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Diagnostic aids credibility in dentigerous cyst identification; radiological analysis

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Objectives: To assess the incidence of dentigerous cyst in the jaw bones and the benefits of clinical and radiological analysis in diagnosis and treatment plan of odontogenic dentigerous cyst.
Methods: 25 patients presenting with chronic recurrent jaw swelling not responding to routine dental treatment for dental infection. Special folders done for each patient including personal and medical information, investigations, treatment plan, and follow-up. The cases treated by enucleation or marsupialization and specimens were sent for histopathological examination.
Results: 25 patients diagnosed as cases of dentigerous cyst depending on clinical and radiological analysis and confirmed by histopathology. Most cases detected in the anterior maxillary region. The most common involved tooth is the maxillary canine. The mean age of the patients is (24.5 years). The circumferential pattern is the most common type of dentigerous cyst detected on radiograph.
Conclusions: Dentigerous cyst most commonly detected in the anterior maxillary region. Panoramic view is one of the corner stones in management of dentigerous cyst.
Keywords: dentigerous cyst, panoramic view, odontogenic cyst.

Introduction

The cyst is a pathological cavity lined by epithelium and contain fluid, semi-solid, or solid material due to epithelial proliferation, degeneration, and liquefaction.[1] Odontogenic dentigerous or follicular cyst,[2] is a type of developmental jaw cysts surrounding the crown of unerupted or impacted teeth.[3] This cyst usually arises from the reduced enamel epithelium which is a tooth forming structure.[4] The most common involved teeth are the lower wisdom teeth and upper canines.[5] The exact origin of dentigerous cyst is unknown, some theories said that the pressure of tooth eruption causes venous obstruction which lead to fluid accumulation between tooth follicle and crown of unerupted tooth.[3] Other theories believed that this type of cyst is of inflammatory origin, and appear due to previous periapical inflammation of deciduous teeth that are present near the tooth follicle of erupting tooth.[6] The dentigerous cyst comprising 14–20% of jaw cysts, males affected more than females and mandible more than maxilla.[7] The cyst is asymptomatic, unless it became infected or reach significant size leading to jaw deformity. On radiograph, the cyst appears well-defined radiolucent lesion surrounded by sclerotic border surrounding the crown of unerupted tooth.[8] Many complications associated with dentigerous cyst like infection, teeth displacement, jaw fracture, or may change to ameloblastoma which is a benign locally aggressive odontogenic tumor. Some literatures said that this type of cyst if left untreated may change to malignant tumor like mucoepidermoid carcinoma and squamous cell carcinoma.[9] The diagnosis of dentigerous cyst confirmed by history, clinical examination, radiological assessment, and histopathology. Radiological assessment by orthopantomogram (OPG) is considered as one of the cornerstones in diagnosis and management of dentigerous cyst. They are cheap, easily performed, available in many medical centers, provide good interpretation of the lesion, and safe with limited ionizing radiation in comparison with other radiological tools like cone beam CT scan (CBCT) and medical CT scan. Surgical management of dentigerous cyst is either by enucleation or marsupialization.[10] The aim of this study is to detect the incidence of dentigerous cyst in the jaw bones and to evaluate the benefit of OPG analysis in diagnosis and treatment of dentigerous cyst.

Methods

This study done in maxillofacial department in Al-Salaam teaching hospital in Mosul/Iraq from Mar 2017 to May 2019. 25 patients presented with recurrent jaw swelling not responding to local and systemic measures of dental treatment referred from many medical centers in Mosul. Inclusion criteria include patients with age group between second and fourth decades of life and radiolucent lesion surrounding the crown or whole impacted teeth. Exclusion criteria include patients with primary dentition, elderly patients, radiolucent lesion associated with carious necrotic teeth, lesion in the edentulous area, post-surgical recurrence cases, lesion confirmed as a tumor rather than cyst by biopsy.

Case sheet done for each patient including demographic information, medical history, investigations, treatment plan, and follow-up. A radiological assessment done for detection of site, size, and cyst pattern. Fine needle aspiration biopsy done for cytological evaluation. 20 patients managed by surgical enucleation which include removal the whole cyst lining along with extraction of associated tooth. The surgical specimens were sent for histopathological examination and the patients were kept in follow-up. Five patients managed by marsupialization which includes gradual decompression of the cyst by creating a window in the oral mucosa and jaw bone and suturing of the cyst lining with oral mucosa and frequent washing by disinfectant solution like chlorohexidine 0.2%. A prosthetic plug made from methyl methacrylate is fabricated in this procedure to avoid food impaction in the cyst cavity during course of the treatment with gradual adjustment, till we complete the cyst management which take about 6–8

months. Marsupialization is performed for large cyst where there is a risk of jaw fracture, damage to local anatomical structures like inferior alveolar nerve and maxillary sinus, or in children to enhance eruption of teeth with non-displaced and suitable position for eruption. While enucleation is done in small cyst away from the maxillary sinus and inferior dental canal, uncooperative patients who can't continue with long course of treatment as in case of marsupialization and patients with poor oral care.

