

Caries Starts on the Surface of the Tooth

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Abstract

Caries is a chronic disease of hard dental tissues that progresses progressively, centripetally and leads to the destruction of teeth. Its origin is multi-caused, and its high frequency makes it one of the most common diseases of modern man. Caries starts on the surface of the tooth (in 75% of cases on the biting surface) with the breakdown of enamel and progressively penetrates in depth and width, affecting other dental tissue structures. A large number of general and local, internal and external factors are associated with the occurrence of caries. General factors include: race, hereditary factors, age of the individual, gender, function of endocrine glands, diet, etc. Local factors include: microorganisms, saliva, shape and arrangement of teeth, iatrogenic factors, poor dental hygiene, etc. The aim of this paper is to say a few words about occlusal caries.

Keywords: *Occlusal Lesions; Occlusal Caries; Radiography; Restoration*

Introduction

Occlusal lesions at the moment are the major shape of caries in children after the discount in relative caries prevalence over the last decades [1]. Occlusal caries may match undetected on visible exam for motives. Firstly, it begins off evolved at the fissure partitions and is obscured through sound superficial tooth and secondly, lesions have a tendency to cavitate late, if at all, in all likelihood due to the fact fluoride publicity reinforces the ionic shape of the overlying tooth. Superimposition of sound tooth additionally mask small- and medium-sized lesions on bitewing radiographs. The small occlusal hollow space withinside the 2nd molar arouses suspicion that different pits and fissures withinside the molars might be carious. Unless lesions are very huge, extending into the center third of dentine, they will now no longer be detected on bitewing radiographs.

Caries

If the carious system is permitted to progress, it destroys the tooth, inflicting a hollow space to shape withinside the teeth [2]. Eventually it reaches the dentine. Once caries reaches the dentine, the carious system speeds up. In addition, the affected person may also sense pain on stimulation with sweet/bitter or hot/bloodless. This ache is just like the pain that takes place while dentine is uncovered because of lack of tooth for different motives together with trauma, erosion or abrasion. The pain subsides inside seconds of disposing of the stimulus. The pain can be poorly 'localized', that is, it could be tough for the affected person to mention wherein precisely it's miles. Often pain is localized handiest to an approximate vicinity inside to 3 teeth of the affected teeth.

The irritation reasons swelling of the pulp however, for the reason that pulp is restricted in the inflexible pulp chamber, the stress builds up. Thus, there's extreme and continual ache withinside the teeth. The swelling additionally stops the blood circulate the pulp - which then dies. The pain may also then subside for a while. However, the useless pulp is inflamed with microorganism from the mouth (odontogenic

contamination). The contamination can then unfold thru the teeth root apex into the alveolar bone and reason apical periodontitis. This is painful, particularly while the teeth is touched or the affected person bites on it. Such a teeth have to be root treated (endodontics) or extracted (exodontics) in a timely fashion. Otherwise, a dental abscess, granuloma or cyst will nearly unavoidably shape eventually.

Test

Test of teeth sensibility (vitality) of the tooth withinside the area of the sinus [1]. Even a level though the primary molar is the maximum probable reason, the adjoining tooth need to be examined due to the fact multiple teeth is probably nonvital. The effects need to be in comparison with the ones of the tooth on the other side. Both hot/bloodless techniques and electric powered pulp testing can be used due to the fact significant reactionary (tertiary) dentine may also slight the response.

Injured teeth

Periapical and/or occlusal radiographs need to be taken to assess injured tooth [3]. Alveolar fractures, in conjunction with crown and root fractures and dental luxations, can exceptional be located with those radiographs. To come across a root fracture, the important x-ray beam have to be directed thru the fracture line. Multiple radiographs need to be taken from numerous exceptional angles to be greater predictable in visualizing fractures.

Today, virtual radiography is an exceptional opportunity to conventional radiography, offering an nearly on the spot picture, with notably much less radiation, terrific diagnostic quality and no processing errors. The garage of the pix is handiest restricted through hard pressure area. The radiographic picture displayed for the affected person may also permit for higher communicate concerning analysis and remedy plan. Digital radiography is greater touchy than conventional radiography withinside the detection of simulated outside root resorption lesions.

