Content available at: https://www.ipinnovative.com/open-access-journals

Journal of Oral Medicine, Oral Surgery, Oral Pathology and Oral Radiology

Journal homepage: www.joooo.org

Case Report

CBCT report of three intresting cases of cysts and its radiographic presentations

A Cicilia Subbulakshmi[1,*], **Saravana Bharathi**[2], **S Naveen**[1]

[1] *Private Practitioner, India*
[2] *Dept. of Oral Medicine and Radiology, Raja's Dental College, Vadakankulam, Tamil Nadu, India*

ARTICLE INFO

Article history:
Received 03-02-2021
Accepted 15-06-2021
Available online 07-10-2021

Keywords:
BCT
Peri-apical cyst
Dentigerous cyst
Radiographic presentation of cysts

ABSTRACT

Accurate diagnosis with imaging and treatment planning are key in the execution of any surgical procedure. Panoramic radiography has been routinely used in dentistry to assist in clinical diagnosis, treatment procedure but it has limitations such as overlapping of anatomical areas which are of interest in the diagnosis. The invention of computed tomography (CT) had revolutionized the digital imaging though their limitations like 2-dimensional imaging features such as distortion, magnification, and superimposition were present. Cone beam computed tomography (CBCT) is rapidly gaining Interest in the medical fraternity. it was designed with the aim to offset some of the limitations of panoramic and CT imaging .
CBCT ever since its inception, it had been routinely used in dentistry for its numerous advantages such as 3-dimensional and multi-planar views. Linear, Curved and angular measurements could be performed along with area and volume calculation and density. All with less radiation exposure compared to conventional computed tomography (CT) scans. In this case series three cases of jaw cysts have been presented with varied radiographic features and the role of CBCT in these cases flooding us with enormous radiographic informations which paved the way for precise surgical management.

1. Introduction

CBCT is used in medical and all dental fields including orthodontics, periodontics and endodontics.[1,2] In Oral and maxillofacial surgery, CBCT plays a pivotal role in mandibular canal tracing, impaction, dentoalveolar surgeries, implants, tumor and cyst removal. When treating cyst and tumors, it is imperative to measure the lesion from different angles to study its spread.[3,4] With CBCT, there is less than 1% error as compared to the other conventional methods.[5,6] It also helps in preventing complications during surgery, reduces functional deterioration after surgery.[7,8] Here we present a series of cases consulted with CBCT imaging and its importance in diagnosing cysts and tumors while emphasizing on ordering a CBCT directly when a cyst or a tumor has been suspected.

2. Case Presentation

2.1. Case 1

A 40-year-old male reported with a chief complaint of swelling in his lower right back tooth region associated with pain on mastication. History revealed an insidious onset of swelling which was not noticed by the patient until the pain had started. There was no other contributory history. Clinical examination revealed a swelling in the region of 37, 38 with significant buccal and lingual cortical expansion. There was no other discharge or bleeding. He was ordered a CBCT (carestreem 9300) directly in order to study the extent of the lesion. The scan revealed a large unilocular, expansile and osteolytic lesion of about

* *Corresponding author.*
E-mail address: drcisu@gmail.com (A. C. Subbulakshmi).

https://doi.org/10.18231/j.jooo.2021.053

3 × 3 cm in diameter in the left posterior mandible extending anteriorly from 36 and posteriorly to 38 region with well-defined thin sclerotic border which was not continuous. Internal structure was uniformly radiolucent with no calcifications (Figure 1 (a). The buccal and lingual cortex were thinned out with significant expansion. The lesion was more pronounced on the lingual side with large area of perforation compared to buccal side (Figure 1 (b)) The Lower border of mandible was visualized with expansion with perforation. A Horizontal impaction of 38 was seen above the mandibular canal. The cystic lesion appeared to arise from the cervical level of impacted 38. The crown of 38 was within the lesion. There was a mild apical root resorption of 37. Borders of the radiolucency was well defined with clear involvement of the mandibular canal (Figure 2). The sagittal and coronal and axial sections showed significant expansion of buccal and lingual cortices (Figures 3 and 4). The above radiographic findings suggested that the lesion is a dentigerous cyst involving impacted 38 with a differential diagnosis of Unicystic ameloblastoma and Odontogenic Keratocyst. After surgical excision, the diagnosis of Dentigerous cyst was confirmed through histopathology.

