Periodontics sheet 18
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Antiseptics and Antimicrobials in periodontics:
Antimicrobials consists of antiseptics and antibacterial agents (antibiotics), but antiseptics (eg. Mouthwash) are a separate entity which they are commonly known as disinfectant (such as lozenges).

There is no substitute for a toothbrush. Antiseptics and antibiotics are not a substitute for a high standard oral hygiene. There are specific indications for using antiseptics and for prescribing antibiotics.

**Evaluation of antimicrobial agents:** there are some properties of good antiseptic and antimicrobial agents. These properties should apply for both antiseptics and antibacterial agents:

 1) Specificity: Antimicrobial substances reserved for the treatment of serious medical infections must as a role not to be used to control plaque locally. Systematically administered antibiotics may be used in rare situations in patients with aggressive and refractory forms of periodontal diseases, but only after proper periodontal diagnosis.
Why do we administer antibiotics for aggressive periodontitis? Because they culture the bacteria AA. Other diseases which are the refractory periodontitis, refractory periodontits means that the disease is not amenable to treatment. Here we have to do the basic treatment which is scaling and polishing and curettage then we have to administer antibiotics.

Why we don’t prescribe antibiotics for chronic periodontits and chronic gingivitis?
Because we there are about 300 species found in these diseases and we don’t know until now which antibiotic can work on these species.

2) Efficacy: The antimicrobial agent selected must be effective against microorganisms implicated in the etiology of gingivitis and periodontitis. The plaque that causes gingivitis and periodontitis contain more than 300 species of bacteria, and there is no chance to eliminate all these types of bacteria using single medication, so it is waste to prescribe an antimicrobial agent to eliminate the plaque locally.

They have selected a certain drug against Aggressive periodontitis, what is it? The drug is tetracycline, they improved this drug and now they call it doxycyline, they used to give it in a dose of 100mg/day but recently they called the drug Periodox (Periodontal doxycycline) with a dose of 20mg/day and is only indicated for the treatment of aggressive periodontits.

 3) Substantivity : There are two properties of the substance you should differentiate between them: Absorption and adsorption, absorption is when one substance enters completely into another e.g. a sponge absorbs water molecules, while adsorption is when the molecules of one substance adhere to the surface of the adsorbent substance and this what we mean by substantivity. So substantivity is a measure of the contact time that connects a substance and a substrate in a given medium.
The substance is the mouthwash and the substrate is the tooth, and there should be a time of exposure of the mouthwash as indicated by the manufacturer to reach the maximum ADSORPTION. As we said adsorption not absorption, because if absorption occurred there will be systemic problems which will affect the whole body.
In treating dental plaque infections, the substantively of the antimicrobial agent is of the utmost importance, since the agent needs a certain amount of time in order to inhibit or kill a micro-organism.

The minimum amount of time needed for the mouthwash to allow the contact between the substance and the substrate is 30 seconds so that after you spit the mouthwash there will be retention and adsorption of the substance on the tooth to kill the bacteria.
But keep in mind that not all mouthwashes have the property of adsorption but have the property of contact to the tooth. Which means that the effect of some mouthwashes ends after 30 seconds of rinsing with them, but there are other mouthwashes that will be active after spitting the mouthwash (some will remain active for 12 hours if you use them before sleeping).
Substantivity=Adsorption.

**Aims of anti-plaque agents:** we have certain goals in manufacturing antiseptic and antimicrobial agent:

 1) Should inhibit microbial colonization of the tooth surface and subsequent development of plaque. Till this moment they haven’t manufactured an antimicrobial or antiseptic agent that reduces bacteria by 100% and inhibit colonization of the tooth surface. Many of the available agents have transient effect and can reduce bacterial plaque by up to 90%, but none of these has succeeded to eliminate bacterial plaque completely. So they only help not eliminate totally.

2) Should eliminate plaque already present by dissolution or alteration to form less pathogenic plaque. Unfortunately none of the antimicrobial and antiseptic agents available has succeeded to dissolve or eliminate the plaque already present in the oral cavity, so that’s why until now this aim is not achieved. And that’s why we have to use tooth brushes.

3) Should inhibit the calcification of the plaque to form calculus. Till this moment there is no agent or drug available that can inhibit the transformation of plaque into calculus.

