

## Dental Health 2019- UTILITY OF TOMOGRAPHY IN MAXILLO-FACIAL RADIOLOGY- VSPM Dental College

**Anuraag B. Choudhary BDS. MDS, Associate Professor**

Department of Oral Medicine & Radiology, VSPM Dental College, Nagpur Maharashtra, India

Imaging is an important diagnostic adjunct to the clinical assessment of the dental patient. The currently used imaging modalities include intra-oral radiographs, panoramic radiographs, magnetic resonance imaging (MRI), computed tomography (CT) including cone-beam (CB) CT, ultrasonography (US), and nuclear medicine including positron

Emission tomography (PET). The introduction of panoramic radiography in the 1960's and its widespread adoption throughout the 1970's and 80's heralded major progress in dental radiology - providing clinicians with a single comprehensive image of both jaws and maxillofacial structures. However both intraoral and extraoral procedures, used individually or in combination, suffer from the same inherent limitations of all planar two dimensional (2D) projections - magnification, distortion, superimposition and misrepresentation of structures. The cone-beam technique (CBCT or DVT) is the most recent advance in computer-assisted tomography. Initial studies using phantom have confirmed a geometric accuracy of up to tenths of millimeters. Advanced cross-sectional imaging techniques are used in dento-maxillofacial imaging to solve complex diagnostic and treatment-planning problems, such as those encountered in craniofacial fractures, endosseous dental-implant planning, and orthodontics, among others. With the advent of Cone Beam Computed Tomography (CBCT) technology, cross-sectional imaging that had previously been outsourced to medical CT scanners has begun to take place in dental offices. CBCT or Digital volume tomography is a novel technique for maxillofacial imaging at a lower radiation dose and lower

cost than CT. The introduction of CBCT specifically dedicated to imaging the maxillofacial region heralds a true paradigm shift. The unprecedented interest in CBCT from all fields of dentistry is because it has created a revolution in maxillofacial imaging - facilitating the transition of dental imaging from 2D to 3D images and expanding the role of imaging from diagnosis to image guidance of operative and surgical procedures via third party applications software. The purpose of this paper is to provide an overview of this CBCT technology and review its capabilities with specific applications in clinical practice.

To assess the diagnostic quality of images generated using the newly developed digital volume tomography (DVT) system and comparing them with conventional images from patients with maxillofacial trauma. The study population included 22 male patients aged 18 to 60 years with a history of maxillofacial trauma. Each patient had undergone conventional radiographic and DVT examinations to analyze the number of fracture lines in the jaws and to compare the images for their diagnostic quality by an oral radiologist and a general radiologist using the  $\chi^2$  test. A statistically significant difference was found between the number of fracture lines evaluated on the conventional radiographs and on DVT, especially for condylar head (7) and the midface (4.41 to 4.57), zygomaticomaxillary complex and Le Fort fractures, respectively. The detection of fracture lines and visualization within the mandibular-maxillary area using DVT was superior to using conventional radiographs.

**Background and aims:** Considering nowadays trend among dentists to install a radiology laboratory be-

side their current practice, we proposed to investigate the aspect of financial efficiency related to such investment. **Methods:**We evaluate two existing options: simple investment, consisting of intra-oral equipment and accessories, or investment in a radiology center that includes panoramic and CBCT equipment. The initial investment includes equipment acquisition, fitting out of the location, radiology accreditation and other miscellaneous expenses. Costs were estimated based on current quotations on the specific market available in Romania. We also described a financial model to estimate the financial risk. **Results:**The analysis was made under the assumptions that the laboratory is operated by the dentist who made the investment in the form of a legal person and paying corporate tax like all Romanian entities. The analysis took into account current fees for different types of X-rays, usual expenses of such a laboratory, and describes the approach to this analysis, starting with the initial investment estima-

tion and forecast of revenues and expenses. Based on these projections and assessment of the working capital, we have built the cash flows forecast. Following a risk analysis we could assess the financial efficiency of the two investment alternatives. **Conclusions:**Our study reveals that the radiology center represents a more profitable investment due to the higher economic return rate.

Computed tomography (CT) and magnetic resonance imaging (MRI) were introduced in the 1970s and 1980s and have since become the mainstay of cross-sectional imaging of the human body. With the advent of multislice scanners, which increase resolution and decrease scan time, CT technology has been especially important in changing the landscape of oral and maxillofacial imaging. MRI, with its ability to delineate marrow and soft tissue pathology, especially with the use of gadolinium contrast material, is often complementary to CT. MRI is also vital in the imaging of the temporomandibular joint (TMJ).