Results

25 patients diagnosed as cases of dentigerous cyst depending on clinical and radiological features and confirmed by histopathological examination. 18 patients are males and 7 patients are females with a ratio of 2.5:1. The age of patients in this study are (14–35 years) (mean: 24.5 years) (Table 1).

15 cases (60%) were detected in the maxilla and 10 cases (40%) in the mandible (Table 2).

12 cases were associated with the maxillary canine, 9 cases in the lower wisdom tooth region, 2 patients in the upper wisdom tooth region, 1 patient associated with lower second premolar and 1 case associated with upper anterior supernumerary tooth (mesiodence) (Table 3).

Circumferential type of dentigerous cyst were seen in 14 patients (56%) and central type seen in 7 patients (28%) and lateral type seen in only 4 patients (16%) (Table 4).

Unilocular pattern of dentigerous cyst was seen in 20 patients (80%) and multilocular seen in 5 patients (20%) (Table 5).

Table 1. **Sex distribution.**

Sex	No. of patients	%
Male	17	68
Female	8	32
Total	25	100

Table 2. **Incidence according to jaw involvements.**

Jaw involved	No. of patients	%
Maxilla	15	60%
Mandible	10	40%
Total	25	100%

Table 3. **Incidence according to involved tooth.**

Tooth involved	No. of patients	%
Maxillary canine	12	48%
Lower wisdom teeth	9	36%
Upper wisdom teeth	2	8%
Lower second premolar teeth	1	4%
Upper Supernumerary teeth	1	4%
Total	25	100%

Most cases that are associated with the lower wisdom teeth seen in class II position C according to Pell and Gregory classification of lower wisdom tooth. The average size of the cyst (8.525 mm) (mean: 16.75) measured with OPG. The results of histopathology coincide with expected radiological diagnosis.

Discussion

Dentigerous cyst is a type of developmental cyst of odontogenic origin which most frequently occur in association with impacted teeth. This type of jaw cysts are most commonly seen in the second or third decades of life.[11] This kind of cyst account 24% of all jaw cysts.[12] Its asymptomatic unless become large causing cortical jaw bones expansion or become infected.[13] The results obtained in this study show that the maxillary jaw bone affected more than the mandible in comparison with study done by Sepideh et al. in which the incidence is more in mandible.[14] The anterior region of maxilla affected more than posterior region and the most common involved tooth is the upper canine with males predilection in comparison with study done by Sasmita et al. in which the prevalence is more in the posterior maxillary region with females predilection.[15] This may be attributed to many factors like differences in social and education level between population were the violence and assault are more common between our peoples making the dentoalveolar region especially, the anterior part of maxilla more liable to trauma and this result may support the concept of inflammatory origin of the dentigerous cyst. On the other hand, the gender deference may be due to racial and ethnic factors related to the jaw dimensions and teeth size in addition to educational and social factors related to a close medical contact and early prophylactic extraction of impacted teeth in females. The radiological assessment represented by two-dimensional OPG is considered one of the important parameters in management of dentigerous cyst. They are technically simple, cheap, available in many medical centers, safe in relation to amount of ionizing radiation in comparison with other radiation measures like cone beam CT scan and medical CT scan and provide adequate information about the lesion in relation to site,

Table 4. **Incidence according to type of cyst.**

Type of dentigerous cyst	No. of patients	%
Circumferential	14	56%
Central	7	28%
lateral	4	16%
Total	25	100%

Table 5. **Incidence according to cyst pattern.**

Cyst pattern	No. of patients	%
Unilocular	20	80%
Multilocular	5	20%
Total	25	100%

size, and cyst pattern. The results obtained from radiological assessment coincide with the histopathological reports of the surgical specimens. One of most important issue in the diagnosis of dentigerous cyst is the differentiation of this type of odontogenic cyst from dental follicle. This depends on many factors like presence of pathological bony cavity surrounding the impacted tooth, contents of the cyst (fluid or semi-fluid material) and epithelial lining of the cyst (usually stratified squamous epithelium), presence of these factors will establish the diagnosis of dentigerous cyst even in small radiolucency surrounding the crown of impacted tooth.[16] This truth coincides with the finding in our study that depends on radiological analysis and histopathological examination of the specimens. The main drawbacks of OPG is the lack of three-dimensional abilities to detect the bicortical bony expansion of the lesion and the proximity of the lesion to vital structures like maxillary sinus and inferior dental nerve as in case of CBCT- and medical CT scan, in addition contrast medium in case of panoramic view is of no value in comparison with medical CT scan.

Conclusions

In this study, the dentigerous cyst most frequently involve the anterior maxillary region in association with impacted upper canine. Most common clinical presentation of dentigerous cyst is painless, chronic, and recurrent swelling associated with impaction teeth. The panoramic view considers one of most important tools in diagnosis and treatment plan suggestion for dentigerous cyst. A unilocular radiolucent lesion with well-defined boarder associated with impacted teeth is the most common radiological features of dentigerous cyst. Circumferential type is more common than other types of dentigerous cyst detected in OPG.

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