Transtomography or transography— an imaging technique in implant planning.

Lingam

Vishnu dental college, bhimavaram, Andhra pradesh, India

ABSTRACT

Aim: To illustrate the use of sectional tomography for implant planning using a metal ball as a radiographic guide and to evaluate the accuracy of transtomography. Materials and methods: By using recent panoramic radiographic unit, and following the parameters given by the manufacturer’s guidance manual we have assessed the available bone height and width in five cases for implant planning. Results: Comparing with the radiographic image and the actual size of the metallic ball, we could successfully estimate the bone height and plan accordingly in the above five cases. Conclusion: Panoramic radiography is a technique which is economically feasible in regular dental health care units and available in many developing countries. This modified technique in newer OPG machines can be helpful in evaluating the bone during implant planning.

1. Introduction

Dental implantology has experienced explosive growth in the recent years. The implants are placed in edentulous areas of the jaws, where morphology and amount of bone may vary depending on factors such as traumatic extraction, healing and the duration of edentulousness. Planning the implant treatment can be difficult and time consuming because the length, diameter and angulation of the implants are critical factors in successful treatment. The shape and height of the alveolar ridge and its angulation are important anatomical factors that must be carefully considered before implant treatment. [1-3] Anatomical landmarks such as the mandibular canal and the floor of the maxillary sinus must also be accurately located before considering dental implant placement. Long lasting and highly aesthetic treatment results need appropriate clinical examination and a thorough radiological survey.

Radiography offers the sole method of noninvasive analysis of bone required for implant placement. Many types of radiographic imaging are recommended for treatment planning for implants, such as panoramic, periapical and occlusal radiographs, conventional tomography and computed tomography (CT) and the latest being 3-D CT.[4,5].

The conventional mode of radiographic imaging gives us two-dimensional image and does not provide information regarding the thickness of the bone available.

Sectional tomography is a specialized radiographic projection technique that gives a layered image of the bone, perpendicular to the dental arch. Thus helps in visualizing the thickness of the available bone.

This can be attained by using the regular OPG machine by modifying certain parameters during the patient positioning and exposure.

2. Materials and Method

Step 1: Patient education.
Step 2: Making impression of edentulous area.[figure-1]
Step 3: Identification of implant placement area.
Step 4: Aligning the impression on the positioning device. [Figure 2].
Step 5: Adjusting the OPG parameters.
Step 6: Patient positioning on the OPG machine[figure 9]
Step 7: Radiation exposure.

Keywords:
Orthopantomography (OPG)
Sectional tomography
Implant
CT (computed tomography)
3. Results:

ADB = ABH

RDB  RBH whereby

Thus: ADB x RBH = ABH

RDB

ADB = Actual diameter of metal ball [which is known to be 5mm].

RDB = Diameter of metal ball on radiograph [OPG or periapical].

ABH = Actual bone height available for implantation [vertical distance between alveolar crest and opposing landmark].

RBH = Bone height available for implantation as measured from the radiograph.

Comparing with the radiographic image and the actual size of the metallic ball, we could successfully estimate the bone height and plan accordingly in the above five cases. This procedure could help the implant planning in an accurate way. After the implant placement we could check the optimum height measured from the implant to the other vital structures. [figure 10, 11, 12]

3. Discussion:

Comparing with the radiographic image and the actual size of the metallic ball, we could successfully estimate the bone height and plan accordingly in the above five cases. This procedure could help the implant planning in an accurate way. After the implant placement we could check the optimum height measured from the implant to the other vital structures. [figure 10, 11, 12]

Treatment planning for implants includes a radiographic examination that provides information about the location of anatomical structures, the quality and quantity of available bone, the presence of bone lesions, the occlusal pattern, and the number and size of implants, as well as prosthesis design, all of which are essential for successful implant treatment. Radiography has taken different phases in the evolutionary path. One of them is the sectional tomography of maxilla and mandible for bone assessment to place an implant using OPG machine. This technique also helps in assessing the position of deep seated bony lesions like odontomes, impacted teeth, variations in mandibular canal etc. Instead of prescribing CT for the assessment of bone to place an implant, practicing this technique will be more useful in dental clinics in a country like India, where this technique is more economical and patient exposure is less when compared to CT. [11-13]

Sakalura & et al in their study confirmed that approximately 63.8% of the dentists prescribed only panoramic radiography for dental implant assessment and 28.9% ordered panoramic radiography plus periapical radiography and/or conventional tomography and/or computed tomography [CT]. Only 7.2% of the dentists ordered conventional tomography or CT as a single examination, although 10.1% ordered it in combination with other imaging modalities. The main reasons given for prescribing panoramic radiography were broad coverage and cost [86.4%]. [16]
In a study conducted by Christian Frei, Daniel Buser & Karl Dula among 50 patients undergoing implant surgery at 77 edentulous areas observed the preoperative OPG and spiral CT images with the post operative OPG & concluded that panoramic radiograph alone suffices the requirement to come to an appropriate treatment planning without the necessity of other sophisticated imaging modalities in standard implant cases that is the first & second premolar and molar areas. [10] Welander et al described how advanced panoramic machines that combine a translational movement with a pendular movement of the beam and detector make direct digital transtomographic images that can be utilized for the same purposes as conventional tomography[6] Modern tomograms can give good accuracy but care has to be taken in interpretation of the images. Blurring has been noted in the posterior maxilla and posterior mandible, due to overlying bony structures (Bou Serhal et al. 2000)[14.,15]

Although several image diagnostic methods are available to evaluate proposed sites for implants, currently not a single technique is considered ideal for pre- and postoperative analyses. Studies suggest a combination of various techniques to obtain reliable information.[17,18]

5. Conclusion

However, when weighing risk and cost against the benefit, excessive utilization of newer techniques should be avoided, especially when conventional methods are similarly efficient and adequate. [18] OPG machine being easily available this modified technique in newer OPG machines can be helpful in evaluating the bone during implant planning.

6. References