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X-Ray and its application in dentistry

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Abstract
In this article, we review the role of x-rays in the field of dentistry and the most important applications necessary for it in detecting oral and dental diseases, in order to assess the pathological condition suffered by the patient who visits the specialist dentist. It has become normal to conduct x-rays of the teeth periodically or annually for children and adults, since the dentist needs these rays in order to diagnose the type of diseases that the patient suffers from, or because he wants to follow up a specific problem in the teeth and the extent of its development, or in order to identify The results achieved after taking the treatment by the patient. If the patient recently suffers from a specific problem in his teeth, he must most likely undergo a dental x-ray so that the dentist can obtain a complete and clear picture showing what kind of defect occurred in the teeth. Therefore, the dentist will determine whether the teeth can be treated with a specific medication or repaired using a temporary or permanent filling, or both, or if necessary, the tooth must be extracted after exhausting all the solutions to repair and preserve it.

Keywords: *Rhododendron arboreum*, *R. campanulatum*, Jack bean urease, leaf extract, inhibition

Introduction

Teeth are considered like any organ or any part of the human body. They need a set of tests, including x-rays, in order to identify the type of problem that the tooth is exposed to, which consequently affects the health and safety of the teeth. Through our article on dental x-rays, we will learn about the importance and applications of x-rays in this field. Radiographs are performed by emitting beams of x-rays that penetrate the oral region at certain levels and rest on the film or radiological sensors used. Through radiographs, the teeth to be detected appear in a light color to them and the tissues surrounding them, and in the event of any cavities or defects represented by tooth decay, it will appear in the images in a different and distinctive color due to the low density of that substance. X-ray used for dental radio-graphic image, and object detective models represented by the identifying of dental disease purposes [1, 2], bone losing [3, 4], missing teeth [5], and teeth enumeration. Dental x-rays are defined as the pictures that are taken of the teeth and used by the dentist in order to assess the health condition of the jaw, teeth and gums, and for the mouth in general. X-rays are used with a small amount of radiation that can take pictures from inside the mouth to detect any defect in the teeth and gums. X-ray image processing techniques have many vital roles on digital radiographic of teeth images for digital acquiring, manipulating, storage, retrieving and exchanging the information's of radiography [6]. The need for x-ray examination of children's teeth is often more than the need for adults, since the dentist may need to constantly monitor the growth of children's teeth. These x-rays can also help the dentist diagnose and identify the problem in the child's teeth. When there are complications, the tooth must be extracted, such as the growth of additional teeth behind the children's original teeth. These tips are important in order to ensure good dental health, and therefore good health in general, because dental health and safety are strong evidence of the safety of all vital organs in the body, so dental cleaning is necessary, as well as a periodic visit to the dentist.

The discovery of X-rays

X-rays were discovered long ago by the German scientist Röntgen in 1895, and since that time these rays have taken an important role in various medical fields, and they have become used a lot in diagnosing various diseases, and they have also become used in treating a number of diseases such as cancers. X-ray imaging shows an image of the teeth, jawbones, periodontal tissues and surrounding structures, as well as an accurate diagnosis of dental, oral and jaw problems. Through X-ray imaging, it is possible to show cavities formed in the teeth due to a certain defect, tumors, and hidden teeth such as wisdom teeth, as well as bone loss that cannot be noticed by visual and clinical examination. The X-ray image is made by firing a beam of rays that penetrates the oral structure and jaws at different levels, and then settles on the film or on the radial sensors. In these x-rays, the appearance of the teeth in a light color is due to their reluctance to penetrate those rays, in addition to the presence of cavities or cavities in the teeth, which appears in the images in different dark colors as a result of the low density of that substance. Given the difficulty of approaching the surfaces of the teeth and photographing them directly, therefore, caries lesions in these surfaces are diagnosed by radiographic images [7].

The important tips in photographing teeth by x-ray

- Depending on the patient's age and general health, a decision can be made to perform dental X-rays every one to two years, or according to the patient's condition.
- Ensure adherence to and adherence to dental examination appointments.
- The case should be presented to the dentist early when facing any pain or any other developments in the mouth and teeth.