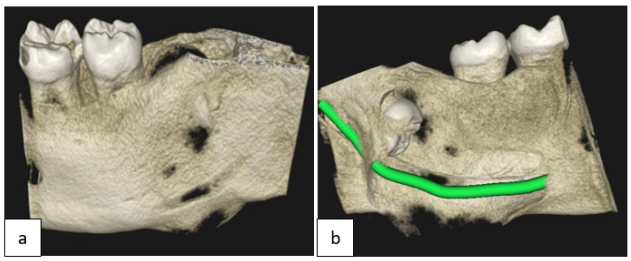

Fig. 1: a: Buccal 3D; **b:** Lingual side with mandibular canal line

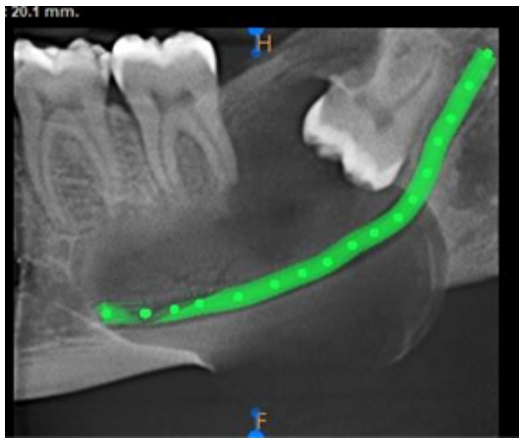

Fig. 2: Reconstructed panoramic image with mandibular canal tracing

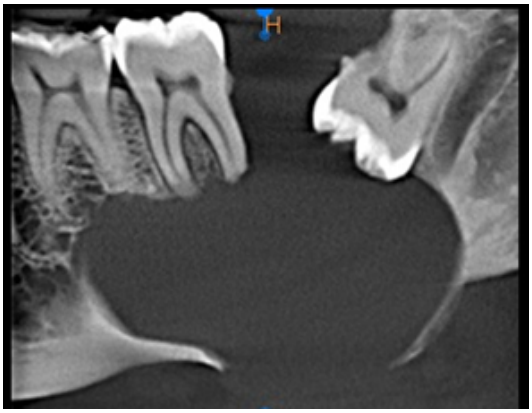

Fig. 3: Oblique sagittal sections

2.2. *Case 2*

A 61-year-old male reported with a chief complaint of a swelling in his upper front tooth region there was no other contributory history. Clinical Examination revealed a swelling over 11,12,13 and 21 with no signs of inflammation. Panoramic radiograph revealed a large radiolucent, osteolytic bone lesion in the maxilla anterior region roughly extending from 13 to 23. The borders were faint and not well defined (Figure 4). Further study the extent of the lesion, a CBCT was taken (Carestreem 9300) Sagittal sections of CBCT was made from right to left. The lesion in the form of radiolucency was seen in between 12 and 11. It measured approximately 2.5 × 2 cm in diameter. There was perforation of the buccal, palatal cortex and floor of nasal fossa. The lesion was more towards the left side of maxilla extending till the region between 23 and 24. The involved teeth appeared to be vital. The roots of the teeth were not resorbed or displaced which indicated a slow growing and less aggressive lesion. The walls and floor of the maxillary sinus were intact. No evidence of impacted teeth. No evident odontogenic/ pulpal pathology noted in the maxillary anterior region (dental caries, fracture). Axial sections clearly demonstrating the perforation of the buccal and the palatal cortex and the nasal fossa. The radiolucency is uniform and better defined borders (Figures 5, 6, 7 and 8). The lesion was provisionally diagnosed as periapical cyst with differential diagnosis of Globular-maxillary cyst. Following surgical treatment, the Naso-palatine cysts were confirmed through histopathology and a palatal obturator was fabricated using the 3D images of CBCT was used to close the defect in the palatal bone.