The following need to be taken into consideration through the clinician all through the radiographic exam of a demanding injury:

- Stage of root development
- Possible crown and/or root fractures
- Relative proximity of the distance between a fractured crown and the pulp
- Any radiographic abnormalities of the pulp, including pulp calcification or internal resorption
- Possible intraalveolar root fractures
- Possible fracture of the alveolar bone
- Degree of dislodgment of a luxated teeth from its dental alveolus
- Variations in thickness of the periodontal ligament
- Signs of root resorption.

Radiography

Bitewing radiographs are noticeably dependable for detecting approximal lesions however much less so for occlusal lesions [4]. Radiolucencies growing underneath the touch regions appear to be horizontal V-fashioned notches in tooth-handiest lesions. As the lesion

progresses into dentine, a mushroom formation takes place because the tooth seems to be undermined alongside the tooth-dentine junction (EDJ). The state of affairs is greater tough to evaluate at the occlusal surfaces because the greater mineralised and thicker tooth in part obscures the lesion progression. The advancing lesion is consequently noticeably underdiagnosed through radiographs. A difficult manual indicates that a lesion is 25% greater superior than while predicted from a radiograph.

A bitewing radiograph wishes to be taken efficiently to have the maximum diagnostic yield. Film holders yield the maximum correct effects and make sure that the X rays pass perpendicularly thru the crown of the teeth. This reduces the quantity of overlap. A clean define need to be seen of the tooth overlying the dentine and lets in good difference among the two tissues. A clean alternate withinside the radiolucency of the teeth can then be visible. Caries seems as radiolucent shadowing and takes place at susceptible sites. Approximately, this could arise underneath the touch vicinity and above the alveolar bone. Beneath the occlusal surfaces the faint define of caries may be detected. The radiolucent sector seems as a diffuse sector below the tooth. The volume of the lesion unfold is greater tough to visualise as the majority of the tooth and dentine in part obscures the X-rays; this effects in a much less correct evaluation of occlusal caries in comparison to that taking place approximately. The frequency of bitewing radiographs need to be assessed for every person. A excessive caries threat person would possibly require radiographs taken at every year intervals while a person without a caries enjoy for some of years might want them much less often, e.g. each 4 - 5 years.

Removal

Removal of all softened carious tissue on the amelo-dentinal junction (cavity periphery) is crucial, and handiest sound tooth/dentine or stained however organization dentine need to be retained in the suitable state of affairs [1].

Carious dentine elimination over the pulp is handled differently. In a younger affected person with noticeably large pulp chamber size, there's continually a tendency for the operator to be greater conservative. Very gentle or flaky dentine (superficial, bacterially contaminated, caries-inflamed dentine) is preferably eliminated. Slightly gentle dentine may be left in situ overlying the pulp, supplied an excellent peripherally properly-sealed adhesive healing is positioned over it. Deciding whether or not to depart the ultimate layers of softened dentine may be tough, and the decision rests, to a degree, on scientific enjoy. Physically interpreting softened dentine in hastily advancing lesions is tough. The private layers are gentle thru demineralization however aren't always grossly inflamed and may be retained over the pulp (demineralized, caries-affected dentine). Also, bacterial penetration of the dentine isn't reliably indicated through staining in advancing lesions. Evidence indicates that after a pulp is uncovered all through carious tissue elimination processes, the possibilities of medium-time period pulp demise in at first symptomatic tooth are accelerated notably while in comparison with the ones instances wherein demineralized, caries-affected dentine is retained as oblique pulp safety and the hollow space sealed with an adhesive bio-interactive restorative cloth.

Diet

Dietary evaluation includes factors: enquiry into way of life and into the nutritional additives themselves [1]. Information approximately the eating regimen itself is of little fee until it's miles taken in context with the affected person's way of life. Only nutritional guidelines tailor-made to the affected person's way of life are probable to be adopted. Using the COM-B ('capability', 'opportunity', 'motivation' and 'behaviour') version for behaviour management/alternate, sufferers want the functionality to alternate their behaviour, in addition to the opportunity inside their contemporary lifestyles (or a alternate this is sensible for the affected person to gain is wanted on this vicinity) and motivation to do it. It is crucial the oral healthcare crew works with the affected person on this regard. Also, the use of the GPS method to editing behaviour is probably beneficial on this regard - affected person focused aim putting, making plans and self-reflection of outcomes.

