CONE BEAM COMPUTED TOMOGRAPHY
VERSUS
DIGITAL RADIOGRAPHY
IN ASSESSMENT OF
IMPACTED WISDOM TEETH

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By

Dalia Ali Hussein

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Faculty of Oral and Dental Medicine

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Supervisors

Dr. Hoda Abd El Kader Saleh

Professor of Oral Radiology Department

Faculty of Oral and Dental Medicine

Cairo University

Dr.Sherouk Hassan Ali Khalifa

Lecturer, Oral Radiology Department

Faculty of Oral and Dental Medicine

Cairo University

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بِسْمِ اللهِ الرَّحْمنِ الرَّحِيمِ

وَقُلْ رَبِّ زِدْنِي عِلْمًا

الآية رقم [١١٤] من سورة طه

Table of Contents

List of Tables

List of Figures

List of Abbreviations

Abbreviation	Content
2D	Two Dimensional
3D	Three Dimensional
CBCT	Cone-Beam Computed Tomography
CCD(s)	Charge-coupled Device(s)
CMOS-APS	Complementary Metal Oxide Semiconductor Active Pixel Sensor
CT	Computed Tomography
FOV(s)	Field Of View(s)
IAN	Inferior Alveolar Nerve
IIT/CCD	Image Intensifier Tube/Charge-Coupled Device
Lin	Lingual
M(s)	Molar(s)
MDCT	Multi-detector Computed Tomography
MIP	Maximum Intensity Projection
MPR	Multi-planar Reconstruction
OMS	Oral and Maxillofacial Surgeons
PA	Postero-anterior
PSP	Phosphor Storage Plate
ROI	Region Of Interest
SPSS	Statistical Package for The Social Sciences
TMJ	Tempro Mandibular Joint

Introduction

Introduction

The history of wisdom teeth problems is probably as old as the history of mankind. The term "impacted tooth" refers to a dental disorder that involves failure of a tooth to emerge through the gums. An impacted tooth remains embedded in soft gingival (gum) tissue or bone beyond its normal eruption time. Dental impaction has been reported to affect as much as 25-50% of the population. Any tooth can be impacted; however, the principal teeth that present impactions are third molars and maxillary canines[1, 2, 62].

Surgical removal of wisdom teeth is common due to different causes including unrestorable caries, non-treatable pulpal and/or periapical pathology, cellulitis, abscess ,osteomyelitis, internal/external resorption of the tooth or adjacent teeth, fracture of tooth, disease of follicle including cyst/tumor, tooth/teeth impeding surgery or reconstructive jaw surgery, and when a tooth is involved in or within the field of tumor resection[4].

The surgical procedure is straight forward with little or no risk for damage to the surrounding structures. In cases which have intimate relationship between their roots and the mandibular canal or the lingual bone plate, permanent or temporary damage to the lingual or inferior alveolar nerve may occur with temporary or permanent paresthesia of the affected side of the lower lip[63, 64-66].

Regarding maxillary third molars little structures are critical to surgical success as the maxillary sinus. Understanding of the maxillary third molar anatomy, including its location, circumscribed bone is also essential for extraction because the method of approach and risk of sinus perforation should be adequately determined before extraction. In addition understanding the anatomy in the interpretation of odontogenic infection pathways is important. That is why an accurate radiographic diagnosis is necessary to estimate the risk involved with an anticipated extraction[3, 6].

The intent of radiographic imaging is to provide an intraosseous view of related structures. The location and position to other structures such as the mandibular canal, adjacent teeth, sinus walls, and cortical borders are Important for assessing the treatment complexity, prior to extracting impacted

third molars. In addition, the assessment determines the presence or absence of pathologic conditions and can be beneficial for predicting treatment outcomes[7].

Failure to adequately determine these relationships leaves both the dental surgeon and the patient uninformed of the associated risks, a situation which is well documented by a variety of undesirable treatment outcomes such as nerve damage, bleeding, sinus perforations, and jaw or tooth fractures[8].

The localization of impacted teeth can be confirmed radiographically using a combination of perpendicular or near perpendicular projected images like occlusal, periapical, or panoramic radiographs. Alternatively, pairs of images taken with known different perspective can be used for localization using the parallax technique[2].

While panoramic imaging has been a great benefit to the dental profession, it still has some significant limitations. Some of these are associated with all film-based systems and include chemical processing and related quality assurance problems. In addition, panoramic radiographs are susceptible to degradation by errors in patient positioning. Digital imaging has proved to be a significant advance for intra-oral radiography. Many of the quality assurance problems associated with film processing have been eliminated. In addition, use of various types of enhancements may allow digital images to exceed the diagnostic performance of film[10].

Digital technologies add more benefits, to conventional panoramic radiography by eliminating errors associated with processing and providing an opportunity for the use of digital enhancement. Digital panoramic radiography also promises a decrease in radiation exposure as they require a lower dose for image formation.

Because of the limitations associated with the use of a two-dimensional image, three-dimensional information with the aid of cone beam computed tomography (CBCT) or low-dose computed tomography (CT) has been used by some clinicians[2, 10].

Cone-beam computed tomography (CBCT) is a very useful tool in the assessment of impacted teeth and is being widely used instead of or in addition to conventional techniques. Its main advantages include: more detailed visualization of the region where surgery will take place, when compared with

other conventional types of radiographs, and reduced patient exposure to radiation in comparison with helical computed tomography. With CBCT, the impacted tooth can be seen in multi-planar views (Multi-planar Reconstruction – MPR). This makes it possible to obtain the precise location of the tooth and to establish the relations between it and adjacent structures[86-88].

Inspite of the extended applications of CBCT in the various fields of dentistry little work was done to evaluate the reliability of this modality in assessment of impacted wisdom teeth in comparison with digital radiography.