Preparing for a dental x-ray

It should be known that conducting a dental X-ray does not require any prior special preparations, but the only thing that must be done is the need to clean the teeth well before the imaging takes place, which helps to create the appropriate healthy environment that helps the doctor to deal with the mouth and teeth. In the dental clinic, the patient sits on a chair, and sometimes there is a bulletproof shield placed on the chest and abdomen area, then the x-ray machine is placed sideways to take pictures of the mouth and teeth, while some dental clinics contain a separate specialized room dedicated to perform dental X-rays. The dental x-ray images are ready and present immediately at the same moment, and this is what happens in the case of using digital x-rays. The dentist immediately reviews them and makes sure after verifying the presence or absence of deformities in the teeth or jaw bones or not. After that, the dentist reviews the result of the x-rays to the patient so that he knows what kind of problem he suffers from in the teeth or jaw, and what are the necessary suggestions for treatment that are appropriate to the case, especially if a major problem was detected by the doctor during the x-rays, such as tooth decay or Presence of tumors in the oral tissue. There are a limited number of research studies that have reported extracting a single tooth from panoramic images using multiple methods, such as micro-learning [8] or evolutionary algorithms [8].

Dental X-ray imaging and case diagnosis

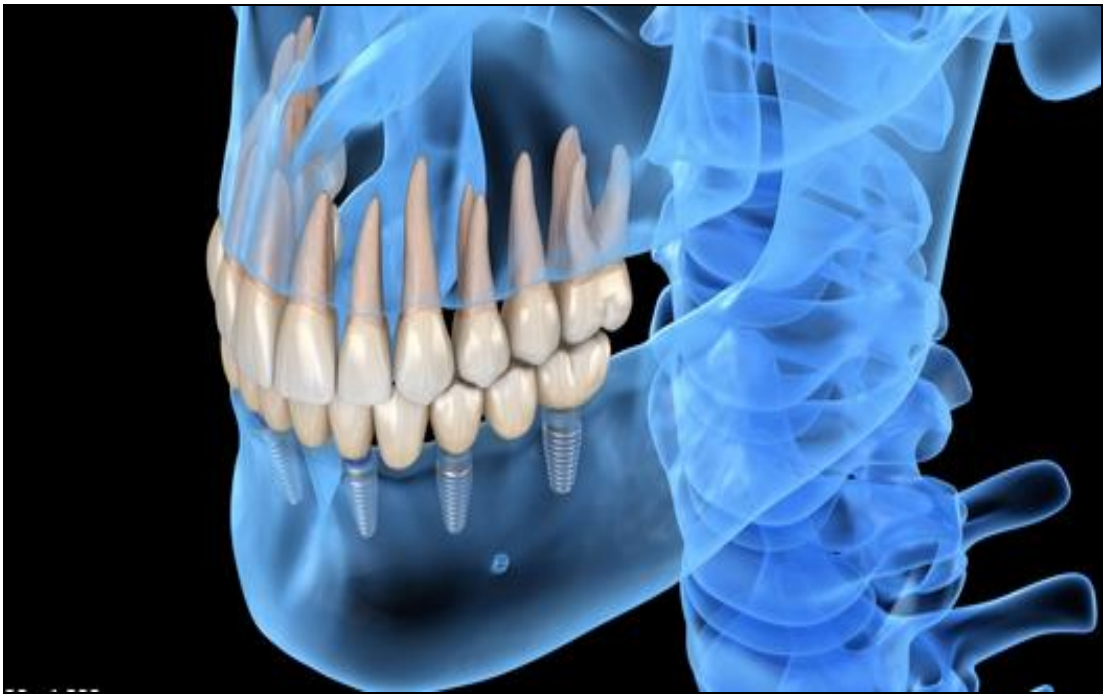
X-rays are an important method for diagnosing the condition in the various branches of dentistry, as it helps the dentist to discover various types of diseases and the situation in relation to the accurate diagnosis of the condition. As previous studies, bitewing x-ray has been proven to be an active method for detect of proximal caries, and difficult hidden [10], as shown in figure no. 1, A and B. Thus, this helps the dentist to develop the appropriate treatment plan for the patient. X-rays detect the following:

- The presence of necrosis in the tooth.
- Detection of bone condition and density.
- Lesions that are generated in the roots of the teeth and the presence of cysts.
- The shape and direction of the roots of the teeth, this helps the dentist in the process of tooth extraction, especially the extraction of the wisdom tooth.
- The situation in which the upper and lower jaws are located and their relationship to the upper and lower teeth, which helps in developing the appropriate treatment plan for cases that require orthodontics.
- The position of the jaw joint and the most important strange cases that affect it.
- Conditions of deciduous and permanent teeth and their development.
- The relationship between the roots of the posterior maxillary teeth and the paranasal sinuses.
- Check whether there are impacted teeth and how to place them.
- Detecting the presence or absence of cancerous diseases, and jaw fractures.
- Giving a full picture of all dental treatments that took place in previous periods, such as fillings, nerve treatment, and others.