The eating regimen file need to consist of all of the food and drinks consumed, the amount (in comfortably predicted units) and the time of ingesting or drinking. It need to embody each weekdays and the weekend due to the fact behaviours can regularly be very exceptional.

The only technique is for sufferers to preserve a written file of their eating regimen for four consecutive days, inclusive of 2 operating days and 2 enjoyment days (weekend). The want for sufferers to conform completely and determine their eating regimen virtually must be stressed, and of course, the eating regimen need to now no longer be modified due to the fact it's miles being recorded. Ideally, the evaluation need to be executed earlier than any nutritional recommendation is given. Even sufferers who do now no longer preserve an sincere account had been made greater aware in their eating regimen. If they recognize what ingredients to leave out from the sheet to make their dentist happy, as a minimum step one in an educative system has been taken.

Clearance

An impacted teeth is the one, which fails to both erupt in part or absolutely in its regular location withinside the mouth because of insufficient area and obstruction through an adjoining teeth or tooth/gentle tissue and bone, past its chronological age of eruption [5]. Few tooth are greater predisposed to impaction than the others because of loss of area withinside the jaw.

Mandibular third molars are commonly impacted if the area among the mandibular second molar and anterior border of ramus is inadequate. The gentle tissue that covers the occlusal floor of in part erupted mandibular third molar is called operculum. Operculum is specially prone to infection and is regularly immediately traumatized while it's miles stuck among the crown of the teeth that it covers and antagonist teeth all through closure of mouth (while ingesting or swallowing).

The crypt shape of the pericoronal tissues favors entrapment of meals particles and proliferation of micro-organisms on this vicinity. These elements predispose to acute infections like necrotizing ulcerative gingivitis or scientific circumstance like pericoronitis.

Pericoronitis is described as an acute contamination with accompanying irritation of gingiva and contiguous gentle tissues approximately the crown of an incompletely erupted teeth. Most often affected tooth are mandibular third molars because of loss of area withinside the jaw.

The microbial plants that develops withinside the distally placed pseudopocket is the predominant reason. This plants is predominantly anaerobic i.e. *Peptostreptococcus*, *P. gingivalis*, *P. intermedius*, *F. nucleatum*. Symptoms of pericoronitis consist of: painful, swollen gingivae withinside the vicinity of the affected teeth and awful scent or flavor withinside the mouth. In superior stages, discharge of pus from the gingivae close to the teeth and lymphadenopathy will also be present.

Operculectomy method turned into executed with scalpel technique to gain complete tissue clearance on occlusal desk of gentle tissue impacted mandibular third molar. The occlusal desk hence uncovered turned into then subjected to the dimension of mesio-distal measurement the use of a vernier caliper device. Post-operative snap shots had been repeated. All sufferers had been prescribed with an antibiotic and analgesic as in keeping with the want in person case. Post-operative commands had been delivered. Patients had been recalled after one week and one month. The evaluation of occlusal tissue clearance and snap shots had been repeated.

Restoration

The mandibular proper first molar calls for orthograde endodontic root canal remedy and substitute of the brief healing with a center [1]. Retention for the center may be supplied through residual teeth tissue, supplied the carious tissue destruction isn't gross. The restorative cloth can be packed into the pulp chamber and the first 2 - 3 mm of the foundation canal (a shape of Nayyar center). If inadequate herbal crown stays, it could be supplemented with a preformed put up withinside the commonly greater instantly distal canals.

The different molar tooth will want to have their brief restorations changed through definitive restorations. Caries has worried handiest the occlusal floor, however elimination of those huge lesions has in all likelihood left little greater than an tooth shell. Restoration of such tooth with amalgam might require immoderate elimination of all of the unsupported, undermined tooth, leaving little greater than a root stump and a few spurs of teeth tissue.

