

Role of Dentscan V/S Radiography in the Evaluation of Tumours of the Jaw

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Abstract

Introduction: The Dental CT programs have been successfully used to evaluate tumours of the jaw and planning surgical procedures.

Aim: To compare efficacy of dental CT with dental radiography in studying jaw tumours.

Material and methods: We evaluated patients with jaw lesions undergoing both Radiography and Dental CT and then compared the findings of both the modalities.

Results: We obtained only fair agreement between radiographs and CT with respect to relation with the adjacent tooth & with the alveolar crest, no to slight agreement between radiographs and CT with respect to relation with the nasal floor & only slight agreement between radiographs and CT with respect to relation with the adjacent tooth.

Conclusion: Dental CT being a multiplanar modality has proved to be better than dental radiographs for assessing jaw bone lesions since it can clearly depict the actual extent of the lesion, without magnification, geometric distortion or superimposition of anatomical structures.

Key Words: Dentscan, Dental CT, Jaw lesions.

Introduction:

Radiography has been widely used for obtaining a comprehensive overview of the maxillofacial complex. The clinical use of Radiography is limited by the uncertainty regarding the actual dimensions of structures.¹ Dental CT is one of the most valuable modalities for assessment of jaw lesions because of the clear depiction of the soft and hard tissues without any superimposition of anatomical structures.²⁻⁴ Additionally, CT exhibits no magnification or geometric distortion. Within the limits of its spatial resolution, CT is considered more to be reliable than conventional projection radiography as a morphometric tool.⁵⁻⁸ Dental CT is able to display the jaw in three planes without any artifacts from dental amalgam or filling and can hence, provide detailed information about the jaw tumour including lesion extent, cortical margins and relation with and

involvement of surrounding structures. It not only helps in the treatment planning of the lesions, but also in diagnosis of the lesion and differentiation between benign and malignant. In our study, we intend to compare the findings of Radiographs and Dental CT and also establish the role of Dental CT in evaluation of patients with tumours of the jaw.

Aims and objectives:

To compare the efficacy of dental CT with dental radiography in studying jaw tumours.

Material and Methods:

We evaluated patients with jaw lesions undergoing both Radiography and Dental CT. The findings of both the modalities were compared. Dental radiography was performed in the Oral Medicine and Radiology Department - Orthopantomogram or Intraoral Periapical view. CT
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scan was done using Phillips - Brilliance multislice slice CT scanner. The reconstructions were performed at the Philips workstation using Dentascan software. The nature of the tumours were confirmed on histopathology. All the relevant data was entered into SPSS 11.5 data sheet for statistical calculation. Weighted Kappa values (which are a measure of observer agreement – overall measure of agreement that is corrected for agreement by chance) were calculated using the Stata 10 and SPSS 11.5 software. The statistical significance of the results was determined by using p value, generated by SPSS 11.5 software.

Observation and Results:

There were 20 patients with tumours of the jaw in our study.

Table No. 1

| Spectrum of lesions | Number of cases |
|----------------------------|-----------------|
| Ameloblastoma | 14 |
| Juvenile ossifying fibroma | 3 |
| Cementoblastoma | 2 |
| Pleomorphic adenoma | 1 |

The relation of the lesion with the adjacent tooth was not visualized on Radiograph in 14 cases, 9 of which showed no contact on CT, 3 showed direct contact and 2 showed resorption of the adjacent tooth. 2 of the cases showed resorption on Radiograph which was confirmed on CT. A kappa value of 35 % with p value 0.02 indicated only fair agreement between radiographs and CT with respect to relation with the adjacent tooth.

The relation of all 6 central maxillary lesions with the nasal floor could not be visualized on Radiograph – 2 of these showed no contact on CT, 1 showed direct contact and 3 showed encroachment. A kappa value of 0 indicated no to slight agreement between radiographs and CT with respect to relation with the nasal floor.

The relation of the lesion with the floor of the maxillary sinus was not visualized in 5 out of 7 cases.

