

# Cone Beam Computed Tomography: A Useful Tool in Diagnosis of Bone Island and Implant Insertion Guidance

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## Abstract

The aim of this paper is to make surgeons aware of the use of cone beam computed tomography (CBCT) within the field of implantology. The paper describes one case illustrating the improved diagnostic yield using CBCT over conventional radiography thus facilitating the appropriate insertion guidance of implants.

**Keywords:** Cone beam CT; Implants; Insertion; Imaging; Guidance

## Introduction

Cone beam computed tomography (CBCT) has been used in dentistry since the mid 1990s. As the name implies, it uses a cone shaped X-ray beam which rotates around the patient to acquire a volumetric data set of the region of interest with a single rotation of the patient. The CBCT volumetric data set comprises a three-dimensional (3D) block of cuboid structures known as voxels, where each voxel represents a specific degree of X-ray beam absorption. Image reconstruction is achieved using computer algorithms ultimately producing 3D images at high resolution. The main advantage of CBCT is that the radiation dosage is considerably less than conventional CT scanning. In addition with most units the patient is scanned in the upright position, and so there is less distortion of the soft tissues in comparison to conventional CT where the patient is supine. This is particularly useful if the facial soft tissues are reconstructed. The literature is replete in clinical applications of CBCT within the oral medicine specialty the clinical applications include imaging of impacted teeth and dental abnormalities, assessment of alveolar bone heights and bone volume, investigation of the temporomandibular joint and so on. The use of CBCT in the field of endodontics has also been described as it is useful for diagnosing canal morphology, assessing root and alveolar fractures, analysis of resorptive lesions and identification of pathology.

This paper reports on one case where conventional radiographs suggested the need for a CBCT which yielded additional diagnostic information to allow the clinician to make the diagnosis and to guide the implant insertion process. In this case, CBCT imaging was carried out using the Kodark 9000C-3D (Imaging Sciences International, Hatfield, PA, USA). The data was then exported into Simplant (Materialise, Leuven, Belgium) to carry out the 3D reconstructions. The exporting of data and 3D construction of images takes additional time and resources.

## Clinical Case

### General condition

A 48 years old Female patient was referred to the Oral & Maxillofacial department by her local general dental practitioner regarding the right mandible tumor, which exists since her childhood, but without any symptoms and uncomforted. Recently, she worries about the tumor, and want to have a diagnosis. The patient presented a hard mass with a clear boundary in the right mandible premolar region and the premolars are slightly oblique. The patient hasn't any other uncomforted feeling.

A panoramic radiograph showed the a mass in the right mandible premolar area, according to the characteristic of the X-ray film, the diagnosis of odontoma or complex odontoma was made, further examination and treatment were required and moreover the panoramic presented a dense sclerosis lesion near the mental foramen, with a diameter of 1.5cm in the left mandible, and there isn't any Periosteal reaction surrounding this dense sclerosis lesion (Figure 1).

CBCT ( Kodark 9000C - 3D ) scan was taken around the dense sclerosis lesion near the mental foramen in the left mandible premolar area. CBCT showed a high-density lesion, a homogeneously dense sclerotic focus in the cancellous bone, similar to the surrounding cortical bone, prominent inward from the from the lateral cortical, with the diameter of 1.5cm, the semi-circular shape, clear boundary (Figure 2).

## Discussion

Bone Island, bone spot, also known as enotosis, is of different patterns of cortical bone nodules within the cancellous bone [1]. This benign lesion is probably congenital or developmental in origin and



**Figure 1:** The panoramic radiograph showed a dense sclerosis lesion near the mental foramen, with a diameter of 1.5cm in the left mandible.

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