Role of MDCT in Evlatuation of Mandibular Lesions

Solanki Kunal G.[1], Makwana Viral B[2], Vaghela Digish U[3], Patel Jayesh M.[4]

ABSTRACT

Introcution: Confirmatory diagnosis of Various Mandibular pathologies as early as possible is critical to decide the management. CT Scan in most cases is the final imaging modality to conclude imaging diagnosis of mandibular pathology and its extent. The aim of the study is to correlate clinical findings, MDCT Scan findings and biopsy findings, as well to establish the importance of CT Scan as a strong imaging modality for Mandible lesions.

Material and mehtods: MDCT Scan were done in 70 patients with suspected Mandibular Pathologies. Findings of CT were noted and probable diagnosis was given. Follow up and confirmation of the diagnosis was done in all cases were which was followed up by peroperative findings and biopsy report.

Results: In present study, in 61 patients MDCT scan was accurate for diagnosis as per peroperative findings and biopsy report. In 9 patients probable diagnosis given onCT scan was not matched with postoperative biopsy diagnosis. In 25 patients OPG or conventional radiographs were inconclusive for lesion characteristics but CT Scan revelscharacteristics and extent of lesion. In 9 patients OPG reveled single lesion while CT showed multiple lesions.

Conclusion: MDCT Mandible is recommended in patients with mandibular pathologies as a final imaging tool.

Keywords: MDCT Mandible, Lesions of Mandible, Arteriovenous Malformation Mandible, Ameloblastoma, Keratocystic Odontogenic Tumour.

INTRODUCTION

" The face is the mirror of the mind ". But any pathology on the face will definitely disturb the mind. So early diagnosis and characterization of the pathology and timely treatment will give glow on the face and ultimately calm the mind. Mandible and teeth are very common and timely management and diagnosis is of prime importance

Lesions of Mandible falls into vast spectrum of odontogenic and nonodeontogenic lesions. Many lesions have similar radiology appearance. CT scan is very helpful in those cases to reveal secondary findings to get some clue. However many lesions require biopsy to get the final diagnosis. Imaging especially CT Scan even if don't give final diagnosis will narrow the differential.

With the way back of discovery of X ray in 1895, there has been continuous development in studying and depicting pathologies of different systems of body.

Earlier OPG was the only modality to throw some light on the mysterious mandible pathologies. Only small boat to sail in the mysterious sea of mandible pathology until departure of the big ship - CT Scan.

Correlating the CT Scan findings with Biopsy are essential for predicting the importance and usefulness of different findings.

MATERIAL AND METHODS

The study was conducted during June 2015 to January 2016. The study was done on 70 patients referred for CT Scan Mandible in B.J. Medical college Ahmadabad. Inclusion criteria for selection of the patients was patients having nontraumatic clinically suspected mandibular pathologies, patients refereed for CT Scan due to inconclusive clinical diagnosis in toothache, patients with OPG or X rays done and were referred for further evaluation. Exclusion criteria were traumatic injuries to mandible as well patients with metal prosthesis. Thus Patient refereed for MDCT mandible after road traffic accidents or other trauma were excluded from this study. Final diagnosis was suggested by CT Scan and clinical correlation. Final diagnosis was confirmed by biopsy in all cases. All patients were evaluated clinically and then underwent CT Mandible. 54 patients also underwent OPG or Radiograph of Mandible. Contrast Enhanced CT Scan done in 52 patientsand Plain CT Mandible done in 18 patients.CT Scan for follow up of lesion done in 2 patients. No selection bias were exercised in terms of patients age and sex.

In all patients CT Scan was done by SIEMENS SOMATOM DEFINITION 128 slice MDCT. Following CT Technique was used in all patients: - Plain CT scan of Mandible (without IV contrast) was done with. 16X0.625 mm Collimation, 5 mm Slice thickness, 1.75 Pitch with Table speed/gantry rotation –55mm/17.5 mm were used.

Whenever indicated Plain CT is followed by intravenous bolus of non-ionic iodinated contrast material via power injector. 100 cc of contrast was administered at rate of 3.5 ml/sec. CECT Mandible was done under the supervision of the anesthetist.

Detail Findings were noted and probable diagnosis or differential diagnosis were given. In all cases follow up was taken by peroperative findings and by biopsy report. Result of the study was analyzed and was compared with other available studies.

STATISTICAL ANALYSIS

SPSS version 21 was used to infer results. Results are based on descriptive statistics.