Restoration might be higher completed with a radiopaque glass ionomer cement and resin composite hybrid/layered healing. The glass ionomer cement used to update the missing dentine have to be radiopaque in order that it isn't careworn with residual or secondary caries on radiographs. A resin composite bonded to dentine with a dental adhesive might be an opportunity to the glass ionomer cement. Alternatively, tricalcium silicate cements (e.g. Biodentine) will also be used to repair the majority of the misplaced dentine, observed through a resin composite floor veneer, preferably positioned a few weeks after placement of Biodentine, at a overview appointment.

The number one desires of dental restorative remedy are to update diseased or broken teeth shape and to repair feature [6]. Interest in using amalgam for the healing of tooth dates again to the 1800s onward. Amalgam is a metallic alloy, of which one in every of the additives is mercury. Dental amalgam is the end result of aggregate of liquid mercury with amalgam alloy powder composed mainly of silver, tin, and copper. Amalgam alloy is derived from the intermetallic compound Ag_3Sn and the powder may be lathe-cut (irregular-shaped) debris, round debris, or a combination of those. When the powder is blended with mercury (approximately 40 - 50% through weight), it is able to be packed or condensed right into a organized teeth hollow space.

In the putting reactions of dental amalgam, a chain of intermetallic compounds are formed. The response merchandise of Hg with natural γ -segment (Ag_3Sn) alloy are Ag_4Hg_5 (γ_1) and $\text{Sn}_7\text{-}8\text{Hg}$ (γ_2). The γ -segment does now no longer react absolutely with mercury and a number of the authentic Ag_3Sn stays as unreacted debris, that's the supply of energy in dental amalgam. The γ_2 -segment could be very weak, is susceptible to corrosion, deforms comfortably, and contributes to the static creep of amalgam. Because of those properties, greater copper (Cu) is integrated both withinside the shape of a 2nd alloy powder combined with the primary (admixed alloy) or through coating of Ag_3Sn alloy with Cu alloy (unicompositional alloy). These new generations are known as excessive-copper amalgams, wherein the copper content material of the alloy debris can be as excessive as 30% through weight. Increase withinside the copper content material, which ends up in lower of silver content material, has a direct have an impact on at the value of product. It is of relevance to note that no γ_2 -segment is found in those new generations. At the quit of the amalgamation response, very little unreacted mercury stays and reacted mercury isn't effortlessly launched from the amalgam. Dental amalgam restorations are clean to control and location, are capable of face up to regular occlusal forces, and feature a low value. Some disadvantages, however, are that the cloth is silver-colored, touchy to blending technique and problem to corrosion and does now no longer have bonding properties. Additionally, amalgam restorations commonly require large hollow space practise to offer enough mechanical retention and there are regulatory worries approximately amalgam disposal withinside the wastewater. Due to those disadvantages, particularly the rising worries over its capacity neurotoxic outcomes and environmental troubles related to waste amalgam disposal, scientific use of amalgam maintains to decline.

Implants

Total teeth loss because of demanding injury, terrible dental hygiene, periodontal or congenital illnesses impacts over 276 million humans worldwide [7]. Today, detachable dentures and synthetic dental implants had been typically applied to repair occlusal feature as teeth substitute therapy. Nevertheless, there are a few demanding situations in the use of the synthetic implants, inclusive of excessive threat of bone loss and fracture encircling synthetic implants and excessive susceptibility to contamination and irritation, consequently main to implant failure. Accordingly, locating opportunity processes to fabricate biologically changed tooth is an crucial call for to rehabilitate physiologically useful tooth.

Theoretically, the complete teeth might be generated through implanting the autologous stem/progenitor cell-seeded scaffolds on the site of teeth loss, wherein it is able to grow, erupt, and increase like a herbal teeth. Actually, this method might take location simply

withinside the presence of the suitable molecular supply(s), scaffolds, and the cascade expression of unique genes which can be worried in teeth improvement withinside the presence of numerous increase elements. Mimicking such situations is viable through knowledge the shape and steps of embryonic teeth improvement.

