RESEARCH ARTICLE

A Comparative Study Between Some Cases of Dental Caries Diagnosed with X-rays, and Histological Method

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ABSTRACT

Our current research includes a comparative diagnostic study in some cases of different dental caries and knowledge of their causes and the extent to which tooth tissue is affected by caries. This was done based on realistic experiences based on applied scientific and preventive bases, through which patients can treat various cases of tooth decay, after examining the cases of injury and the type of tooth injury using X-rays for this purpose. The cases highlighted are: (Bitewing, interproximal caries, Inflammatory resorption of the root apex induced by periapical periodontitis, Hypercementosis due to apical inflammation, and Sclerosing osteitis, a focal zone of sclerosis associated with periapical inflammation from a non-vital lower first molar.). Some cases have been treated with medical treatment methods, getting rid of the disease, and repairing the tooth either by using the filling or other methods and cases that cannot be treated or repaired, so the dentist is forced to extract the tooth in cases after reaching the appropriate solution in the treatment, in addition to photographing the clips. The histopathology of the affected tooth after its extraction gives a clear picture of the nature of the injury and how the tooth tissue has eroded.

Keyword: Dental caries, Histological sections, X-ray.

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INTRODUCTION

Tooth decay is defined as the disease that damages dental structures, and this leads to what is usually known as tooth decay, or dental cavities, and thus the formation of holes in the teeth. This damage primarily affects the hard tissues of the teeth: the enamel layer, the dentin layer, and the cement layer. With continued destruction, the tissue begins to collapse, and this may eventually lead to holes in the teeth. If this decay is left untreated, this histological disease can lead to strong pain and tooth loss and infection, and in certain cases, this disease may lead to death. Although tooth decay is a disease that has existed in society since ancient times, however, its incidence rate is very low in the periods of the ancient stone age and the intermediate stone age, due to its association with nutritional changes. Even at present time, tooth decay is still one of the most serious and most dangerous diseases common all over the world. Tooth decay is also one of the most common chronic diseases in the world.[1] For this reason, it is very difficult to make an early diagnosis of primary decay by a dentist. Visual observation and radiographic examination are the two most common cofactors in routine clinical practice to detect dental caries lesions.[2,3]

The detection of carious lesions is not simple, especially if the healthy tooth tissue obscures the lesions[7] To validate such methods, a systematic comparison with a universally accepted measure is required. Histological sectioning, be it hemisection or serial sections, is widely used as an in vitro validation method for caries detection. However, histological preparation is a cumbersome and labor-intensive technique that leads to irreversible sample loss. Moreover, samples can be damaged by fracture or chipping of dental hard tissues, while the saw cut can incur irreversible destruction or obfuscation of small lesions. Furthermore, histological sections of teeth affected with caries preferably show changes in translucency and color, but do not reveal actual mineral loss.[1] This requires trained and experienced observers to reach consistency in determining the delimitation of a carious lesion.

Diagnostic Methods with X-ray

Patients are advised to perform dental radiological examinations to serve as an aid to diagnosis by a specialized dentist, and that is the best way to know the accuracy of dental caries. And that these instructions aim to prepare the patient to prepare for the diagnosis of caries in his teeth by X-rays are among the skills of the doctor in practicing the profession since the

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dentist, in this case, is in the best position in the diagnosis and give the judgment to the patient.[8] The concept of radiological justification has been described as the effective use of X-rays in the field of dental practice well in the guidelines in the world,[9] specifically in the guidelines of the (American, and European Dental Association).[10]

These guidelines fundamentally proposition that:

1. The X-ray examinations must give reasons for on an individual patient foundation by demonstrate that; the benefits to the patients outweigh the detriment of potential.
2. The anticipated benefits are that; the X-ray examinations are likely to give new information to aid the injury's control.
3. When referring a patient for a radiographic examination, the dentist should supply sufficient clinical information (based upon a history and clinical examination) to allow the practitioner taking clinical responsibility for the X-ray exposure to perform the justification process. Figure 1: (a, b, c, d)