Fig 1: to show proximal caries, and difficult hidden caries

Modern imaging methods for computer x-rays

As a result of the recent development, a new device appeared in the CT scan of the teeth and jaws, as this device, through the computer, shows semi-real images of the teeth and jaws through which the doctor can see the teeth and jaws. The jaws clearly have multiple angles depending on a special computer program, and with this program the dentist can accurately measure the distances between any two points in the bone, as well as the possibility of rotating the skull imaging using the tomography device through which the dentist takes a three-dimensional image of the teeth and The mouth, and the computer also gives a clear picture of the bone in which the implant is to be placed, and the computer also determines the real location of the implant and the position designated for more than one implant, and it is also possible to determine the depth to which the customized implant must reach without reaching sensitive areas such as nerves the sinuses and blood channels, and this type of surgery is characterized by the fact that it causes little pain compared to the traditional method. x-ray used in many branches of dentistry such as the placement of implants, orthodontics treatment planning, grafting, development the tempro-mandibular joint, detection of anatomic variation, evaluation of trauma patients, and caries [11], as shown in in figure no. 2 (A, and B) below:



A

B

Fig 2: To show modern imaging methods for computer x-rays **(**A, and B):

How to take a dental x-ray image?

Taking x-rays of the teeth is the well-known, common and basic method for examining and diagnosing the case that the patient suffers from in the dental clinic, since the structural structure of the teeth and their biological composition allow this technology, as through the application and use of x-rays he can diagnose various pathological conditions. Obtaining clear images of the teeth through x-rays is done by passing the x-rays through the tooth to be examined and photographing it clearly on the imaging tape or the digital sensor located on the other side. There are some minor differences between the digital and analog imaging method, and these differences are represented by the accuracy, skill, and intensity of the x-rays that require its operation, as shown in figure no. 3, below:

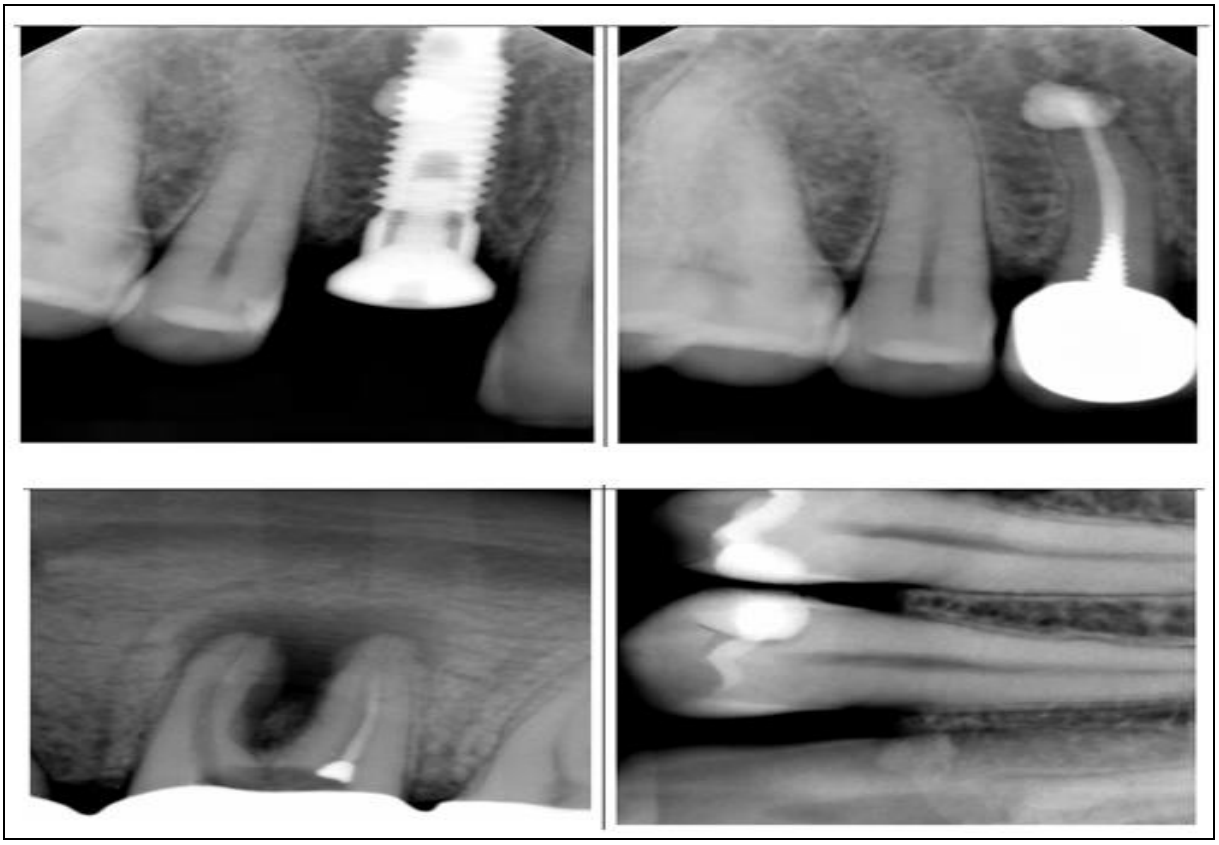


Fig 3: It represents a number of dental images taken for different cases

What do the x-rays used in dentistry show?

X-rays help the dentist to clarify many problems that lead to defects in the jaw and teeth, and enable him to detect and accurately diagnose in order to provide the appropriate drug in treatment. The x-ray highly used for detected of caries types, and assessment of bone loss in periodontics [12]. Among the most important problems that are illustrated by x-rays in the diagnosis of the condition in adult teeth are the following:

1. Lateral caries that is located between the teeth, which is difficult to see with normal examination and diagnosis.
2. Tooth decay that is generated under fillings, which is not visible to the eye, can only be diagnosed by X-ray.
3. When there is weakness of the jaw bones.
4. When changes occur in the bones or the roots of the teeth due to the presence of a certain infection.
5. In cases of preparation for dental implants, or the installation of an orthodontic device.
6. An abscess associated with inflammation that appears at the end of the tooth roots, or in the area between the teeth and gums.
7. When some tumors or cysts appear in the jaws, or in the tissue surrounding the teeth.

The most prominent types of x-rays used in dentistry

There are many techniques that used x-rays for the detection of teeth defect, such as radiographic copying processes for recording images [13].

1. Periodical dental x-rays

They are small in size (3 x 4 cm), so that approximately three or four teeth appear in their imaging, as shown in figure no. 4 below:

Fig 4: to show a Periodical dental x-ray:

2. Occlusal X-rays

These are the X-rays that are larger in size than the aforementioned type, and show the shape of the teeth and all the surrounding tissues, as well as the image of the entire jaws (upper and lower), as shown in figure no. 5 below:

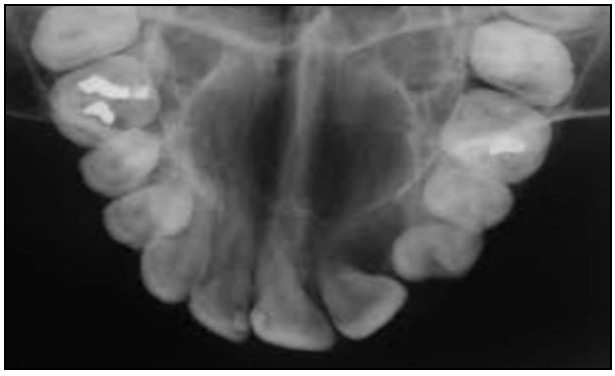


Fig 5: to show an occlusal X-rays

3. Panoramic X-ray

It is the X-ray that shows the condition of the teeth with the surrounding tissues in the area that includes the jaws (upper and lower) completely, as well as the temporo-mandibular joint with the sinuses.

Risks of dental x-rays

It is known to everyone that dental x-rays depend on sending waves of radiation to the jaws and teeth, and that these radiation levels are very low, so they are considered very safe for children and adults, especially since the dentist uses digital x-rays of the teeth, knowing The risks of exposure to digital radiation waves are less than other types. Among the most important risks of this x-ray are the following:

1. This radiation used is not considered safe for fetuses, and may cause many risks leading to fetal deformities, so pregnant women or those who think they are pregnant should avoid exposure to all types of x-rays.
2. These X-rays can cause damage to cells and tissues around the teeth and gums, especially when exposed to them continuously by the patient.
3. Also, the dentist must avoid continuous exposure to these rays of all different types, and the doctor must be at a distance when conducting the imaging.

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