

***Title of Lecture:***

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* There are three methods for tooth numbering:
1. **Two-Digit notation**

The first number indicates the quadrant whereas the second number indicates the tooth within the quadrant, we give number 1 to the tooth closest to the midline.

* We have four quadrants; upper right, upper left, lower right and lower left.
* Practically, **we give the upper right quadrant number 1**.
* For example, 22 is the upper left lateral incisor, 36 is the lower left first molar.
1. **Palmer notation**

Here, we used L that is inverted according to the quadrant and a number to indicate the tooth.

* **Most common, used in our dental school.**
* The Palmer notation consists of a symbol (┘└ ┐┌) designating in which quadrant the tooth is found and a number indicating the position from the midline.
1. **The universal numbering system**
* We use **ONLY** numbers, from 1 to 32. (32 is the total number of teeth in the oral cavity of an adult)
* We start from the upper right third molar (number 1) through all the upper teeth to the third upper left third molar (number 16), then to the lower left third molar (number 17) and finally to the lower right third molar (number 32) through all the lower teeth.
* **Not commonly used here.**
* Definition of cavity and cavity preparation
* **Cavity**: is a defect of the enamel or any tooth structure due to pathological processes of dental caries. This defect is not necessarily caused only by caries, it can be caused by non-caries injuries as well.
* Examples of causes: fractures, secondary caries and erosion.
* Any cavity or lesion produces a cavity needs indicated full cavity depression.
* **Cavity depression**: is a dental procedure to prepare and remove the defected tissue and finally shaping the remaining tooth structures to receive the permanent filling, and **most importantly to retain the filling within the cavity.**
* If you are preparing a cavity depression and you insert the filling that is going to be loose after one month for example, better not to do this treatment; the filling has to be retained well.
* According to the type of filling material that is used, you design the cavity to retain the filling within.
* For example, amalgam is a filling material that has no adhesion ability to the tooth structure, how to retain it? By mechanical design.
* Rotary instruments (hand pieces and brus) are used in the preparation.
* Excavator, for instance, is used to remove soft carious decay in deep cavities.
* Caries terminology

Caries are classified according to their: 1. **location**, 2. **extent** and 3. **rate of progression.**

* Location:
1. Pit and Fissure caries
* Occlusal two thirds of the buccal surface of lower molars.
* Palatal two thirds of the upper molars.
* Lingual surfaces in the upper anterior teeth. (in the cingulum)
1. Smooth surface caries
* Cervical area of any tooth.
* Proximal surfaces. (slightly below the contact point)
1. Root caries
* Enamel rods are found in rows along the tooth. Within each row, the long axis of the enamel rod generally is perpendicular to the underlying enamel-dentine junction. In permanent teeth, the enamel rods near the cementoenamel junction (CEJ) tilt slightly more toward the root of the tooth than would be expected. (they slightly diverge outward)
* **Pits and fissures aids in the retention of the dental plaque and bacteria.**
* RECALL… The acidogenic theory: Enamel is a highly mineralized acellular tissue, and caries act upon it through a chemical process brought on by the acidic environment produced by bacteria. As the bacteria consume the sugar and use it for their own energy, they produce lactic acid. The effects of this process include the demineralization of crystals in the enamel, caused by acids, over time until the bacteria physically penetrate the dentin.
* If caries started in the pits and fissures of the enamel the patient can’t feel a thing, unless he is concerned about his oral hygiene so he notices the discoloration of the fissure. But the common case is when caries happen under the enamel, the enamel becomes unsupported and eventually under the load of mastication will cause a fracture, the patient will feel a cavitation.
* **Pits and Fissures enamel caries are cone-shaped.** When caries reach the DEJ, they attack it and spread all over giving the cone shape. (base toward the DEJ and the apex toward the occlusal surface)
* The progression of caries in the dentine is more rapid; because of the dentinal tubules. Dentinal caries are also cone-shaped. (base toward the DEJ and apex toward the pulp)
* Smooth surfaces enamel caries are cone shaped. (base toward the external surface and the apex toward the DEJ)
* In the smooth or rough (Pits and Fissures) surfaces dentinal caries are alike, only the enamel caries differ.
* Root caries are related to patients with very bad oral hygiene and is commonly seen in old patients. Here, dental plaque causes gum inflammation and consequently gum rescission and will expose the roots to the oral cavity. Root caries are considered as complicated cases, especially when there is severe teeth mobility.

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**Figure 1 Pits and Fissures caries Figure 2 Smooth surface caries**

* Extention:
1. Reversible (enamel-tooth structure is hard / NO disturbances)
2. Irreversible (cavity – destruction of the enamel – extention to the dentine – operative treatment)
* If a patient came complaining about teeth pain when drinking something hot or cold (stimulation) this means caries which need a treatment. But if the pain was nonstop, with or without a stimulus, might wake him up while sleeping, this needs an operative treatment.
* White spot lesion: demineralization causes the area to appear white, if left untreated, progression continues causing tooth destruction.
* Diet and improved oral hygiene lead to remineralization but white spots still can be seen.
* For example, white spot lesion with brown discoloration is on the mesial surface of the lower left first molar and for any reason the lower left second premolar was extracted, the area is now exposed to the oral cavity which makes it easier to clean and brush, thus, easier remineralization.
* Rate of progression
1. Acute caries (rapid progression / soft / light colour / cavitation)
2. Chronic caries (slow distraction of tooth structures)
3. Arrested caries (No procedure used for the treatment, only by improving the oral hygiene or fluoride application …etc)
4. Primary caries (initial progression)
5. Remnant caries (remains in the cavity after restoration)
6. Secondary caries (common / micro leakage / caries that appears at a location with a previous history of caries. This is frequently found on the margins of fillings and other dental restorations.)
* Light brown colour indicates that there’s soft dentine that has to be cleaned.
* Cavity classifications:

