**Oral pathology**  **Lecture #6**

\*\* Most important part in caries prevention is to avoid cavitations and as a dentist you must preserve the tooth surface zone – so you shouldn’t probe on any early caries that will cause a reversible lesion to be an irreversible one.

**B) Dentine caries:**

\*\*There are differences between dentine and enamel caries response :

1. Dentine is a living tissue; it has cells “odontoblasts” that can fight caries progression along with its fluid in the dentinal tubules.

\*\*The dentine responds to the caries as it is a living tissue to fight their progression:

1. The fluid inside the tubules may contain immunoglobulins that can fight bioirritation (bacteria).
2. The bioirritation to the odontoblastic processes will cause tertiary dentine formation (reactionary dentine), that is found adjacent to the pulp and it will be formed to protect the pulp: it is more calcified, irregular, less in number and more tortuous dentinal tubules.

\*\*This Reactionary (tertiary) dentine:

-will increase the distance between the caries and the pulp making the invading of the bacteria more difficult.

- Tertiary dentine is not restricted only to caries, could be formed by attrition, abrasion or anything that causes loss of tooth structure.

2. Dentine contains more organic material than enamel (20%), therefore caries do not need only acids to invade it; proteolytic and hydrolytic enzymes are also needed to destroy this organic content.

3. In dentine there is faster progression of caries compared to E because it is less mineralized, twice as rapid as enamel.

\*\*It is slower in older patients🡪because tubules are narrower (because of production of peritubular dentine) and in some are sclerotic.

4. Shape: cone shaped base at dentinoenamel junction, apex toward the pulp and its related to the orientation of dentinal tubules.

**\*\*\* 4 zones in ground sections:**

1. **Zone of fatty degeneration:**

🡪 DEGENERATION OF ODONTOBLASTIC PROCESSES>>>once there’s irritation to an area near the pulp, cellular changes and fatty degeneration will occur.

\*\*Then sclerosis occurs to these tubules creating the second zone: zone of sclerosis.

* + Impermeability of dentinal tubules
  + Favors sclerosis of dentinal tubules

1. **Zone of sclerosis:**

* Beneath & at sides.
* Reaction of odontoblasts to irritation 🡪 deposition of peritubular dentine leading to reduction in the diameter of the dentinal tubules and some will calcify to prevent the bacteria from reaching the pulp.

\*\* When odontoblasts die before calcification the dentinal tubules will be empty forming what is called Dead tracts 🡪 they will be closed by pulp cells by eburnoid (reaction of the pulp cells to the presence of dead tracts that can easily be invaded by bacteria is production of this layer). (Bacteria spreads easily in them).

1. **Zone of Demineralization:**

• Acid attacks and demineralization of inter-tubular and peritubular dentine ahead of bacteria

1. **Zone of bacterial invasion:**

* Multiplying within DT.
* Liquefaction foci 🡪acid of bacteria will cause dentinal tubules to become distended and soft leading to fusiform enlargement of dentinal tubules.

1. **Zone of destruction:**

**-** More Liquefaction foci.

**-** much enlargement of dentinal tubules and some LF get united to form Transverse clefts– some say those clefts are connections of dentinal tubules or incremental growth lines - and this will result in bacteria invading peri- & inter-tubular D 🡪with masses of bacteria between the tubules and not inside them (once there’s transverse clefts it means that the bacteria isn’t just only in the dentinal tubules but it has invaded all layers of the dentine).

**-** Clinically zone of destruction is very soft – due to excessive loss of minerals - and usually is removed by excavator, and the transverse clefts makes this removal of dentine in form of layers.

**-** It was found that there is no difference in number of microorganisms (bacteria) between the medium hard dentine and soft dentine.

**-** Removal of dentine stops at hard dentine and restoration is made. But as we said before there are layers and they are not all infected with bacteria as in the zone of demineralization (which is acid ahead of the bacteria), thus it is safe to say that this layer can be left there at times as pulp exposure can be avoided by this.

**-** Even if there is some bacteria left the isolation by a good restoration prevents it from progressing and it will die.

**C) Root surface caries:**

- Gingival recession must be there .

- 2 zones: Hard surface zone, subsurface demineralization.

- The demineralization happens in circles around the root which may lead to fracture of the crown.

(Spread in form of concentric layers)

\*\* Bacteria associated with root surface caries: Actinomyces species. (DOMINANT)

\*\*Hypermineralized surface & sub-surface demineralization

**\*\*Other Causes of loss of teeth structure other than caries :**

\*\*Tooth wear (attrition, abrasion, erosion, abfraction). – You should differentiate between them by definition & clinically to know what is the treatment plan that should be followed.

1. Attrition : is loss of tooth structure due to tooth –to – tooth contact (proximal surfaces –occlusal surfaces) between incisal edges , cusp to cusp (during mastication).

