nguyen Hong Loi [5,6] ... Based on the above assessment, the study was conducted with the aim of commenting on the clinical and radiographic characteristics of dentigerous cyst in patients treated at the Department of Odonto-Stomatology, Bach Mai Hospital.

MATERIALS AND METHODS

Including 31 patients who were diagnosed with crown cysts and underwent surgical treatment at the Department of Odonto-Stomatology Bach Mai Hospital, regardless of age, gender, ethnicity, from 08/2017 to 08/2018.

Subjects of study

Inclusion criteria: Patients with a diagnosis of crown cysts and agree to participate in the study group.

Exclusion Criteria: Patients with systemic diseases that contraindicate surgery, the

anatomical result of the disease is not a crown cyst.

Study methods

Study design: The study was designed according to the cluster case study method. Applying a convenient sampling method, there are enough biomedical statistical samples of at least 30.

Data processing: Data are cleaned, coded and entered using Epidata 3.1 software and then analyzed using SPSS 16.0 software. Variables are calculated in proportion with 95% confidence. The difference is statistically significant with $p < 0.05$.

Ethical considerations

We only conduct research on the topic when the detailed outline has been approved by the outline grading council of Bach Mai Hospital, the board of directors of the Department of Odonto-Stomatology. Patients voluntarily participate and patients' information is kept absolutely confidential. Research is purely for scientific purposes, not for any other purpose.

RESULTS

General characteristics of the study subjects

Table 1. General characteristics of the study subjects

Characteristics	%	
Age	≤ 20	38.7
	21 – 30	41.9
	≥ 31	19.4
Gender	Male	67,7
	Female	32,3
Time of disease detection	< 6 months	74,2
	6-12 months	6,5
	>12 months	19,3

Comments: The age group from 21 to 30 accounts for the highest rate with 41.9%. The male/female ratio was 2.1 however this difference in the study sample was not statistically significant with $p = 0.06 > 0.05$. The shortest time to detect the disease is 1 day, the longest

time to detect the disease is 4 years. There were 23 patients who were detected and treated within 6 months, accounting for 74.2%. The number of patients treated late after 12 months since detection accounted for 19.3% (6 patients).

Clinical characteristics

Reason for admission to the hospital

Table 2. Reason for admission

Reason for admission	Quantity (n)	Rate (%)
Accidentally detected via X-ray	4	12,9
Facial deformity	13	41,9
No real teeth on the jaw arch	6	19,4
Swelling, pain, numbness, or pus detection	8	25,8
Sum	31	100,0

Comments: Patients who come to the doctor for facial deformity account for the highest rate with a rate of 41.9% (13 patients). There are 4 patients who detect crown cysts accidentally when going for dental examination and x-rays, accounting for 12.9%. There were 6 cases that were actively sent to the doctor by their families because they did not see permanent teeth growing (19.4%). Cases come to the examination due to signs of swelling, pain, pus detection, numbness... accounting for 25.8%.

Functional symptoms

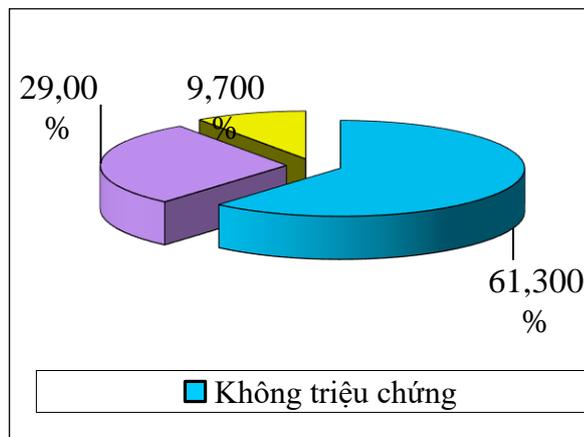


Figure 1. Functional symptoms

Comments: Most of the cases had no functional symptoms, accounting for 61.3% (19 patients). There were 9 patients with mild pain, 3 patients with numbness accounting for 29.0% and 9.7%, respectively.

Number of cysts per patient

Table 3. Number of follicles per patient

Weight	Amount		p
	n	%	

Single capsule	27	87,1	0,006
Multipurpose	4	12,9	
Sum	31	100	

Comments: In our study, there were 27 patients with single cysts accounting for 87.1%, which was 6.7 times higher than the rate with polycysts (12.9%) with $p = 0.006 < 0.05$, this difference was statistically significant. Of the 4 polycystic patients, there were 2 patients with 2 cysts and 2 patients with 3 cysts. Thus, the total number of cysts in this study is 37 cysts.