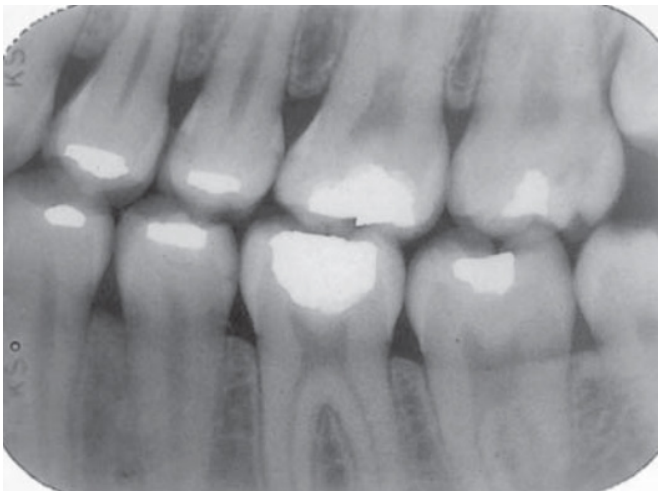
HISTOLOGICAL IMAGING

Various methods are adopted to study the anatomy of teeth, in which Ground section of teeth is the utmost simple and effective technique. Several factors determine how a thin tooth section is grounded and studied, including its shape, thickness, and use. The other method, where the microtome used decalcified teeth is prepared with Hematoxylin and eosin staining is also effective. Ground sections of teeth are sections prepared without using any chemical and maintaining its anatomy.[11,12]

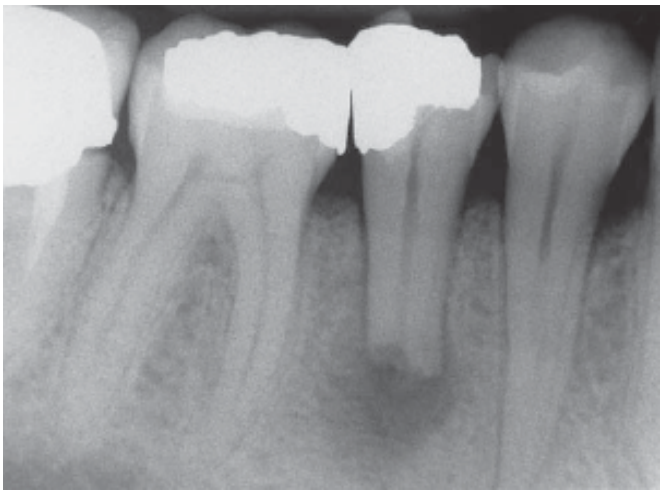
Literature Review

Apparatuses that Used for Doing Section of Teeth

1. Treated the teeth extracted with formalin for about 24-hours.



a: Radiographic image showing mutual decay.



b: The resorption of Inflammation in the high peak, that caused by the top gingivitis inducing from the non vital pulp.

c: Hyper-cementosis, because of the apical inflammation.

d: confinement in a severe dry socket. all area of the lamina properia, and attached trabeculae have become necrotic, leading to the sequestrum.

Figure 1: For showing the cases of dental caries; a, b, c, d, where diagnosed by X-ray.

2. Electrical lathe machine (High, and Low speed): ground doing for (4–5 mm) thickness.
3. Stone carborundum, (Static, Fine, Rough).
4. The xylene.
5. D.P.X.[13,14]

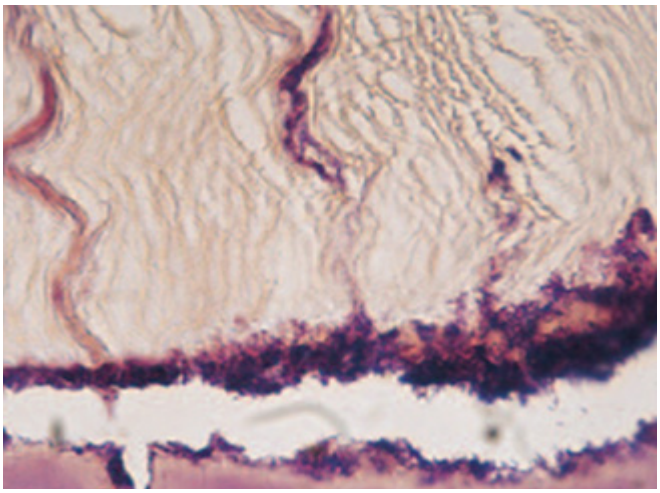
Methods

- First, the teeth are soaked in (20%) of formaldehyde for about 24-hours.
- Washing it in water.
- The tooth could be sectioned for any thickness, using the (Ultra-microtomes) diamond to cut blades.
- Various uses available burs, tooth ground from both sides equally, and then makes a thin grounded section (Figure 2).