2 of these 5 cases showed no contact on CT and 3 showed encroachment. 1 case showed direct contact on Radiograph which was found to be encroachment on CT. A kappa value of 17 % indicated only slight agreement between radiographs and CT with respect to relation with the adjacent tooth.

The relation of the lesion with the mandibular canal could not be visualized in 5 out of 7 cases. 3 of these showed no contact on CT and 1 showed encroachment. Rest of the 3 cases showed no contact and encroachment on Radiograph respectively which was confirmed on CT. A kappa value of 40 % was obtained which indicated only fair agreement between radiographs and CT with respect to relation with the adjacent tooth.

The relation with the alveolar crest was not visualized in 12 out of 20 cases on Radiograph, 7 of which showed erosion and 5 did not show erosion on CT. 4 cases which showed erosion on Radiograph also showed erosion on CT. A kappa value of 29 % with $p < 0.001$ indicated only fair agreement between radiographs and CT with respect to relation with the alveolar crest.

Discussion:

The Dental CT programs have been successfully used to evaluate tumours of the jaw and planning surgical procedures. Dental CT is an excellent new modality for viewing the jaw. It is also a new partnership between radiologists and dentists. The dental radiographs do not answer all the questions in the dentist's clinic and these answers are found in radiology departments with dental CT scans⁹.

In case of assessment of tumours of the jaw, it is very important to obtain accurate information about the height and width of the jaw, as well as information about the location of vital structures, such as the mandibular canal, nasal floor and maxillary sinuses and detailed information about internal anatomy and the relationship between lesions and the cortical margins and roots of the teeth.

In our study, the relation of the lesion with the adjacent tooth was not visualized on Radiograph in 14 cases. Two cases showed resorption on Radiograph which was confirmed on CT. We got a kappa value of

35 % with p value 0.02 indicating only fair agreement between radiographs and CT with respect to relation with the adjacent tooth. This implied that CT was significantly better than Radiographs in regards to relation of the lesion with the adjacent tooth. Plain

film Radiography could not detect the relation of the lesion with the adjacent tooth, whereas CT was found to be very precise for this purpose due to assessment done in multiple reformatted planes.