2.3. *Case 3*

A 29-year-old female reported with a chief complaint of retained primary teeth and constant rhinosinusitis. Clinical examination revealed retained 52, 53, and 63. Impacted 13,18 and 28 with missing 12 and 23. CBCT

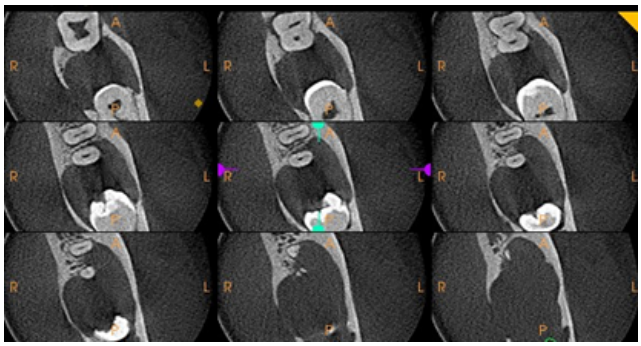

Fig. 4: Axial cross sectional image

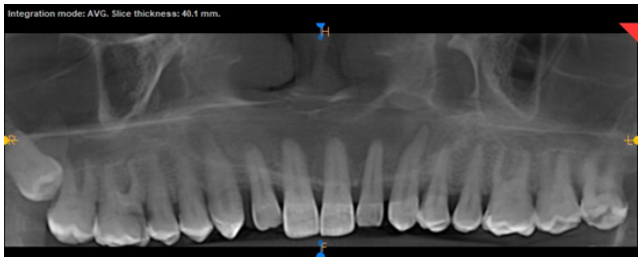

Fig. 5: Panoramic radiograph reveals a large radiolucent osteolytic bone lesion seen in the maxilla anterior region roughly extending from 13 to 23