According to **plaque**, cavities have five classifications:

1. Class I cavities (Pit and fissure cavities)
2. Class II cavities (cavities or restorations on the proximal surfaces of posterior teeth / might include the occlusal surfaces which in this case is called two surfaces class II; occlusal-mesial, occlusal-buccal, occlusal-distal)
3. Class III cavities (cavities or restorations on the proximal surfaces of anterior teeth **NOT INCLUDING the incisal edge** / here we start with the lingual side to preserve the labial walls for esthetics)
4. Class IV cavities (cavities or restorations on the proximal surfaces of anterior teeth **INCLUDING the incisal edge**)
5. Class V cavities (cavities or restorations on the cervical area of all teeth / seen more in the labial and buccal sides / lower incidence in the lingual side because the saliva and tongue aids the cleaning process)
6. Class VI cavities (recently added to the list / cavities or restorations on the incisal edge of anterior teeth or cusp heights of posterior teeth)

According to the number of surfaces involved:

1. Simple cavities (one surface)
2. Complex cavities (more than two surfaces)
* Practically, we say MO when we mean mesial&occlusal and MOD when we mean mesial&occlusal&distal …etc
* In class II, MO, **the outline/design of the cavity depends on the extension and the location of the caries.**
* Two types of cavity preparation: conventional and modified.
* Positions for the operator
1. Right front position (working area 7 to 12 o’clock / upper anterior teeth / on the right side of the patient)
2. Right position (upper and lower anterior teeth and lower right posterior teeth)
3. Right rear position (**most common** / the operator is sitting behind and on the right side of the patient / the operator’s left hand surrounding the head of the patient)
4. Direct rear position (**rarely used** / lingual view of the lower anterior teeth)
* Direct procedures for the lower jaw and indirect procedure for the upper jaw.
* Positions for the patient
1. Upper jaw: occlusal surfaces of the upper teeth must be perpendicular to the floor.
2. Lower jaw: occlusal surfaces of the lower teeth must be on 45 degrees to the floor.
* **Modifications on both the operator’s and the patient’s positions can be done according to the working area.**
* Before working on any cavity preparation you should have a background knowledge for the pathology of dental caries and its progression. In addition to that, the anatomy of the tooth structure (especially, enamel and dentine) and their thickness. **When studying the anatomy of a certain tooth we must consider the age of the patient.**
* Enamel
* Varies in the thickness from one area to another. (thick incisally (2mm) and occlusally (premolars: 2.3-2.5mm and molars: 3mm) and thin at the DEJ)
* In the initial cavities in pits and fissures the floor of the cavity must be slightly (0.5mm) in dentine.
* **Composition: 95% inorganic, 1% organic. 4% water.**
* Enamel rods extend from the DEJ toward the external surface and roots. (perpendicular and diverge outward) / 5-12 million (5 million in lower incisors and 12 million in molars)
* As we go toward the DEJ, **three properties of enamel decreases**:
1. Enamel rod diameter ( from 8 to 4)
2. Enamel hardness
3. Enamel density
* **One thing increases**: solubility (fluoride makes enamel more resistant, aids in the teeth stabilization and reduces demineralization / idle level of fluoride concentration in drinking water: 0.08-1.25/million, >1.25/million dicolouration (fluorosis), <0.08/million decreased resistance and teeth become more prone to caries)
* Colour: yellowish white and translucent (shiny colour depending on enamel thickness, dentin, age, oral hygiene, intrinsic and extrinsic discoloration)
* When isolating the tooth, by dehydration for example, it becomes whiter, so **we do shade matching before isolation.**
* Esthetic fillings are available in different shades, the operator select the matching shade and choose the composite accordingly.
* Dentin
* DEJ (dentino-enamel junction): junction between the dentin and the enamel, curve in shape for more attachment and a more solid relation.
* **The largest portion of the tooth structure.**
* Odontoblasts are considered as part of the pulp (body) and the dentin (cell processes).
* Primary dentin formation starts before eruption and continues three years after it.
* Some reactions and irritations cause the formation of reparative and secondary dentin.
* It is a living tissue, **continues formation throughout life.**
* Hardness: enamel > dentin > pulp
* The hardness of dentin is 1/5 that of the enamel and it’s 3 times greater in the DEJ than near the pulp.
* By increasing age, the mineral content of dentin increases.
* Elastic tissue, more than the enamel, to provide support and cushioning.
* **Composition: 75% inorganic, 20% organic, 5% water.** (less mineralized than enamel)
* Dentinal tubules: extend from the plup to the DEJ, at the tips, they become straight and perpendicular / S-shaped / number of tubules: adjacent to the DEJ = 15000-20000 and adjacent to the pulp = 45000-60000 / diameter: at the DEJ = 0.5-0.9 might reach 1 micron as well and at the pulp 2-3.
* Colour: yellowish-white but darker than the enamel, softer, not translucent due to its thickness.
* Dentin is more sensitive than enamel.