[1]Assistant Professor, [3]Associate Professor, [4]Tutor, Radiology Department, B.J.Medical College, Civil Hospital Ahmedabad, [2]Superintendent, Community Health Center, Dholka, Ahmedabad, Gujarat, India

Corresponding author: Solanki Kunal G., "Govinddham ", Plot -55/2, Sector -14, Gandhinagar, State - Gujarat, Country -INDIA. PIN -382016.

How to cite this article: Solanki Kunal G., Makwana Viral B, Vaghela Digish U, Patel Jayesh M. Role of MDCT in evlatuation of mandibular lesions. International Journal of Contemporary Medical Research 2016;3(4):1186-1189.

Diagnosis and Frequency (Total 70 Cases)	CT Appearance	No of cases	Percentage of CT Apperance
Ameloblastoma (17 cases = 24.28%)	Multiloculated lytic lesion with cortical erosion	14	82%
	Multiloculated lytic lesion with cortical erosion	3	18%
Keratocysticodontogenic tumor (KCOT) (14 cases = 20%)	Cyst with mild cortical expansion without destruction	12	86 %
	Cyst with cortical expansion and erosions	2	14%
Periapical cyst (12 cases=17.14%)	Cyst with sclerotic margins	10	80 %
	Lytic-Sclerotic lesion with soft tissue swelling	2	20%
Odontoma (10 cases=14.28%)	Opaque lesion with lucent rim	10	100%
Dentigerous cyst (6 cases =8.57%)	Expansile cyst with unerupted crown of teeth	6	100%
Osteomyelitis (5 cases=7.14%)	Lytic lesion with sequestrum	4	80%
	Lytic-Sclerotic lesion with soft tissue swelling	1	20%
Cementoblatsoma (2 cases =2.85%)	Well circumscribed radioopaque mass associated with root of tooth	2.	100%
Fibrous Dysplasia (2 cases =2.85%)	Lesion with ground glass density and expansion	2	100 %
Arteriovenous Malformation (1 case =1.42%)	Multiloculated cystic lesion with intense postcontrast enhancement	1	100%
Osteogenic Sarcoma (1 case==1.42%)	Aggressive destruction of bone with periosteal reaction and soft tissue mass	1	100%
Osteochondroma (1 case==1.42%)	Bony outgrowth with area of sclerosis	1	100%

Table-1: Frequency and MDCT apperance of mandibular pathologies

MDCT Diagnosis and Frequency	Diagnosis on Biopsy		Total no of case
	Same Diagnosis	Different Diagnosis	
Ameloblastoma	13	4	17
Keratocysticodontogenic tumor (KCOT)	12	2	14
Periapical Cyst	11	1	12
Odontoma	9	1	10
Dentigeous cyst	6	0	6
Osteomyelitis	4	1	5
	55	9	64

Table-2: Correlation of MDCT Diagnosis and Biopsy Diagnosis

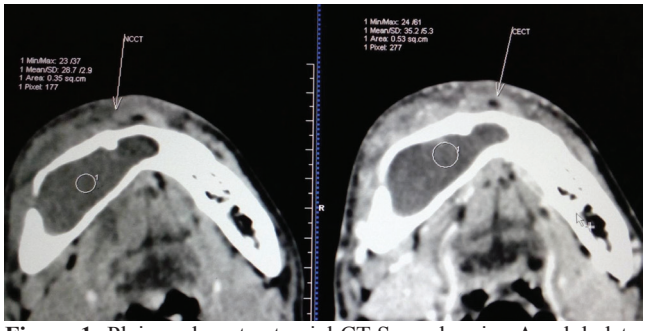

Figure-1: Plain and contrast axial CT Scan showing Amelobalstoma - buccolingually expanding enhancing lytic lesion with cortical destruction in body of mandible on right side

RESULTS

In this study most common pathology was Ameloblastoma (24.28%), followed by Keratocysticodontogenic tumor (KTOC) (20%).

In present study, in 61 patients MDCT scan was accurate for diagnosis as per peroperative findings and biopsy report. In 9 patients probable diagnosis given on CT scan was not matched with postoperative biopsy diagnosis. In 25 patients OPG or conventional radiographs were inconclusive for lesion characteristics but CT Scan revealed characteristics and extent of lesion. In 9 patients OPG reveled single lesion while CT showed multiple lesions.