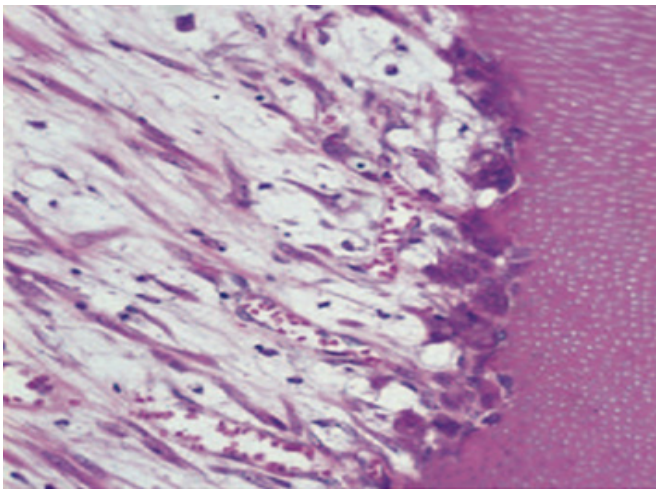
DISCUSSION

It is confirmed that to explicate radiographic images, clinicians should have the many skills needed for the visional diagnosis that namely, the ability for recognizing abnormal modality, which is known as perception, and the ability to explain these modalities, for reaching to true diagnosis.[15] There are some general symptoms of dental caries like tooth pain, sensitivity due to hot and cold, bleeding from gums, pain while chewing the food etc..[16,17]

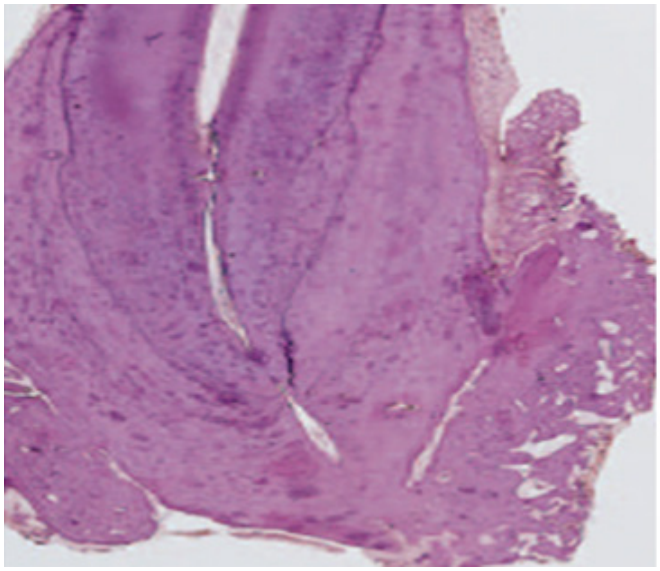
Multiple factors are responsible for increasing the growth rate of dental caries. These are teeth condition, saliva, plaque, time and food habits. Dental caries is mainly two types:



a: Caries spread along the amelo-dentinal junction at higher power showing how enamel is undermined and invaded from below. The terminations of the dentinal tubules are also infected, but destruction is mainly at the expense of the enamel because of its higher mineral content.



b: Resorption during periapical periodontitis. Active osteoclastic resorption of dentine is continuing in the presence of inflammatory exudate. This is a common change but usually minor in extent.



c: Hyper cementosis in Paget's disease. An irregular craggy mass of bone like cementum has been formed over thickened regular and a cellular cementum.

d: Dry socket typical appearances of chronic alveolar osteitis; the socket is empty and the bony lamina dura is visible.

Figure 2: illustrates the histological comparison of the four dental caries diagnosed with radiography a, b, c, d.

- Enamel caries: This type of caries firstly affects the enamel layer, and if it remains untreated,, it spreads into the dentine layer and touches the root of the teeth. Shows enamel caries.
- Inter-proximal Caries: Here, dental caries occurs intermediate position of two teeth.

The necrotic lesion appears clearly in the radial picture because the necrosis region is a tissue consisting of minerals from which the tooth structure is formed. Bitewing, is peripheral and panoramic radiography also, and it is known that multiple techniques are used in radiography in dentistry. Bitewing radiography is a valuable method for detecting mutual decay in its early stages before becoming clinically visible during diagnosis.The diagnosis with this technique is to align the radiation between teeth and in parallel to reduce the interference of nearby surfaces. Imaging is done through the horizontal angle of the X-ray beam, and these x-rays also reveal cases of peripheral secondary tooth decay.[18] When bacteria penetrate the enamel layer, they reach the intersection of the spinal cord and spread horizontally to undermine the enamel layer. This, in turn, has three prominent effects: the first: it loses the layer of enamel support ivory until it is clearly weakened. Second, it is attacked from the bottom. Thirdly, it helps spread bacteria along the intersection of the spinal cord by attacking a wide area of the ivory layer, so the primary lesion will be the bridgehead to attack the enamel layer, but the erosion of the enamel layer is what determines the area of the cavity that has occurred. X-ray diagnosis of dental caries helps confirm the validity of the presence and survival of the tooth or not. In certain cases, if the tooth removal process does not take place, the adhesive tooth becomes partially submerged by the continued growth of the surrounding alveolar edge. Therefore, in this case, this tooth must be removed surgically if necessary, in order to allow the posterior to erupt.