* Around the teeth we have periodontal ligament and it allows movement of the tooth in all directions , so there will be friction with the proximal surfaces and contact points .
* Porcelain on teeth is harder than the enamel allowing more attrition to occur.
* Types of Attrition:   
  **A-** **Physiological attrition: (normal attrition)**   
  i) Related to age; more clear in elderly patients.

ii) Men more than women; higher masticatory forces.

iii) Type of diet; rigid food needs strong masticatory force.  
iv) Affects initially incisal edges then functional cusps (upper palatal / lower buccal) then nonfunctional cusps.

\*\*Normal occlusal attrition has been calculated at 30 micrpmeter /year for molar teeth.

v) Proximal surface: due to movement of teeth, the contact point will be converted to contact area with the friction more contact will result leading to loss of dimension of the arch. So we have migration of teeth mesially ,which throughout life, may amount to as much as 1 cm from third molar to third molar (arch length decreases 1cm).

\*\*after dentine exposure , the attrition in dentine will be faster than the attrition in enamel (dentine is softer than enamel so attrition appears as cup- shaped cavities on incisal edges and occlusal surfaces-. (cup shape)

**B- Pathological attrition: softer teeth lead to more attrition**.

\*\*Presence of the following will accelerate the attrition process:  
1) abnormal occlusion: high occlusal forces on certain teeth more than normal.

2) Bruxism: habit of clenching on teeth.

3) Habits such as chewing of tobacco, betel or gum.  
4) Abnormal tooth structure such as in amelogenesis imperfecta and dentinogenesis imperfecta.

\*\* Exposure of dentinal tubules by attrition leads to the formation of tertiary dentine and sclerotic dentine to protect the tooth against pulp exposure ,these patients who have loss of tooth structure may sometimes (NOT ALWAYS bec of the formation of the sclerotic dentine) complain of hypersensitive dentine.

\*QUESTION:

Does the vertical dimension of face decrease in patients with attrition of occlusal services?!

1. Abrasion   
    is loss of tooth structure due to contact and friction with foreign body (not masticatory).
   * + 1. Most commonly tooth brush abrasion, factors that lead to this:

* hard toothbrush using the wrong tooth brush.
* abrasive toothpaste.
* Abnormal technique: horizontal with force

It appears as wedge shaped grooves with sharp angles and polished surface. It is most pronounced in cervical 1/3 upper area of roots accompanied by gingival recession and decrease in width of the attached gingiva .

Right handed patients will have abrasion cavities mainly on upper left teeth and vice versa

* + - 1. Occupational abrasion develops when objects are held between or against the teeth during work; e.g. (hair grips, nails ...ect)

So people may get notch on their incisors .

* + - 1. Wrong usage of toothpicks and flossing with high force.
      2. pipe-smoker.
      3. Ritual abrasion of the teeth is uncommon today and is confined mainly to Africa as they file their teeth.

\*\* The wear in teeth opposing porcelain is due to abrasion or attrition???? Attrition

1. Erosion

Loss of tooth structure by a chemical process that does not involve bacterial action.

1. Dietary erosion; follows the excessive intake of acid such as citrus fruit and soft drinks (carbonic acid). The erosion develops on the gingival 1/3 of the labial maxillary incisors teeth, they appear smooth, shallow polished clean and broad concavities and hard to distinguish them from caries.

\*\*habits of drinking citrus fruit cause more erosion like using straw will decrease and eating lemon will increase.

1. Acids from body itself “chronic regurgitation of gastric content or persistent vomiting” ,the palatal surface of maxillary anterior teeth and occlusal surface of posterior teeth will be affected .

\*\*It could be voluntary or involuntary regurgitation

1. Involuntary regurgitation: condition referred to as perimolysis, the followings induce involuntarily gastric acids to reach mouth

1- Some exercises, spicy food, onion, and smoking)

2- Pregnancy.

3- Patients with gastro esophageal reflex and hiatus hernia.

4- Chronic gastritis as in chronic alcoholic.

B) Voluntary regurgitation – habits “practiced by patient “ -.

1- Anorexia nervosa: manifests with people who hate eating and avoid it to maintain their weight, in fact they see themselves fat as they are extremely thin , and when they are forced to eat they induce vomiting. Complications may be associated especially in girls such as anemia and severe weight loss.

2- Bulimia nervosa: manifests in people who love food and eat but it will be followed by inappropriate compensatory behavior (voluntary vomiting and excessive exercise).

3. Occupational erosion

It is seen in workers exposed to acids in their workplace (lead-acid battery).

\*\*Loss of tooth structure due to heavy occlusion is mainly seen in the cervical 1/3 of the tooth and erosion contributes in worsening the case.

1. Abfraction. Is it myth or reality?!