

Clinico-Radiological Study of Odontogenic Cysts in Mandibular Region from Agartala, Tripura

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ABSTRACT

BACKGROUND

Most common osseous destructive lesions effecting the jawbone are odontogenic cystic lesions, which are lined by epithelium, has been involved in the formation of teeth as the epithelial cell rest are present in jawbone after teeth formation. The three most common odontogenic cysts (OCs) are radicular cyst (RC), dentigerous cyst (DC) and the odontogenic keratocyst (OKC). Less common variety is the residual cyst. Odontogenic cysts are mainly developmental and inflammatory in origin. The objective of the present study was to find clinico-radiographic characteristics of odontogenic cysts in the mandible.

METHODS

This was a case series (descriptive) study on OCs of mandible conducted at Tripura Medical College and Dr BRAM Teaching Hospital, Hapania, Agartala, Tripura (W), India, over a period of 6 months from August 2019 to January 2020. Subjects showing clinico-radiographic features of OCs in mandible were included, subsequently confirmed by histopathological examinations. Usually orthopantomograms (OPGs) and intra oral peri apical radiograph (IOPAs) were done for radiological findings, computed tomography (CT) scan was required for examination of the size of lesion. Data were analysed using windows excel.

RESULTS

Diagnosis of OCs was confirmed in 20 patients, among them, males were (60 %) and female were (40 %). The age range of the patients was 17 - 65 years. Most common type of cyst diagnosed in the study was radicular cyst in 50 % cases followed by dentigerous cysts which were in 30 % cases, odontogenic keratocysts were in 15 % patients and others were 5 %. RCs were represented in higher percentage (50 %). Right side of mandible was the most effected side (60 %) than left side (40 %). Main finding of the study was, in every type of cystic lesions, males were recorded as predominant, and it occurred in early age group.

CONCLUSIONS

Main finding of the study was radicular cyst which was in higher percentage (50 %) and was being most common with association of carious tooth.

KEYWORDS

Odontogenic Cysts, Mandible, Finding

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BACKGROUND

In the maxillofacial region, cystic lesions play very important role as pathology – mainly the odontogenic variety, though it is broadly classified as odontogenic and non-odontogenic type. Odontogenic cysts are most frequently occurring cysts with 2.25 times higher than non-odontogenic cysts¹ in jawbone. OCs are developmental and inflammatory in origin. OCs originated from odontogenic epithelium or its embryonic remnants.²⁻⁵ Still in most of the cases, their aetiology is unknown. Nearly two third cysts of mandible are radicular cyst. These radicular cysts are found at the periapical region as radiolucent unilocular lesions, generally asymptomatic in character.¹ Radiographic findings of dentigerous cysts shows that it is associated with crown of an unerupted tooth, a unilocular radiolucent lesion with well-defined sclerotic margins.^{5,6} Another variety, odontogenic keratocysts (OKCs), usually appears as a unilocular radiolucent lesion often associated with an impacted tooth with smooth corticated borders, that arises from dental lamina.⁷ Findings of Naz et al. was that, out of 98.9 % OCs, – radicular cysts were 54.6 %, dentigerous cysts were 28.7 % and OKCs were 18.7 %. A male predilection was reported in OCs in many studies.⁸⁻¹⁰

Most common sites of occurrence of OCs are mandibular molar region and maxillary incisors and canine region.⁹ Younger age groups are most affected by developmental cysts.¹¹ OCs may cause damage to jawbone, root resorption and pathological fracture.^{12,13} Provisional diagnosis is made by clinical and radiological examination. Radiograph like, IOPA x-ray, OPG and CT scan can be used to assess the size aggressiveness of the lesions.¹⁴ For final diagnosis, histopathological examination of biopsy tissues is necessary. Treatment is mainly surgical enucleation with or without marsupialization. Peripheral ostectomy and even local resection may advocate for an aggressive lesion.¹⁵ This study was to assess or evaluate the clinical and radiographic presentation of mandibular odontogenic cyst and their relative frequency.