Calculated from Table 2 the calculations are; $\chi^2 = 2.851$, df = 5, So $\chi^2/df = 0.57$, $P(\chi^2 > 2.851) = 0.7229$

Thus P value is 0.72, So it can be stated that MDCT diagnosis correlates well with Biopsy diagnosis.

In 4 cases, On CT Scan probable diagnosis was given Amelo-

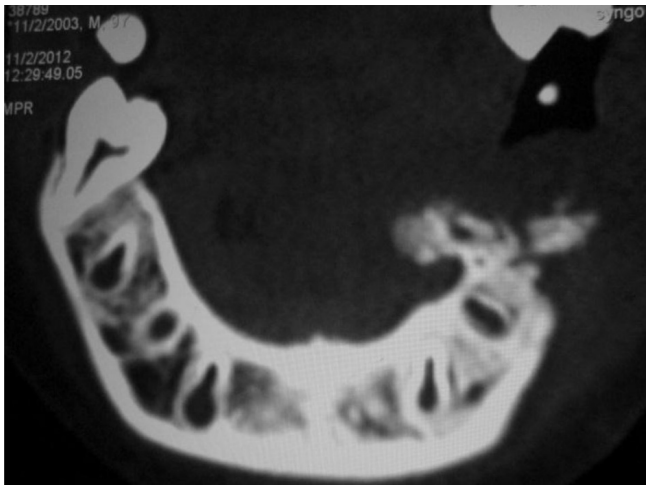

Figure-2: Coronal scan bone window setting showing Osteochondroma - bony outgrowth with sclerosis arising from mandible body on left side

blastoma turned out to be KTOC on biopsy, while in 2 case CT diagnosis of KTOC turned out to be Ameloblastoma on Biopsy.

DISCUSSION

As cost effective and easily accessible as well low radiation dose, conventional radiographs such as panoramic radiographs (orthopantomographies [OPTs] or panoramic X-rays) or dental intraoral radiographs are commonly used for the diagnosis of pathology of the mandible.[9] However conventional radiographs having two-dimensional projections of three-dimensional structures, have a limited role for the assessment of lesion size, lesionmargins, as well as extension into important anatomic structuresor soft tissues. New imaging modalities complement conventional radiographs overcoming the above-mentioned limitations and providing more specific information in terms of diagnosis and therapeutic options.[9] With the introduction of multi–detector computed tomography (MDCT), the imaging evaluation of patients with mandibular lesions has changed.

Although Cone Beamed Computed Tomography (CBCT) has gained increasing popularity over the past years, it does not allow evaluation of extraosseous structures; use of CBCT may therefore lead to underestimation of disease extent.

Dentists and oral surgeons were experiencing difficulty with the use of conventional radiographs to determine whether there was sufficient bone in the jaw to accommodate dental implants.[3] But now with MDCT Mandible it has been easier for them to decide.

CT has many advantages over Conventional X ray used for diagnosis in mandibular pathologies as it gives access forimaging of both bones and soft tissues. Excellent differentiation between different types of tissues, both normal and diseased is also possible as well as the images can be manipulated.[2]

In all patients the exact extension of the lesion, the involvement of nearer anatomical structures and planning for biopsy and surgical planning could be decided in our study.

Whenever a benign lesion is suspected, the surgeon need to know the integrity of the inferior cortex of mandible as it helps to decide the approach if curettage or resection is needed. Also relationship of the lesion to the root of teeth is essential to determine as to plan if any of the vital or nonvital teeth need to be resected.[3]

Multicystic Ameloblastoma is the most common type accounted in our study. On CT most common appearance was of multiloculated lytic lesion with cortical erosions. Solid or multicystic ameloblastoma is the most common variant, accounting for 85% of all ameloblastomas. This variant is also the most aggressive and has a high recurrence rate compared with the other variants. Radiographically the multicystic (solid) Ameloblastoma variant typically appears multiloculated with internal septations manifested by a honeycomb or soap-bubble appearance.[5]

In our study CT was also helpful in evaluation of teeth root resorption or erosion.The hallmark of ameloblastoma is extensive tooth root absorption.[5]