It may be that the resorption that accompanies the decay is irregular, so that part of the tooth that suffers the injury is cut. The other part is still buried, or it may appear on the surface, as an external appearance. This apparent increase in cement thickness is not a disease in itself, nor does it need to be treated at all. But if there is a large hypersensitivity, such as in Paget's disease, then extraction becomes difficult. Rarely, hyper-cementosis leads to fusion of the roots, of the adjacent tooth. So, it is rarely observed until an effort is made to extract one of the teeth. Then the two teeth are found to move in unison, and surgical inter-vention becomes necessary in this case. Women are affected continuously and repeatedly so that the pain always begins a few days after the extraction, but sometimes it is delayed for more than a week. In this case, the root is deep and very painful and accompanied by palpitations constantly. in this case we can see the mucous membrane is around a socket (red and flexible). It is without a clot in the cavity, that involves the saliva and food debris often decompose. But when washing debris, bleached white bones can be observed or felt, with a probe as a rough area. Sometimes the hiding place becomes hidden, by pellets that grow near of the gums. So, the pain usually lasts for more than one week, or sometimes longer.

The different radiological images during the diagnosis of different cases of tooth decay indicate that each case requires a special protocol in dealing with it as a pathological condition that can be treated in different ways, either through fillings or tooth extraction in the necessary cases that require this. And that this difference and the difference between one case and another gives a clear approach to developing different treatment methods according to the dentist's skill. The use of histological methods to clarify cases of tooth decay after the diagnosis made using X-rays gives an accurate diagnosis of the condition wherever it is, whether it is deep near the surface in the tooth tissue or in the root canal as well, so it must be known that the histological use is to clarify what happened to the tooth with all Its details and that this method is not done until after the tooth extraction, meaning that it is a means of clarification and comparison, not for treatment.

The major risk behind dental caries is that, it increases the probability of some chronic disease like pneumonia, the birth of premature babies, complications in diabetes etc..[19] Early caries detection and diagnosis not only reduces the risk factors of dental caries but also reduces the time of patients and doctor along with treatment cost. Dental caries detection methods are broadly categorized into four methods. These are instrument-based, radiography, software techniques and image processing techniques. In the "point method", light absorption and secondary emission technique is used to determine the mineral concentration in the tooth. This mineral concentration is different for caries and healthy teeth region. This method is suitable for early caries lesion detection. "Based on the visible property of light" is a kind of imaging technique that determines the caries lesion according to the visible light scattered or absorption quantity. It is capable to distinguish different phase of dental caries evolution. "Radiographs" is also used an imaging technique to detect caries lesion. In this technique, very high frequency light is used for imaging. "Software tools" are a hybrid approach that includes sound data, visual change data, localized enamel breakdown change data, etc to decide the caries lesion. It is a kind of automation of the techniques that are used by the experienced dentists to detect the caries lesion. Instrument based method is quite expensive whereas software based techniques is not fully reliable. Till date, dentists uses radiograph to detect not only the affected caries lesion but also other oral disease.

The Protective Reactions Between (Dentine, and Pulp) Under Decay

All the reactions in dentine are fundamental because odontoblast activities. So that dentine, and pulp should be considered as the same tissue. These reactions are not particular and may be induced by other irritations such as erosions, abrasion, and restorative proceedings. The changes of reactionary in dentine is start even before cavities forming

in enamel, but are high likely to evolution safety under slowly progressing decay.

CONCLUSION

Tooth decay is compatible with toothache, but it also causes mouth irritation to give off an unpleasant smell from it, as it is a sign of other diseases that threaten the lives of adults and children. And proper care and appropriate treatment in the early stages of the caries area is very necessary to get rid of the caries lesion. And it should be known that the health care procedures and the appropriate treatment for the decay area have changed with the development of modern technology in the present time. It is well known that some methods used in this field are very expensive or may be harmful to health or there may be a failure to detect caries in the early stages of it. Therefore, the diagnostic technique for dental caries by X-rays is very important and necessary to know the details of the injury and thus treat it at once and avoid tooth extraction. To find out the extent of the effect of caries on the tissue of the affected tooth, it is examined by photographing tissue sections of the case and clarifying what happened to it due to the caries.

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