Cyst is an epithelium lined sac that contains fluid or semisolid, gaseous substance. Clinical, radiographic and histopathological examination of the epithelium lining of the cyst is generally require to conclude a definitive diagnosis.¹⁶ OCs in mandible and its spatial relationship to the tooth is an important diagnostic feature on radiographic procedure.¹⁶ Resorbed tooth roots or displaced unerupted tooth are often seen. Cyst in the mandible are with unilocular or multilocular lucency, in various size and definition. Displaced ID canal and expansion are also seen. World Health Organization (WHO) classifications on 2005 are widely accepted. This classification defines cyst in odontogenic and non-odontogenic variety, tumours are benign and malignant type and on the basis of odontogenic tissue type, further subdivision are there.¹⁷

Tooth develops from ectoderm and mesenchyme. Enamel develops from ectoderm. Dentin, cementum, and periodontal ligament derive from the mesenchymal layer.^{14,18} Any alteration in developmental stage may give rise to cystic lesion in future. OCs are unique in that way,

they only effect the maxillo-facial region. Not only that, OCs are most commonly diagnosed entities in this region.^{8,19}

To find the prevalence of OCs, many studies have been conducted. Some studies²⁰ have shown that mandible was most prevalent site. But other studies indicate that maxilla was the most frequent site.⁵⁻⁶ Odontogenic cyst are slow growing lesion and have expansive tendency with a benign biological behaviour. If they are not treated properly in time, they can reach considerable size.¹⁰ OKCs present a locally aggressive behaviour and are prone to recurrence.^{5,6} So, correct diagnosis of these lesions is necessary for correct surgical treatment.⁷ Objective of this study was to assess the clinical and radiographic presentation of odontogenic cysts of mandible at a tertiary care center

METHODS

This is a hospital-based case series (descriptive) study, conducted among 20 cases over a period of six month at the Department of Dentistry, Tripura Medical College and Dr. BRAM Teaching Hospital, Agartala, from August 2019 to January 2020, adopting convenient sampling technique. Patients complaining of fluctuant swelling of mandible and impacted third molars of mandible attending the outpatient department (OPD) of dentistry at Tripura Medical Collage & Dr BRAM Teaching Hospital, Hapania, Agartala, Tripura, fulfilling all the inclusive and exclusive criteria were included.

Study Tools

Pre - designed patient proforma.

Materials Required

1. History and examination of patient
2. X - ray OPG & X - ray IOPA, CT if required

Inclusion Criteria

1. Patient complaining of fluctuant swelling and impacted mandibular third molar, with complete clinical records.
2. Age within 17 - 65 years.
3. Patient willing to participate in the study.
4. Good quality OPG and IOPA X-ray.

Exclusion Criteria

1. Age below 17 years and above 65 years.
2. Poor quality of X-rays and incomplete patient record
3. Severe systemic disease.

Histopathological examination of cystic lesions was performed in every case. The clinical, radiological and pathological information was recorded for each patient. Lesions were classified with the help of WHO histological classification of jaw cysts in 1992: Radicular cyst, dentigerous cyst, odontogenic keratocysts and residual cysts were identified as OCs. Diagnoses of lesions was made with microscopic features of cyst along with clinical and

radiographic findings. The sites of involvement in the mandibular lesions were sub-classified into: Anterior (from canine to canine), posterior (pre-molars, 1st and 2nd molars, and 3rd molar/ramus area).

Data about demographic information (age and sex) was also collected. Clinical and radiographic findings were assessed such as root resorption, tooth displacement, expansion, and pain. Clinical features like – site of occurrence, present complaint and discharge, nerve involvement by lesion, fluctuation of the lesion, the aspiration of fluid and its color were included, with a complete history of the patient – name, age, gender, presence or absences of swelling, tooth vitality and mobility. Radiographic findings were recorded as detected in IOPA & OPG X-rays. For examination of extension in huge cystic lesion, CT may be required. The size of lesion, multilocular or unilocular appearance, involvement of the local anatomical structures, root resorption of the adjacent teeth were recorded as radiographic features. Medically compromised patient or patient with any contraindication to surgery and who were not willing to participate in the study were excluded from this study. Written informed consent was taken from every patient after fulfilling the inclusion and exclusion criteria and after understanding the purpose of this study. History of the patient, clinical and radiological examination and findings and all patient data were noted in the prescribed proforma and after that final treatment was done accordingly.

Statistical Analysis

Data was entered and analysed using Windows Excel. Analysis was presented as percentages, proportions and figures.

Ethical Consideration

Informed consent was obtained from study subjects before enrolling them in the present study. Ethical permission to conduct the study was obtained from institutional Human Ethics committee (IHEC) before the commencement of study. Personal and clinical information was kept confidential during and after conduct of the actual study.