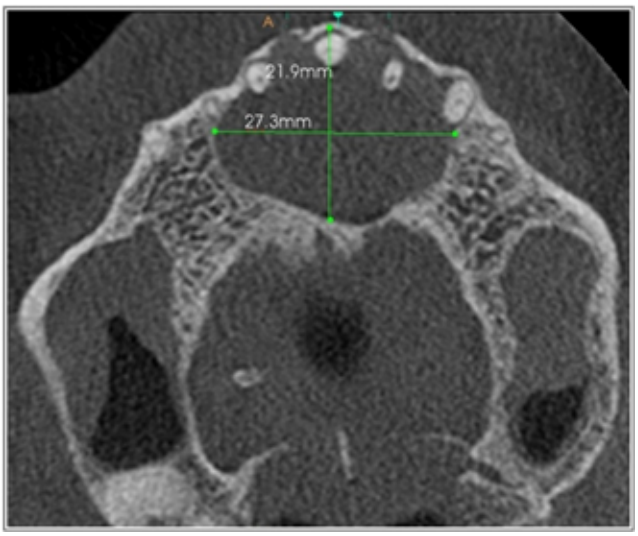

Fig. 6: Measurement in sagittal cross section

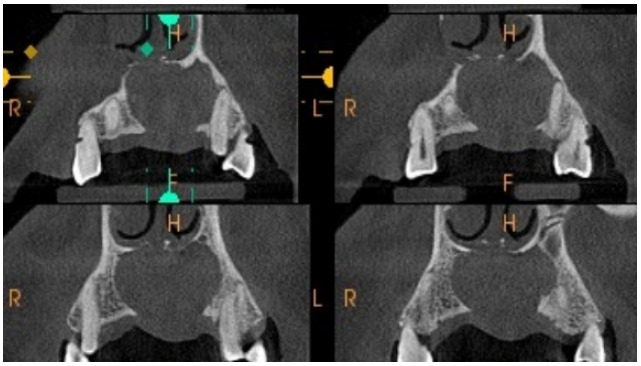

Fig. 7: Coronal section showing nasal floor perforation

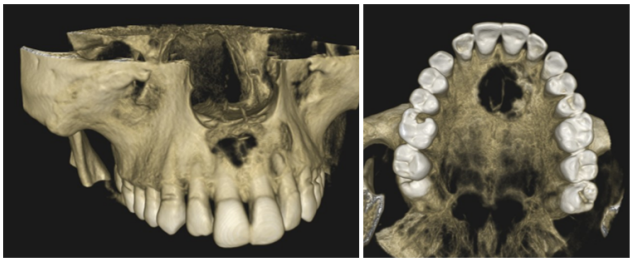

Fig. 8: Reconstructed 3D images

revealed a well circumscribed solitary unilocular hypo dens mass with density suggestive of soft tissue or fluid roughly of about 2cm in diameter seen associated with the impacted 13 extending superiorly up to the inferior nasal turbinate causing perforation of the floor of nasal fossa and enlargement of the right inferior nasal turbinate. It extended up to the mesial surface of 21. Posteriorly there is thinning and perforation of the lingual cortical plate. There was a mild expansion of the buccal and lingual cortical plates. The mass encircled the crown of tooth 13 with no evidence of root resorption 13 (roots of retained deciduous teeth 52 and 53 are resorbed) or tooth displacement (Figures 9, 10, 11 and 12). The internal structure was uniformly radiolucent with no calcifications. The floor maxillary sinus was found to be intact. Axial cross sectional reference image-cross sections made cephalo-caudal with 1mm inter-slice distance. Coronal cross sectional reference image-cross sections made anterior to posterior with 1mm inter-slice distance. Radiographic diagnosis was suggestive of dentigerous cyst involving the impacted 13 causing perforation of nasal floor on the right side and inflammation of the right nasal turbinate. Treatment included surgical enucleation followed by removal of the retained and impacted tooth.

3. Discussion

CBCT provides high spatial resolution, short scan time and rapid image acquisition with less radiation exposure

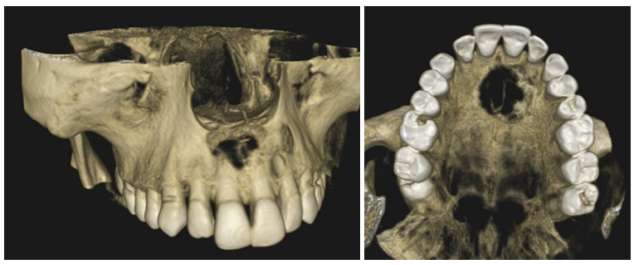

Fig. 9: Reconstructed OPG

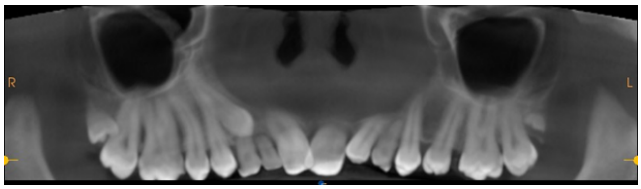

Fig. 10: Sagittal cross sectional image

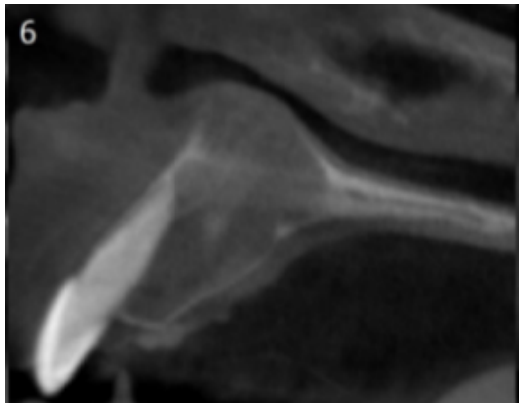

Fig. 11: Axial cross sectional image

Fig. 12: 3D images

compared to other conventional scans. CBCT scanners are mounted on a rotating gantry which from its source, emits a cone-shaped beam of ionizing radiation which then passes through the field of interest and reaches the detector on the opposite end.[9] The source and the detector produce sequential, complete or partial projections of images by rotating around the field on a fulcrum. The images are acquired and read as voxel (three-dimensional pixel or volumetric pixel) for three-dimensional reconstruction.[10] The radiation dose is significantly less than that of conventional medical grade CT-scans.[11]

CBCT has been utilized in displaying the extent, border, surrounding structures, and intra lesional contents of the cyst in the three-dimensions when the lesion is overlapped by adjacent bony structures. They can also be used to assess the size and contour of pre or post-operative deformities in tumor resection and help in determining the volume of bone necessary for reconstructive procedure.[12]

In reconstructed 3D images of CBCT, the morphology and the height of alveolar bone can be accurately displayed, showing buccolingual thickness, mesiodistal width, clear local bone structures and their anatomical relationship with surrounding structures. These images can be helpful in implant placement as they determine the volume of the bone, the position, direction and volume of the implants that have to be placed.[13,14] CBCT is superior to the other modalities used in tracing mandibular canal (MC). The MC can be easily visualized by generating a virtual replica by marking the course of the mandibular canal at different locations. volumetric rendering of the images provides better understanding of localization, cortical destruction, and association with surrounding anatomic structures.