**Limitations of existing preparations:**

1) Only transient effect while they are in the oral cavity.
We have two types of mouthwashes nowadays: The first one gets adsorbed after rinsing 10 ml of this mouthwash for 30 seconds, and gives us an effect of 12 hours once we spit it (the only mouthwash that have this property). And that’s why we prescribe it twice daily, in the morning and at night before bed time.

Other mouthwashes have a transient effect which means that there will be no effect at all once we spit it.

2) Some are of insufficient concentration to kill bacteria and if their concentration is increased they damage epithelial cells.
Studies have shown that if we increase the concentration of the active ingredient (we increase the concentration of the mouthwash) it will definitely kill more bacteria but the more the damage of the epithelial cells. So until now they didn’t find a concentration that can kill all the bacteria without the damage to the epithelial cells.

3) Mouthwashes are only of use on supragingival plaque and therefore for preventing and controlling gingivitis in risk patients. Antiseptic agents are not indicated for daily use and are used only with risk patients. Risk patients means that no matter how much they brush their teeth, there will be areas having plaque and are risk of a disease.
Risk patients: post surgery, handicapped, mucosal conditions "erosive/ulcerative" and prior to ultrasonic scaling.

Note: Aphthous ulcers simply are the breakdown of the continuity of the tissues with no bacterial cause and have no treatment. To get a better healing in the aphthous ulcer as any other injury, we let the patient brush the area more often and use an anti-septic to disinfect the area of this ulcer (not to treat it).

**Enzyme preparations:** preparations of antiseptic agents as mouthwashes:

**1) First generation compounds.**
a) Antibiotics like amoxicillin, but nowadays they use the amoxicillin in combination with something else to make it more effective
b) Phenols are weak antiseptics
c) QUACS (quaternary ammonium compounds)
d) Sanguinarine: Not used anymore.

1st generation compounds reduces the plaque scores by 20-50%.

**2) Second generation compounds.**
a) Bisguanides eg. Chlorohexidine gluconate.

 **Some common examples:**
1) Phenol based preparations:
Listerine: Same as slides.
2)Quacs: Same as slides.
3)Bisguanides: Same as slides.

**Chlorohexidine Data:**Poor systemic absorption means for example if someone drank by accident 10 ml with a concentration of 2%, it does not cause harm at all.

alwayss rinse your mouth while your head is linear (FLAT) not backwards ESPECIALLY the CHLORHEXIDINE GLUCONATE because there might be spit and if this spit touched the eye (pupil), it might cause BLINDNESS. If it happened wash you eyes thoroughly with tap water!

yet, it's not a dangerous product, it's safe, but those were extra-safety instructions. levels up to 0.2% is tolerated by the eye and safe to the skin. here in jordan companies of CHX such as ICI which is now named AstraZeneca it produces CHX of 0.2% but other companies from other countries produce CHX of 0.12% which is fatal to blindness. so be careful that it's 0.2% and if it was 0.12% be very careful.

\*IT IS THE MOST EFFECTIVE ANTI-PLAQUE AGENT TO DATE. not because its better than the others, but because of the ADSORPTION characteristic.

\*IT BINDS TO ACIDIC PROTEIN GROUPS EG: PHOSPHATE SULFATE, DICARBOXYLATE. they are present in the salivary glycoproteins that comprises the plaque biofilm.

CXD is one abbreviation of the drug, our logbooks might mention CHX which is also truee, though CXD is more appropriate than CHX.

\* THE CXD ADSORBS TO EPITHELIUM AND TOOTH SURFACES, IT MAY ALSO BIND TO BACTERIAL CAPSULES, polyysacharides in nature and therefor it reduces the bacterial binding to tooth tissues.

\*The patient should follow the instructions! and rinse TWICE daily. because its effect lasts for 12 hrs, meanwhile for other mouthwashes the patient can rinse as he wishes. 1 X how many times he wants to rinse. because they are TRANSIENT. But CXD is not so if you prescribe it 3 times a dayy, the patient will not benefit because he alreadyy has it. so only twice a dayy.

\*after one minute rinse with 0.2%,ion 30% of drug is released much more than any other drug of the mouthwashes available, calcium ions and detergents reduce oral binding (present in the toothpastes) SO, DO NOT USE TOOTHPASTES IMMEDIATELY BEFORE OR AFTER CXD USE!

to explain that more; the CXD substantivity has another meaning (CATIONIC EFFECT) so the toothpastes and because of the sodium lauryl sulfate which is also present in the shampoo, soaps etc for the body care, and also has an ANIONIC EFFECT, ANIONIC + CATIONIC = DISRUPTION OF THE MOUTHWASH EFFECT (CXD), It becomes transient.

so if we rinsed our mouth with 10 ml of 0.2% of CXD for 1 min or 30 secs, there'll be retention of 30% of the drug to cover us for 12 hrs, BUT if we immediately brushed our teeth with ANY toothpaste on earth, the effect of the CXD will be disrupted. It lost its SUBSTANTIVITY.

as soon as we brushed our teeth, the adsorption effect is gone, substantivity and the cationic effect.