RESULTS

In our study, 20 cases were included as OCs were detected in these 20 cases. The age of patient ranged from 17 years to 65 years. Males were 60 % and females were 40 % (Table no - 1). Males were found to be predominant than females. Side occurrence was found more in right side (60 %) than left side (40 %) in the mandible. The most frequent location of inflammatory cysts was in the mandible in anterior part and developmental cysts were in posterior part. The right side was more affected than left side (60 %). Most common clinical finding were swelling (50 %), followed by pain (10 %), reduced mouth opening (5 %), discharge (5 %), and fluid was aspirated from (30 %) of lesion. Unilocular radiolucency (75 %) was the most common radiographic

presentation followed by multi locular radiolucency (25 %). Radicular and dentigerous cysts were unilocular and keratocysts were found to be multilocular in our study. Root resorption was seen in 3 cases, displacement of teeth was seen in 5 cases. Unilocular radiolucent lesions were more common than the multilocular radiolucent lesions (Table 1).

In present study, the most commonly diagnosed OCs were the RCs (50 % cases). Sex predilection in males (7 cases) was detected more than in females (3 cases), more frequent in age group of 17 - 30 years. Second most commonly occurrence lesion was dentigerous cyst with prevalence of (30 %) cases with most common occurrence in age group of 17 - 30 years and males (4 cases) were predominant than females (2 cases). Third most commonly diagnosed cyst was OKC (15 %), males were higher (2 cases) than females (1 cases) but age group was not significant here. Others were 5 %, which were residual cysts. (Table no - 2 and 3). In most cases, cysts were treated by total enucleation with primary closure of the wound and extraction of non-vital tooth or impacted tooth which was involved in the cyst. They were 17 cases (85 %). Marsupialization was done in only 3 cases (15 %).

		Frequency	Percentage
Age group	17 - 30	9	45 %
	31 - 40	6	30 %
	41 - 50	3	15 %
	51 - 65	2	10 %
		Frequency	Percentage
Gender	Male	12	60 %
	Female	8	40 %
		Frequency	Percentage
Side involved	Left	8	40 %
	Right	12	60 %
		Frequency	Percentage
Radiographic findings	Unilocular	15	75 %
	Multilocular	5	25 %

Table 1. Basic Characteristics of Patients Diagnosed with Odontogenic Cysts (N = 20)

Diagnosis	Frequency	Percentage
Radicular cyst	10	50 %
Dentigerous cyst	6	30 %
OKC	3	15 %
Others	1	5 %

Table 2. Relative Frequency and Percent Distribution of Odontogenic Cysts

Cyst Type	Age Group				Total
	17 - 30	31 - 40	41 - 50	51 - 64	
Radicular cyst	5	3	1	1	10
Dentigerous cyst	3	2	1	0	6
OKC	1	1	1	0	3
Others	1	0	0	0	1

Table 3. Distribution of Patients According to Diagnosis with Age in Groups (N = 20)

DISCUSSION

A cyst is defined as a pathologic epithelium lined cavity usually containing fluid, gas or semisolid material. The epithelium associated with each of the odontogenic cyst is derived from one of the following sources: -

1. A tooth germ.
2. The reduced enamel epithelium of a tooth crown.

3. The epithelial rests of Malassez, remnants of the sheath of Hertwig's.
4. Remnants of the dental lamina.²¹

Cysts are common in jaw bone as teeth are present. Occurrence of OCs in the 17 - 30 age group were frequently high – 45 %, and the OCs in the age group of 31 - 40 years were – 30 %. Male dominance was high (60 %) than female (40 %); Side involved in mandible – right side was more than left; Unilocular radiolucency was more (75 %). Radicular cysts were 50 %, dentigerous cysts 30 %, OKCs 15 % and others were 5 %. Frequency of radicular cyst and dentigerous cyst found in 17 - 30 age group was high.

Presence of epithelial cell rests after odontogenesis in the jaw bone gives rise to OCs in jaw bone which is more common than any other bone.^{22,23,24} The diagnosis of OCs should be based on careful examination of clinical, radiographic and histopathological features, as several other lesions and various type of OCs have similar clinical and radiographic findings.^{25,26}

In our study, sex predilection in male was more than female - which is similar to other studies.^{10,17,27} Men usually have poorer oral hygiene habits and are more susceptible to caries and trauma than women.^{20,27}

In this study, radicular cysts, developed at the apex of a tooth, were more common i.e., 50 % and other studies^{10,27,28,29,30} also observed that radicular cysts were more common type OCs accounting 39.9 % - 86.2 % of all OCs,^{22,31,32,33} and also RCs were 52.3 % reported by Shear, 62.1 % reported by other study.²⁷ and 41.2 % reported by Nakamura et al.³⁴