The coronal and sagittal dimensions generated by CBCT shows the relationship of the Inferior alveolar nerve bundle and the mandibular third molar, this allows the surgeon to visualize the proximity in a vertical, lateral, and depth dimension.[15] In case 1, the axial, oblique and Sagittal section showed deep mandibular canal involvement with the cyst and the buccolingual expansion of the lesion in the ramus region, thereby making it easier to plan for the surgery keeping in mind the involvement of inferior alveolar nerve bundle. The knowledge of the position of the neurovascular bundle in relation to surrounding structures is used in treatment planning, and its accurate location is of importance to the success of many procedures such as implant placement, tooth extraction, or surgical osteotomy.

To avoid damage and complications to neighboring structures, the locations and anatomical variations of the maxillofacial structures for each patient should be identified by using appropriate radiographic techniques prior to surgical treatment planning.[2,5]

When evaluating cysts or benign tumors using CT, intraoral or panoramic radiographs, they show only the two dimensions of the lesion. In contrast, all three dimensions

are recorded by the multiplanar (axial, coronal and sagittal planes) imaging of CBCT. Such multiplanar views provide information on the extent of bone resorption, sclerosis, cortical expansion, internal or external calcifications, and proximity to other vital structures.

Conventional radiographs fails to disclose vital information because of their limitations (two-dimensional representations, anatomic superimposition, distortion, etc.), leading to incorrect diagnosis and treatment. In our 2^{nd} case, CBCT images were typical of naso-palatine cyst with palatal and nasal floor perforation , but the OPG was non-confirmatory of whether it was a odontogenic or non-odontogenic origin with no evidence of its extent and involvement of the nasal fossa. This finding based on findings by Bodin et al. who proposed that exploratory surgery must be an option whenever there was a pronounced radiolucency with a thin cortical border on the periphery exceeding 8 mm in width or if lesion is asymmetrically bulging. They also proposed that radiolucencies exceeding 14 mm in diameter were always cysts.[15] Based on histopathological examination the cyst was found to be a nasolabial cyst as predicted by CBCT.

CBCT can also be used as an adjuvant for routine panoramic radiographs in the following cases:

1. Canine inclination in the panoramic X-ray exceeding 30°
2. Root resorption of adjacent teeth is suspected, and/or
3. Canine apex is not clearly discernible in the panoramic[16]

CBCT images have provided reliable data on root angulation and the management of impacted canines.[17,18] Thus CBCT in the treatment of impacted canine is more beneficial than the conventional radiographs as more accurate images are obtained with fewer imaging artifacts.[19] In our third case, CBCT helped the surgeon to access the impacted teeth with minimal damage to the neighboring structures.

Each application of radiographic technology must be taken into account its potential risks and the net benefit it produces. Prior to the introduction of CBCT, multiplanar views were obtained primarily with CTs (CT) and magnetic resonance imaging (MRI). Physical dimensions and cost of MDCT and MRI equipment prove to be Impractical for installation in a typical dental setting office. Smaller physical dimension, lower cost and easier operation have led to rapid acceptance. We believe that in suspected cases of cysts and infiltrative tumors or fractures, a CBCT can be directly taken instead of a panoramic radiograph or a CT thereby, sparing the patient of any unnecessary radiation exposure. The CBCT images allow practitioners to better diagnose and understand the true extent of dental disease and therefore they can provide more appropriate treatment for patients.

4. Conclusion

CBCT has become an important diagnostic tool for oral and maxillofacial surgeons. The benefit of this imaging modality can be better utilized by realizing its capacities and limitations. It provides the clinician with valuable information and should be used whenever patient's benefits outweigh the potential risk of radiation exposure. A combination of clinical information, signs, symptoms, and radiographic findings should be considered to determine the need for surgery or follow-up.

5. Source of Funding

None.

6. Conflict of Interest

The authors declare no conflict of interest.