\*THERE SHOULD BE 1\2 Hr BETWEEN BOTH, RINSING AND BRUSHING. EITHER OF THEM FIRST. TO AVOID THE ANTAGONISM BETWEEN THE CATIONIC AND ANIONIC EFFECTS.

In the absence of other OH measures (eg: if a person stops brushing his teeth or stops using toothpicks, floss or whatsoever completely) THIS DRUG REDUCES ORAL BACTERIAL COUNT BY 80-90% which is tempting to be honest so thats why we said in the first slide that there's no substitute for high-standard of OH.

\*The min conc. of CXD required to be effective as a plaque inhibitor is 0.12%,0.2%. Both are true.

\*The min time for CXD that it should be kept in the oral cavity during rinsing (for the effective plaque control) is 30 sec, 30 secs of 10 ml. Q: why the listerine for example is 20 ml whereas the CXD is 10 ?

A: Usually, when they want to see the effect of a volume of a mouthwash, they bring 5 ml, rinse it in the mouth.. too little, 7.5 also is little but the 10ml is sufficient enough so you can control the oral skeletal muscles to move the amount freely but the 20ml is just to consume more really, not for any good purposes. the bottle ( the 250ml) will be finished by 20 dayss but consuming 10 ml is enough for 40 dayss, the 20ml in the mouth doesn't continue for 30 secs. because any other mouthwash other than CXD (eg: Listerine) makes foam so the foam adds volume so the volume plus the foam in 20 ml simply spits it. So, the 10 ml is good enough to give us our goal and to retain the desired drug in the mouth.

The unwanted effect of CXD:

All other mouthwashes do not stain the teeth because it has a coloured material, though some of them causes a bit of yellowish discoloration on the teeth (Eg: Listerine(yellow)) or the colgate but it is easily removed by tooth brushing MEANWHILE the CXD gives us stains as if the patient was a smoker (dark stains) but doctors still prescribe it because its advantages outweighs its disadvantages so we prescribe it for 2 WEEKS ONLY not for lifetime and we should tell the patient that there'll be staining and it'll be REVERSIBLE.

we polish it and it goes out!

the discoloration that happens on the dorsum of the tongue Esp. for smokers or people who don't brush their teeth (there'll be brownish discoloration on the dorsum of the tongue) once the patient seizes the use of the mouthwash the brownish discoloration ON THE TONGUE will go awaay. on the teeth as we said we polish them after two weeks and the stains are gone.

- It leads to DESQUAMATIVE GINGIVITIS which is a type of HYPERSENSITIVITY to CXD (gluconate) in rare cases which leads to painful erosions of the gingiva and a burning sensation. also we have to warn the patient about that.

- Altered taste sensation to salty tastes is a short term complication only.

NOTE: the maximum time for the use of this drug is 2 WEEKS.

- Reports of parotid gland swelling are rare and easily reversible following exclusion of its use, it happens in a one of a million of patients (UNILATERAL OR BILATERAL), because if a patient has stones in his ducts for example and he drinks something acidic Eg: pepsi it seals of the duct completely and it swells, the same happens here but as we said its veryy rare (so we don't tell the patient about it because it may and may not happen) and its also reversible upon the seizure of the use of the drug.

\*USES OF CXD:

-In short term following gingival, periodontal or oral surgery.

IT IS NOT A COUNTER ITEM. IT'S TAKEN ON PRESCRIPTION ONLY. Other mouthwashes you can buy it as counter items.

we should prescribe it in those cases:

1- Long term use in patients whose mechanical plaque control is severely impaired.

2- Fixed Orthodontic appliances.

3- Handicapped.

4- as an aid in the management of drug induced gingival overgrowth.

5- Ulcerative gingival conditions, Eg: Aphthous Ulcerations.

6- Periodontal Pockets Irrigation, It's better than using Sodium Hypochlorite in irrigating the root canals.

It was shown effective in reducing bacterial levels within periodontal pockets.

