

Comparison of the Role of Conventional Radiograph with Dentascan in Evaluation of Jaw Tumours

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Abstract

Introduction: High cost, high patient dose and limited availability make CT imaging modality unsuitable for routine dentistry. Owing to the above points the present study was planned with the aim to compare the findings of Radiographs and Dental CT & compare the efficacy of dental CT with dental radiography in studying jaw tumours.

Materials and Method: Patients with provisional diagnosis of jaw lesions were included in the study. All the included patients were planned to undergo Conventional radiograph and Dental CT. Once the investigations were done the findings of both the procedures were compared and evaluated with the help of an expert. Total of 40 patients were included in the study.

Results: On radiographic evaluation 4 cases showed root resorption that was confirmed by CT evaluation. A kappa value of 50% with p value 0.03 indicates there is fair agreement between conventional radiograph and CT in relation to the adjacent tooth.

Discussion and Conclusion: Dental CT at every step has proved to be better than dental radiographs for jaw lesion because it clearly depicts the extent of the lesions. There is no requirement of magnification, superimposition of anatomical structures and geometric distortion. More over dental CT also reduces the artefact from dental fillings.

Keywords: Dentascan, Radiograph, Jaw Tumours

Introduction

Diagnostic imaging and technology helps to develop and implement a cohesive and comprehensive treatment plan for patients. Conventional dental imaging techniques like periapical radiographs and panoramic imaging are easy, economical imaging modality but lose the battle for its lack of perception in the third dimension.⁽¹⁾ Shortcomings of conventional dental imaging are overcome by three dimensional imaging like CT and MRI. The technique of dental CT, also called Dentascan, was developed by Schwarz et al. Maxilla and Mandible are the two complex bony structure present in the jaw. In the case of computed tomography there can be superimposition of dense teeth which might obscure underlying tissues.⁽²⁾ Dental CT is a dedicated post processing and image evaluation software for the teeth and the jaw which creates panoramic and paraxial views of the maxilla and mandible.⁽³⁾

CT has been considered to be reliable than conventional radiography with its spatial resolution. Dentascan is computed tomography which allows the maxilla and mandible to be seen in three planes that is cross sectional, panoramic and axial. In implant surgery it provides measurement of dental implants and comprehensive assessment of the bone morphology. In jaw lesions cases it provided detailed information about jaw tumour that included cortical margins, extent of lesion and involvement of structures. It helps in diagnosis of the lesion and also treatment planning of the lesions.⁽⁴⁾

For the diagnosis of the oral pathologies and also for the assessment of bone morphology in placement of implants Dentascan is used. In most of the cases most

of the pathologies are amenable to direct clinical examination.⁽⁵⁾

The primary purpose of imaging is to detect deep or submucosal extent and adjacent osseous involvement. Bony erosion is better characterized by multi-planar CT Unlike standard pantomography, there is no superimposition of other osseous structures in Dentascan. The image quality is sharp and clear, providing better tissue contrast resolution.

Dentascan is free of magnification and geometric distortion. Seeing the limits; Dentascan is considered more reliable than conventional radioaphy.^(6,7)

High cost, high patient dose and limited available aspect are some of the disadvantaged related to Dentascan which makes it unsuitable for routine purpose. Owing to the above points the present study was planned with the aim to compare the findings of Radiographs and Dental CT and check the efficacy of dental CT with dental radiography in jaw tumours.⁽⁸⁾

Materials and Method

The patients with provisional diagnosis of jaw lesions were included in the study. All the patients were to undergo the conventional radiograph & Dentascan. After the investigation were performed; findings of both the methods were compared and then evaluated. The comparison and evaluation was done with the experts in the field. CT scan was done with the help of Phillips – Brilliance multislice CT scanner. Dentascan software was used to do reconstructions. To confirm the diagnosis of the jaw lesions histopathological methodology was performed by histopathologist. All the data was collected at the end of the study period and was entered into SPSS 11.5 data sheet for evaluation.

Results

The study was planned at the medical institute, for the period of one year. Total of 40 patients with tumors of jaws were included.

In total 28 cases the relation of the tumour with the adjacent tooth was not visualized with help of conventional radiography. When this cases were evaluated on CT 18 cases did not showed any direct contact, 6 cases did showed direct contact and 4 cases showed resorption of the adjacent tooth with jaw lesions. Root resorption was seen in 4 cases diagnosed with tumor jaw. A Kappa value of 40% with p value 0.02 indicated that there existed fair agreement between CT and conventional radiography.