References

1. Horner K. Cone-beam computed tomography for oral surgical applications: where is the evidence? *Oral Surg*. 2013;6(3):112–28. doi:10.1111/ors.12052.
2. Hatcher DC, Dial C, Mayorga C. Cone beam CT for pre-surgical assessment of implant sites. *J Calif Dent Assoc*. 2003;31(11):825–33.
3. Kamburoğlu K. Use of dentomaxillofacial cone beam computed tomography in dentistry. *World J Radiol*. 2015;7:128–30.
4. Oztunç H, Evlice B, Tatli U, Evlice A. Cone-beam computed tomographic evaluation of styloid process: A retrospective study of 208 patients with orofacial pain. *Head Face Med*. 2014;10:5.
5. Orhan K, Seke BK, Aksoy S, Bayindir H, Berberoğlu A, Seker E, et al. Cone beam CT evaluation of maxillary sinus septa prevalence, height, location and morphology in children and an adult population. *Med Princ Pract* . 2013;22(1):47–53.
6. Sinanoglu A, Orhan K, Kursun S, Inceoglu B, Oztas B. Evaluation of optic canal and surrounding structures using cone beam computed tomography: Considerations for maxillofacial surgery. *J Craniofac Surg*. 2016;27:1327–30.
7. Shweel M, Amer I, El-Shamanhory AF. A comparative study of cone-beam CT and multidetector CT in the preoperative assessment of odontogenic cysts and tumors. *Egypt J Radiol Nucl Med*. 2013;44(1):23–32.
8. Nakagawa Y, Kobayashi K, Ishii H, Mishima A, Ishii H, Asada K, et al. Preoperative application of limited cone beam computerized tomography as an assessment tool before minor oral surgery. *Int J Oral Maxillofac Surg*. 2002;31(3):322–6.
9. Ludlow JB, Laster WS, See M, Bailey LJ, Hershey HG. Accuracy of measurements of mandibular anatomy in cone beam computed tomography images. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2007;103:534–42.
10. Orentlicher G, Abboud M. The use of 3-dimensional imaging in dentoalveolar surgery. *Compendium*. 2011;32:1–7.
11. Loubele M, Assche NV, Carpentier K, Maes F, Jacobs R, Steenberghe DV, et al. Comparative localized linear accuracy of small-field cone-beam CT and multislice CT for alveolar bone measurements. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2008;105(4):512–8.
12. Suomalainen A, Esmaeili EP, Robinson S. Dentomaxillofacial imaging with panoramic views and cone beam CT. *Insights Imaging*. 2015;6(1):1–16. doi:10.1007/s13244-014-0379-4.
13. Patel S, Dawood A, Ford TP, Whaites E. The potential applications of cone beam computed tomography in the management of endodontic problems. *Int Endod J*. 2007;40:818–30.

14. Ghaeminia H, Meijer GJ, Soehardi A, Borstlap WA, Mulder J, Berge SJ. Position of the impacted third molar in relation to the mandibular canal. Diagnostic accuracy of cone beam computed tomorgraphy compared with panomaic radiography. *Int J Oral Maxillofac Surg*. 2009;38:964–71.
15. Bodin I, Isacsson G, Julin P. Cysts of the nasopalatine duct. *Int J Oral Maxillofac Surg*. 1986;15:696–706.
16. Wriedt S, Jaklin J, Al-Nawas B, Wehrbein H. Impacted upper canines: examination and treatment proposal based on 3D versus 2D diagnosis. *J Orofac Orthop*. 2012;73(1):28–40.
17. Peck JL, Sameshima GT, Miller A, Worth P, Hatcher DC. Mesiodistal root angulation using panoramic and cone beam CT. *Angle Orthod*. 2007;77:206–13.
18. Liu DG, Zhang WL, Zhang ZY, Wu YT, Ma XC. Localization of impacted maxillary canines and observation of adjacent incisor resorption with cone-beam computed tomography. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2008;105(1):91–8.
19. Walker L, Enciso R, Mah J. Three-dimensional localization of maxillary canines with cone-beam computed tomography. *Am J Orthod Dentofac Orthop*. 2005;128:418–23.

Author biography

A Cicilia Subbulakshmi, Consultant (Dental Radiologist) https://orcid.org/0000-0003-4195-8488

Saravana Bharathi, Professor

S Naveen, Consultant (Endodontist)

Cite this article: Subbulakshmi AC, Bharathi S, Naveen S. CBCT report of three intresting cases of cysts and its radiographic presentations. *J Oral Med, Oral Surg, Oral Pathol, Oral Radiol* 2021;7(3):176-181.