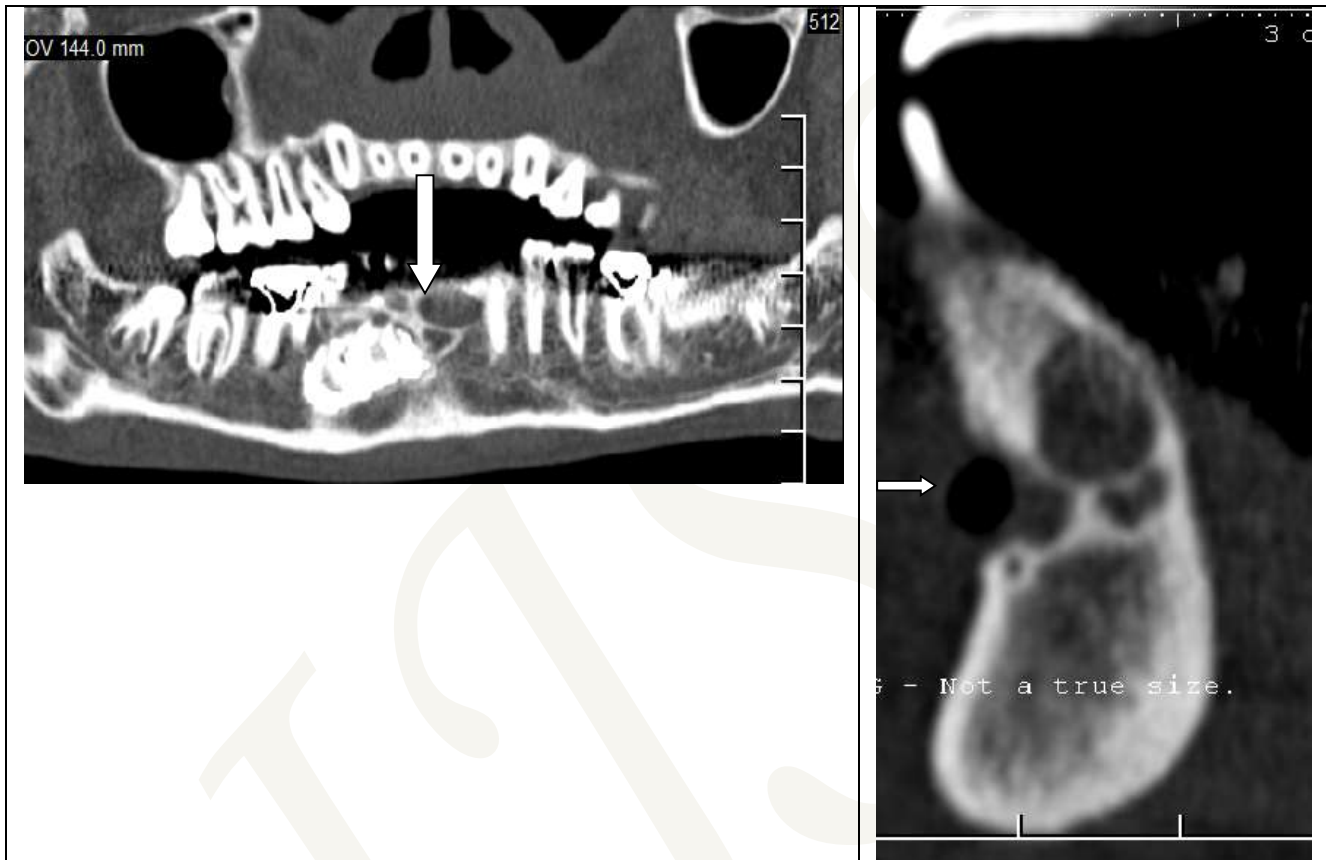


Figure 1. A case of ameloblastoma. 1a. Panoramic view Dental CT showing extent of lesion. Note that the artifacts from the Dental caps are seen to project over the crowns of teeth and away from the lesion (arrow)

Figure 1b. Cross sectional view Dental CT showing perforation of the buccal cortex (arrow)

The relation of all 6 central maxillary lesions with the nasal floor could not be visualized on Radiograph in our study. Dental CT was better than Radiograph in determining the relation of the lesions with the nasal floor as shown by a kappa value of 0 (slight agreement). The reason for this could be that superimposition of structures in Radiographs in maxillary teeth makes it difficult to see their relation with the nasal floor.

The relation of the lesion with the floor of the maxillary sinus was not visualized in 5 out of 7 cases. Dental CT was found to be considerably better than Radiographs for assessment of relation of the adjacent tooth as denoted by a kappa value of 17 % (only slight agreement between radiographs and CT).

The relation of the lesion with the mandibular canal could not be visualized in 5 out of 7 cases. A kappa value of 40 % was obtained which indicated

only fair agreement between radiographs and CT with respect to relation with the adjacent tooth.

The relation of the lesion with the alveolar crest was not visualized in 12 out of 20 cases on Radiograph. We thus concluded that Dental CT was far better than Radiographs in evaluating the relation of the lesion with the adjacent tooth as determined by a kappa value of 29 % with $p < 0.001$ (fair agreement). CT was able to give us information in three planes whereas Radiographs give a two dimensional view only.

Conclusion:

Dental CT being a multiplanar modality has proved to be better than dental radiographs for assessing jaw bone lesions since it can clearly depict the actual extent of the lesion, without magnification, geometric distortion or superimposition of anatomical structures. Another advantage of Dental CT is that it eliminates the streak artifact from dental fillings or amalgams in coronal CT scans. This is because the CT is acquired axially and then these axial images are then used for coronal, saggital, panoramic and cross sectional reconstructions. Hence, the artifacts are seen at the level of crowns of teeth. Thus Dental CT has become an indispensable tool for the evaluation of jaw tumours.

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