In respect to the relation of maxillary lesion with nasal floor, when the evaluation was done with the help of conventional radiograph out of the total 6 lesions none of them showed any correlation. However when the same evaluation as done with the help of CT, two of the tumour showed direct contact, four tumour did not showed any respect with nasal floor while encroachment was seen in patient with tumour. A kappa value of 14 indicates that there was no to slight agreement between conventional radiographs and dentascan in relation of tumour with nasal floor.

For the tumour in the posterior maxillary area; tumour relation with floor of the maxillary sinus was not found in 10. In dentascan 4 out of 10 cases did not show any contact and encroachment was seen in 6. Direct contact was seen in radiography in 2 cases and on CT it showed encroachments. A kappa value of 20% indicated only slight agreement between radiograph and CT.

Total 14 cases were found in the mandibular area. Out of the 14 cases; 10 cases did not showed any relation with mandibular canal on conventional radiography. On visualization with 14 cases 6 cases did not showed any contact on CT and two showed encroachment. No contact and encroachment diagnosed on radiography in 6 cases and was confirmed by CT. A kappa value of 45% was obtained which indicated only fair agreement between radiograph and CT.

Table 1: Spectrum of lesions

Sr. No.	Spectrum of lesions	Number
1.	Juvenile Ossifying Fibroma	6
2.	Ameloblastoma	28
3.	Cementoblastoma	4
4.	Pleomorphic adenoma	2
	Total	40

Discussion

To evaluate the extent of the jaw lesion and planning their surgical procedures Dentascan programme have been used successfully. Dental CT is a non invasive methodology that allows three dimensional measurements without superimposition of

anatomical structures.⁽⁹⁾ Dentascan does not exhibit magnification or distortion hence it is more reliable than projection radiography.

Conventional radiographs are a two dimensional imaging modality of a three dimensional structure. Hence, anatomy in the third dimension cannot be assessed on radiographs. Because pathology tends to lie one behind the other in buccolingual plane, they get superimposed onto each other on periapical panoramic radiographs and easily go undetected.⁽¹⁰⁾ Dental CT is reformatting software used along with spiral / helical CT and allows assessment in all three dimensions. It provides axial, panoramic, paraxial and 3rd volume rendering which helps in diagnosis purpose.⁽¹¹⁾

It is important to obtain accurate information about the width and height of jaw, to know about the vital structure location and exact position such as nasal floor, maxillary sinus lining and mandibular canal and mental foramen. It is also important to get information related to the lesion and margins of the jaw and root of the teeth.^(12,13)

In total 28 cases the relation of the tumour with the adjacent tooth was not visualized with help of conventional radiography. When this cases were evaluated on CT 18 cases did not showed any direct contact, 6 cases did showed direct contact and 4 cases showed resorption of the adjacent tooth with jaw lesions. Root resorption was seen in 4 cases diagnosed with tumor jaw. A Kappa value of 40% with p value 0.02 indicated that there existed fair agreement between CT and conventional radiography. This signifies that Dentascan was better than radiographs for the relation of jaw lesion with adjacent tooth whereas this could not be seen in the normal radiograph.

Due to no defect of super imposition and distortion dental CT was considered better than conventional radiograph to see the relationship of lesion with nasal floor. The reason is that superimposition is the defect found in the conventional radiographs.

The results obtained in our study are superior to the most recent studies that cast doubt on the ability of CT, this way favourable close to that in study done by Close et al. Any comparison of the radiation risk from CT with that from conventional panoramic radiography is problematic, but it would appear from the literature that clinician has to weigh these risks against the benefit in diagnostic yield in planning treatment. It is suggested that for routine cases where implants of suitable length can be inserted safely, panoramic radiographs are sufficiently accurate. But in cases where measured vertical height is inadequate and the option of inserting the implant lateral to inferior canal is considered (for mandible), CT scanning (Dentascan) serves the surgical team as comprehensive examination to achieve optimum results. The same considerations apply to implants located beneath the maxillary sinus.

Conclusions

The advantage of dental ct is that it eliminates the streak artifacts from amalgams or dental fillings in coronal ct scan. The Dentascan is multiplanar which has proved to be much better than dental radiographs to assess the jaw lesions. And there is no distortion or magnification seen in the Dentascan.

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