Also from here the study convention is the number of follicles and $n = 37$

(Later calculations are based on the number of crown follicles)

Signs of plastic balls

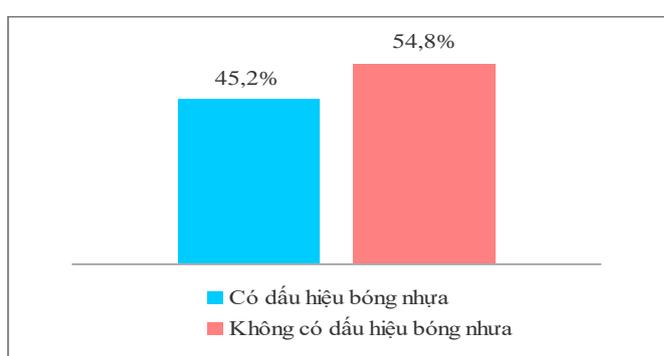


Figure 2. Signs of plastic balls

Comment: Signs of plastic balls are also quite common in crown cysts with 45.2% (14 cysts).

Signs of infection

Table 4. Signs of infection by cyst size

Dimension	Be infected	Have		Not	
		n	%	n	%
< 3 cm (n=17)		3	17,6	14	82,4
3 - 5 cm (n=14)		7	50,0	7	50,0
> 5 cm (n = 6)		4	66,7	2	33,3
Sum (n=37)		14	37,8	23	62,2

Comment: The number of cysts with symptoms of infection (pus detection, swelling of the mucous membrane on the cyst, etc.) was 14 out of a total of 37 cysts, accounting for 37.8%. Signs of infection are more common in large cysts. This sign is in cysts > 5cm in size, accounting for 66.7%; Meanwhile, in smaller follicles of 3-5cm and < 3cm, the rates were 50.0% and 17.6%, respectively.

Swollen bones

Table 5. Distribution of bone bulges by cyst location

Location	Upper jaw		Lower jaw		Sum	
	n	%	n	%	n	%
Not	2	9,5	4	25,0	6	16,2
One copy	16	76,2	7	43,8	23	62,2
Two copies	3	14,3	5	31,2	8	21,6
Sum	21	100	16	100	37	100

Comments: The majority of cysts have clinically detected bone bulges, accounting for 29 cysts (83.8%). Of the 29 swollen bone follicles, there were 23 swollen cysts with 1 bone plate accounting for 52.2% and 8 swollen cysts with 2 skeletal plates with a rate of 21.6%. This difference is statistically significant with $p = 0.014 < 0.05$. In the maxillary bone, the rate of cysts causing bone swelling is higher than in the lower jaw (85.7% vs. 75.0%). This difference was not statistically significant with $p = 0.135 > 0.05$.

Classification of cysts according to the location of the causative tooth

Table 6. Distribution of follicles according to tooth location

Upper jaw	18	17	16	15	14	13	12	11	RTN	21	22	23	24	25	26	27	28
Amount	3			1		1		1	5	1		6	1				2
Lower jaw	48	47	46	45	44	43	42	41	RTN	31	32	33	34	35	36	37	38
Amount	4			1		3			3			2		1			2

Remarks: Dentigerous cysts are found in both the upper and lower jaws, and are present in all four jaw arches (upper, lower, right and left). Crownal cysts can be found in real teeth, but they can also be found in underground excess teeth. With real teeth, crown follicles are more common in canines (3rd tooth) and wisdom teeth (8th tooth).

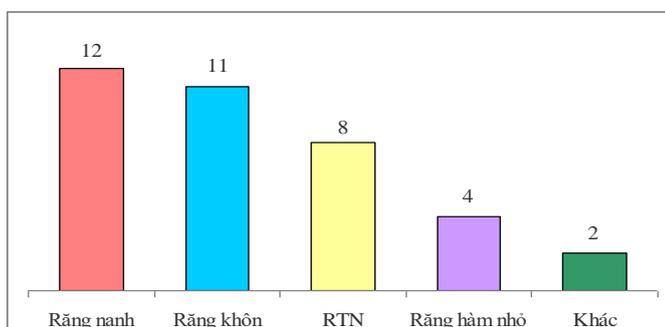


Figure 3. Distribution of cysts by tooth type of cause

Comments: Cysts found in canines account for the highest proportion with 12 follicles (32.4%), followed by wisdom teeth with 11 follicles (29.7%) and underground excess teeth with 8 follicles (21.6%). Dental crown follicles in the small molars group have only 4

follicles accounting for 10.8% and there are 2 follicles in other locations (upper middle incisors) accounting for 5.4%.