The radicular cyst or apical periodontal cyst is the most common odontogenic cysts. In contrast to the other types of cysts, it involves the apex of an erupted tooth and is most frequently a result of infection via the pulp chamber and root canal through carious involvement of the tooth. The epithelial lining of the radicular cyst is derived from the epithelial rests of Malassez in the periodontal ligament and does not seem to exhibit the tendency for ameloblastoma transformation that occurs in the dentigerous cyst.²¹

RCs were more prevalent in males than females in our study, which was similar to other studies.^{2,8,17-19} But some study has shown a higher prevalence in females.^{10,27} Long term chronic inflammatory process induces cystic degeneration in periapical tissues.⁶ Thus, radicular cysts become the most frequently diagnosed cystic lesions. Men usually have poorer oral hygiene habits and are more susceptible to trauma than women.^{20,21}

RCs were slowly progressive, painless swellings, if infected, swelling becomes painful due to inflammatory oedema.^{8,9} Radiographically, most RCs appear as round or pear shaped unilocular radiolucent lesions in periapical part of tooth; the cyst can be situated lateral surface of the tooth. Cyst may cause displacement of teeth or mild root resorption.²⁵ The epithelial lining of a RCs has probably come from epithelial rests of Malassez from the periodontal ligament.^{35,36} Radicular cysts were mostly found in 3rd and 4th decade of life, which was compatible with other studies.^{3,4,10}

The second most common OCs have been described as dentigerous cysts with reference ranging from 11.4 % - 33.0 %, ^{10,25,26,37,38} with men being affected more. Posterior region of mandible was affected more because of impacted 3rd molar. Other studies also supported these findings, similar findings were also reported by Jones et al.⁸ according to him, high incidence of dentigerous cysts at this sites may be due to lower third molars being the most commonly impacted, followed by upper canines. DCs are due to developmental origin from the tooth follicle,³⁹ which is detected during routine radiographic examination. Radiographically, DCs show a well-defined radiolucency around the crown of an unerupted/impacted tooth. Dentigerous cyst was more observed in the posterior part of mandibular region which was similar to others studies.^{3,4,10,40,41}

It originates through alteration of the reduced enamel epithelium after the crown of the tooth has been completely formed, with accumulation of fluid between the reduced enamel epithelium and the tooth crown. The dentigerous cyst nearly always involves or is associated with the crown of a normal permanent tooth. Seldom is a deciduous tooth involved. The diagnosis is ordinarily easy to established from the radiograph alone, although sometimes this may not be true.²¹

The OKCs were the 3rd most frequently diagnoses OCs lesions, accounting for 15 % of all OCs, followed by other cystic lesions, e.g. residual cyst 5 % in our study. The OKCs were mostly seen in the molar and ramus region of mandible.^{27,42,43} Similar findings were also seen our study, though our sample size was very low. OKCs were found in other studies such as 4.88 %.²⁷; Nakamura et al.³⁴ 7.7 %. In most of the cases, patient with keratocyst complained of pain.³⁶

Odontogenic keratocyst is known for its high frequency of recurrence.⁴⁴ OKCs have thin-friable lining which makes it difficult for removal. Complete removal of cyst lining with certain amount of bone is necessary to prevent recurrence.⁹ OKC can be treated by various ways like resection/radical surgery, using Carnoy's solution, decompression,³³ marsupialization followed by enucleation.^{3,15,19} In our centre, we have used enucleation procedure followed by removal of approximately 0.5 cm bone around the lesion. The WHO reported that present new classification for odontogenic cysts and tumours redefined the OKC as keratocyst odontogenic tumour in 2005.

In this study, other odontogenic cystic lesions found as residual cysts (5 %) where grossly decayed tooth / toothwas extracted but cystic lesion was neglected or incomplete treatment of cystic lesion was done.

In our observation, the most common type of odontogenic cysts in mandibular region were radicular cysts (50 %), dentigerous cyst (30 %), OKCs (15 %) and others (5 %), in agreement with the report of Batanineh et al.⁹ Nakamura et al.³⁴ and Mosqueda Taylor et al.⁴⁵

CONCLUSIONS

The results in our study reflected that inflammatory origin of OC lesions in mandible is most common i.e., radicular cysts

in existence with the untreated dental caries and dental trauma followed by DCs and OKCs. Prevention and early management of dental caries and trauma is needed. The infrequent use of routine radiograph makes it difficult for early detection of cyst.

There is a need for large number of samples of mandibular jaw cysts and multicentre studies in future to establish a detailed data of the characteristic behaviour and clinico radiological features of these lesions and as well as for the early treatment plan.

Data sharing statement provided by the authors is available with the full text of this article at jebmh.com.

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