Keratocysticodontogenic tumor(KCOT)formally known as "odontogenic keratocyst" but recently was categorized as an odontogenic tumor rather than a cyst.[5] Most cases In our study were having nonaggressive radiological appearance with minimal if any cortical expansion. 2 out of 14 Keratocysticodontogenic tumors in our study showed aggressive growth pattern and cortical destruction. Keratocysticodontogenic tumor scan show a more aggressive growth pattern including multilocularity, cortical expansion, perforation of the cortical bone, tooth and mandibular canal displacement, root resorption, and extrusion of erupted teeth.[5]

In our study there were 2 cases of recurrence of Biopsy proven KCOT. Most KCOTs possess destructive potential, with a high recurrence rate after resection.[6] It is sometimes very difficult to differentiate between ameloblastomas and KCOT by characteristic radiographic findings. However, KCOT have relatively less resorption or erosion of teeth root. Also in our study all ameloblastoma showed predominant buccolingual expansion while KCOT showed anteroposterior expansion. Ameloblastomas and not KCOT tend to expand the marked buccolingual cortical bone.[1]

The periapical (radicular) cyst is the most common odontogenic cyst.[6] However In our study only 11 cases were undergone CT Scan probably because the clinicians were confident enough for the diagnosis in case of Periapical cyst and with help of only conventional radiographs they managed those cases. In many cases, such as in radicular cysts, the diagnosis is straightforward and no additional imaging is required for diagnosis and treatment.[8] However in one the cases in our study biopsy findings were of keratocystic odontogenic tumour.

Radiographically, a dentigerous cyst appears as a well circumscribed unilocular radiolucent lesion adjacent to the crown of an unerupted tooth most commonly the third molar tooth.[5,9] In our study all cases showed similar radiological picture with four out of six cysts were in association with third molar tooth.

In our study 4 cases diagnosed of osteomyelitis were of chronic Osteomyelitis and were showing lytic lesion and sequestration. One lesion showed Sclerotic lesion with soft tissue swelling, all cases were noted in body of mandible. Osteomyelitis of jaw most commonly involves body of mandible.[7]

Odontoma is the most common odontogenic tumor of mandible. Forming between the roots of teeth, the tumor is initially radiolucent but later forms a radioopaque mass with a lucent rim.[6] It is easy to diagnose on conventional x rays of OPGs so in our study less patients were referred for such probable diagnosis. Radiologically, odontomas usually are not difficult to differentially diagnose.[1]

Both cases of Cementoblastoma showed typical well circumscribed radioopaque mass associated with root of tooth. However expected peripheral lucent rim was not seen in either of cases.[1]

There were 2 case of fibrous dysplasia both of which showed characteristic ground glass bone density. In a study by Subodh Arun Sontakke et al, 100% lesions of fibrous dysplasia showed ground glass bone density.[9]

We came across a single case of osteosarcoma of mandible in this study. CT features are of Aggressive destruction of bone with periosteal reaction and soft tissue mass with mild contrast enhancement. In malignancy of mandible CT imag-

es commonly include soft tissue density masses with mild contrast enhancement associated with bone destruction.[1]
There was a rare case of Osteochondroma in body of mandible in our study. It is extremely rare and only one case reported of OC at angle of mandible. Majority of cases are reported in condyle followed by coronoid process.[10]
By better characterization of vascular supply or vascularised nature of the lesion in many cases CECT Mandible is of extremely useful. In one of the case in our study clinical suspicion of Ameloblastoma turned out to be Arteriovenous malformation on CECT Mandible. Before performing a biopsy or surgery in a radiographically suspected case of ameloblastoma or aneurysmal bone cyst, CT or MRI should be done to rule out the possibility of an AVM to avoid sudden massive hemorrhage from the lesion. Contrast-enhanced CT can be useful in assessing the AVMs.[4]

CONCLUSION

MDCT plays a pivotal role in making a precise diagnosis, grading it and then guiding treatment decisions being far superior to conventional radiography of mandible in all terms except the cost and when metal prosthesis induced artifacts. Availability of diffrent planes in MDCT aids accuracy in diagnosis of mandible lesions. Soft tissue extension is also accurately detected by CT Scan. CT Mandible may be useful for knowing occult lesions in the rest of mandible which cannot be detected by OPG or otherradiographs of mandible. Diagnosis of mandibular pathologies by MDCT correlates well with Biopsy diagnosis. CT often allows differentiation of benign lesions and cysts from malignant lesions; thus avoiding biopsy which usually is necessary to establish the final diagnosis.

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Source of Support: Nil; **Conflict of Interest:** None

Submitted: 03-03-2016; **Published online**: 03-04-2016