X-ray characteristics

Follicle size

Table 7. Distribution of cyst size by age group

Age Group	≤ 20 years old		21 - 30 years old		≥ 31 years old		Sum	
	n	%	n	%	n	%	n	%
< 3 cm	9	64,3	6	40,0	2	25,0	17	46,0
3 - 5 cm	3	21,4	6	40,0	5	62,5	14	37,8
> 5 cm	2	14,3	3	20,0	1	12,5	6	16,2
Sum	14	100	15	100	8	100	37	100

Comment: The number of cysts smaller than 3cm accounted for the majority with 46.0%, the number of cysts larger than 5cm had the lowest rate with 16.2%. The number of cysts smaller than 3cm in size decreases with age group; Meanwhile, the number of follicles with a size of 3-5cm has a gradual increase rate with increasing age groups. There was no difference in the proportion of follicles larger than 5 cm in size in the 3 age groups ($p > 0.05$).

Classification of cysts

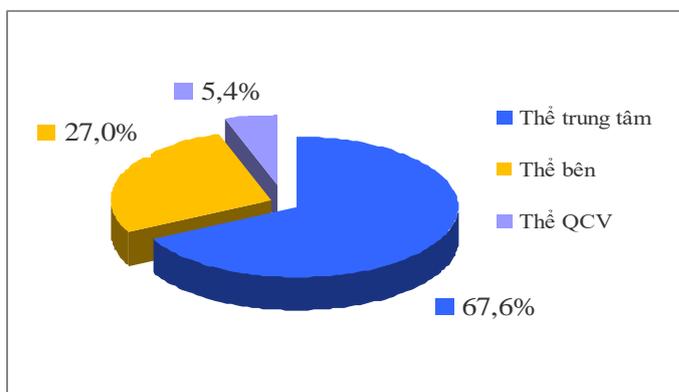


Figure 4. Classification of cysts on x-rays

Comments: The central body accounts for the highest proportion with 67.6%. Peripheral and peripheral bodies account for less of 27.0% and 5.4%, respectively. The central body accounts for a higher proportion than the rest of the bodies, this difference is statistically significant with $p = 0.03 < 0.05$.

Loss of neighboring roots

Table 8. Distribution of follicles according to the condition of nearby root dissolution

Nearby tooth root loss	n	%	p

Pepper	11	29,7	0,03
No pepper	26	70,3	
Sum	37	100	

Comment: On x-rays (panorama and CT cone beam), the total number of follicles that cause dissipation of nearby roots is 11 follicles, accounting for 29.7%. The number of follicles with neighboring root dissipation was less than the number of follicles without neighboring root dissipation, this difference was statistically significant with $p = 0.03 < 0.05$.

Degree of perfection of the tooth in the follicle

Table 9. Distribution of Dental Perfection in Follicular by Age Group

Finish	Age	≤ 20 years old		21 - 30 years old		≥ 31 years old		Sum	
		n	%	n	%	n	%	n	%
Germ		4	23,5	1	7,1	0	0	5	13,5
Not yet full of stalks		11	64,7	2	14,3	0	0	13	35,1
Perfect		2	11,8	11	78,6	6	100	19	51,4
Sum		17	100	14	100	6	100	37	100

Comments: Out of a total of 37 follicles studied, there are 19 follicles with fully developed teeth, accounting for the highest rate with 51.4%. The percentage of teeth that are still germ and the stem is less closed, with rates of 13.5% and 35.1%, respectively. Teeth in the follicle are also the main germ found in young people aged 20 and under. There is only 1 case of teeth that are still germs in the age group of 21-30.

Bone shell puncture on x-rays

Table 10. Distribution of images of cysts that break through the bone sheath

Breaking the bone sheath	n	%
Have	13	35,1
Not	24	64,9
Sum	37	100

Comment: The rate of cortical bone perforation in 13 cysts accounted for 35.1%. The number of cysts without cortical bone breakdown accounted for a higher rate of 64.9%. It is often found in cysts with a small size of less than 5 cm in diameter.

DISCUSSIONS

DC can occur at any age. In our study, the median age was 24.4 ± 6.7 years, with the most common age group being 21-30 with 41.9%. The results of this study are also similar to the research of Nguyen Hong Loi

(1997) at the National Institute of Mental Health and Human Rights, which shows that the most common age of DC is under 30 [6]. The male/female ratio = 2.1 with $p = 0.06$ is not statistically significant, perhaps because our sample size is not large enough.