Interactions among dental epithelium-derived from ectoderm-and neural crest-derived mesenchymal stem cells (NC-MSCs) provoke teeth improvement. Briefly, on the web sites of the destiny teeth, cascade expressions of homeobox genes-such as *Barx1*, *Lhx8*, *Msc1*, and *Msc2*-and secretion of BMPs and FGFs result in the thickening of the dental lamina and consequently provoke teeth improvement. After that, the dental epithelium cells withinside the placode, a particular dental laminar domain, proliferate and invaginate into the area in which NC-MSCs are living and shape the teeth bud. The epithelial cells proliferate and amplify in addition into the NC-MSC including tissue and condense the mesenchyme greater to form a cap structure. In the subsequent stage, called "bell stage," number one, secondary, or tertiary tooth knots shape-primarily based totally at the wide variety of cusps of the eventual teeth-earlier than growing into the crown of the teeth. Then, through expression of a 2nd cascade of genes withinside the epithelial cells of tooth knots (inclusive of BMPs, FGFs, Wnts and Shh), epithelial cells differentiate into ameloblasts, generating tooth, and mesenchymal cells differentiate into the progenitor of odontoblasts, generating dentine and dental follicle. Dental follicle cells produce the periodontal ligament, cementum, and alveolar bone and thereafter teeth eruption starts off evolved through elongation of the teeth root.

Up till now, efforts had been made in rehabilitating misplaced tooth the use of complete teeth bioengineering and exceptional techniques of tissue engineering and organ regeneration.

Recently, numerous strategies have been implemented to engineer completely useful complete teeth from embryonic germ cells in exceptional small and huge animals, inclusive of mice, rats, pigs, and dogs. These research exhibit the feasibility of generating complete teeth on the site of teeth loss as a promising method for teeth substitute therapy.

Dentures

Any sort of denture is designed to be a detachable appliance, one which the affected person can take out of the mouth for cleansing functions in addition to miss in a single day [8]. Acrylic partial dentures are designed to fit round any status tooth, and those regions permit plaque to accumulate and reason both localised caries of status tooth or periodontal sickness if the plaque isn't eliminated promptly.

As chrome dentures are commonly designed to cover much less oral gentle tissue, they have a tendency to permit much less plaque accumulations to increase. Plaque is nevertheless produced in sufferers without a herbal tooth in their very own and as soon as mineralised into tartar, deposits can regularly be visible as a yellow crusty layer withinside the centre of decrease complete dentures or at the perimeters of higher complete dentures. Tartar paperwork in those regions as they're near to the openings of diverse salivary glands withinside the mouth, and saliva gives the minerals for plaque to harden into tartar.

Dentures need to be wiped clean as a minimum two times daily, the use of both a particular denture paste or everyday toothpaste with a toothbrush. They are exceptional wiped clean over a bowl of water to keep away from breakages if dropped and need to be rinsed properly earlier than reinserting.

The critical floor of the denture to be wiped clean is that which covers the oral gentle tissues - the roof of the mouth with higher dentures or the bony ridge of the decrease jaw with decrease dentures.

These regions are in touch with the gentle tissues each time the dentures are worn, and any meals particles or plaque this is left in those regions lets in microorganisms to flourish, specially a fungus which reasons oral thrush and denture stomatitis ('denture sore mouth').

Tiny perforations and scratches withinside the acrylic factors of dentures that arise through the years additionally permit staining to increase, particularly with merchandise together with tea, coffee and red wine.

Various denture soaking sellers are to be had to be used in a single day to help with cleansing and stain elimination, however care need to be taken with bleach-primarily based totally ones which aren't appropriate for chrome dentures, as they reason metallic corrosion with time.

Conclusion

The occlusal surfaces of emerging teeth are particularly sensitive to the formation of carious lesions due to the absence of functional contact with antagonists and the mechanical cleaning of occlusal surfaces, which contributes to the accumulation of plaque. Although it was previously believed that fissures should be sealed only in the eruption phase and that such a procedure is not necessary to be performed on teeth that are four or more years after eruption without a carious lesion, the indication for fissure sealing is set depending on general and local caries risk factors and does not depend on the age of the patient.

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