In our study, the main reason for patients to come to the doctor was swelling and facial deformity, accounting for 41.9%. There were 6 cases admitted to the hospital because there were no permanent teeth appearing on the jaw, accounting for 19.4%. These are cases where the family actively takes the patient to the doctor because they see that baby teeth have been replaced for a long time or permanent teeth have been growing for a long time. Unfortunately, the cases of families with such good background knowledge account for a low percentage. There is still a percentage of patients who come for examination and surgery >1 year late (19.3%), perhaps because this is a benign disease with poor symptoms, so when facial deformity is detected, BN is often subjective.

In our study, there were 27 single-cystic patients accounting for 87.1% of the total sample, nearly 7 times higher than the number of polycystic patients (12.9%). With $p = 0.006 < 0.05$, this difference is statistically significant. The majority of cysts have clinically palpable bone swelling, accounting for 31 cysts (83.8%). The plastic ball sign is directly proportional to the diameter of the cyst, but the swelling does not seem to be significantly related to the size of the cyst.

The larger the size, the higher the rate of infection manifested during clinical examination. However, not every perforation of the bone shell shows signs of clinically manifested infection, as evidenced by the same rate of infection manifestations in cysts with and without perforation of the bone shell. This can be explained by the fact that the infection of DC is not only caused by the breakdown of the bone sheath that communicates with the external environment, but also by infection through

the bloodstream. Therefore, there are cases where the cyst has not broken through the bone sheath but has swelling and fever when visiting the doctor.

Although there is a slight difference in the common order of the follicles of the teeth, crown follicles are still most common in the following groups of teeth: wisdom teeth, canines. This is very easy to understand because the wisdom teeth of the lower jaw are the teeth that often grow underground and are the most stuck.

When looking for an association between BN age and cyst size, we found that cyst size was not directly proportional to BN age, and there was no difference in the proportion of cysts larger than 5 cm in the 3 age groups ($p > 0.05$).

Compared with the ability to destroy the roots of root cysts and keratinized dental follicles, it is found that crown cysts tend to cause more root loss than other dental follicles. This ability of DC is related to the origin of the germ sac, just like when a permanent tooth grows, it is the germ sac that causes the root of the baby tooth to correspond. The results of the study have confirmed that the crown follicles encountered in middle-aged and elderly people (>30) are not formed when the teeth are trapped and gradually increase in size, but may only be formed a few months to the year before they are noticed.

CONCLUSIONS

The findings of this study highlight that dentigerous cysts (DCs) predominantly affect young male patients, with the highest incidence occurring in the 21–30 age group. Clinical presentation often includes facial deformity and swelling, though many cases remain asymptomatic until significant bone destruction occurs. Radiographic evaluation

is essential for diagnosis, with central-type cysts being the most common and a notable proportion causing adjacent root resorption. Therefore, early detection and intervention are crucial to minimize morbidity, as delayed treatment can lead to more severe structural damage. Future studies with larger sample sizes and longer follow-up periods are recommended to further validate these findings and refine treatment protocols. Overall, this research contributes valuable insights into the clinical and radiographic characteristics of DCs, reinforcing the importance of timely diagnosis and appropriate surgical management.

Acknowledgments

To complete this article, we would like to express our sincere gratitude to the patients who participated in the study. At the same time, we sincerely thank our colleagues and students for their support.

REFERENCES

1. Langlais R.P, Langland O.E, No'rtie' C.J, (1995), "Diagnostic imaging of the Jaw", William & Wilkins, pp. 338-347.
2. Parvathi Devi, Thimmarasa V.bhovi, Vishal Mehrotra, Mayuri Agarwal, (2016), "Multiple dentigerous cysts", J. Maxillofac.Oral Surg, 10, Springer Publication.
3. Hr.Mihailova, VI. Nikolov, Sv.Slavkov, (2008), "Diagnostic imaging of dentigerous cysts of the mandible", Journal of IMAB-Annual proceeding scientific papers, 2, pp. 8-10.
4. Anthanasios S.Tournas et al, (2006), "Mutiple unilateral maxillary dentigerous cyst in a non-syndromic patient: A case report and review of literature", Int J of Pediatric Otorhinolaryngology Extra, 1, pp. 100-106.
5. Le Van Son (1980), Large maxillary cyst due to teeth, Graduation thesis

from Hanoi University of Science and Technology, pp. 4-23

6. Nguyen Hong Loi (1997), Dental maxillary cyst, Master's thesis, Hanoi Medical University, pp. 5-19.