Plax, colgate, ; they are made of glycerine, thats why they are sleeky (لزج), it gives us good taste, good feeling without any effect at all.

Hexidine or oraldene or hexetidine it was once one of the best mouthwashes but now its not available here in jordan.

Note: we should know how to write prescriptions (mouthwashes) for our patients.

Antibiotics:

Prescribed in Refractory cases, Necrotizing Ulcerative Gingivitis, Aggressive Periodontitis.

Now FOCUS:

Preferred Drugs:

1- TETRACYCLINE : It's one of the best drugs ever found, it was used previously for the TB, then they produced the Doxycycline. The dose of the Tetracycline is 250mg 3 times per dayy while the dose of the doxycycline is 100mg once daily for 21 dayss; because the bacteria present which is the AA is an opportunistic bacteria, if we give the dose for 7 days or 10 days which is the normal course, it'll get back after 2-3 days so we increase the duration up to 21 dayss.

The loading dose is (some people use a loading dose) 100mg in the morning and 100 in the evening and the other 19 days; 100mg dailyy.

the Doxycycline differs from the tetracycline in that its very safe for people with impairment in the liver and kidney.

we should remember the staining that it causes in the baby's teeth.

2- METRONIDAZOLE (FLAGYL) : IT'S NOT AN ANTIBIOTIC! It's a synthetic drug, antibiotic means that it should be Bio (حيوي), one of the best drugs for many other things, but we use it extensively for A) DESQUAMATION. B)ACUTE NECROTIZING ULCERATIVE GINGIVITIS C)PERICORONITIS D)ACUTE CONDITION.

\*It's not allowed to be used with ALCOHOL.

\*It's not allowed to be used with WARFARIN.

\*It's a PHOTOSENSITIVE DRUG, so don't you ever take this drug and expose yourself to the sun. it leads to Freckles just like the ones that pregnant ladies got. which is almost permanent. so always instruct your patient Esp. in summer times.

The Dose: We as PERIODONTISTS we give 500mg 3 times daily, this is the adult dose, the dose depends mainly on the weight and age of the patient, the sex is not usually related unless the lady is pregnant.

Pediatrics; 125mg or 62.5 mg, 250mg, 500mg.

3- AUGMENTIN : Amoxicillin(250)+Clavulanic acid(125), the clavulanic acid is an anti-penicillinase drug, it prevents the resistance of the penicillin drug.

a dose of 375mg (250+125), the dose of 625mg is given twice or trice daily, also the usual dose is given three times daily depending on the age and the weight of the patient because if we brought a 10 year old patient who is 60 Kg in weight, we should treat him as an adult in medication only of course.

\*Host modulation in periodontal diseases:

we want to kill the bacteria that entered our body whatever the infection was so we want to prescribe a drug that is suitable with the bacteria type, so the scientists thought of the inflammation process as it is an antigen-antibody reaction; HOST RESPONSE, we responded as a host to the antigen which came from outside, for example gingiva with plaque on it there'll be colonies in 10 days and of course the tissues itself want to resist the bacteria so they release PMN's, Lymphocytes, Immunoglobulins and so on so they thought that why don't we manage or treat the host and not the bacteria ?

because if we stopped the host response then bacteria will not have any value whatsoever.. So the host response modulation is a breakthrough in the treatment of periodontal diseases, so we give a medication for the host to (neutralize the host) not react with the bacteria, we give a local medication Eg: 20 mg of Periodox, this is for the aggressive.

drugs that cause host modulation are Anti-Inflammatory drugs, Eg: Ibuprofen..etc. SYSTEMIC USE.

SO the Idea of the Host Modulation is to neutralize the response of the host! and this idea was not applied only on the gum also the liver for example to neutralize itself.

\*Local drug delivery means that we bring the Anti-bacterial and apply it INSIDE the pocket, it was first suggested by Gutzon 30-35 years ago he brought a straw and put in it metronidazole and amoxicillin and applied them directly in the pocket and he found out that 100% of the drug is released and the bacteria are sterilized.

They reached in their studies (local drug delivery) to something called a PERIOCHIP applied between the tooth and the gum with a sustained release up to two weeks and of course the microchip consists of chlorhexidine acetate. the chlorhexidine Gluconate is used as a mouthwash whereas the acetate is impregnated in this microchip, on the First dayy 50% of the drug impregnated in the microchip is released and the other 50% is sufficient to be at MIC (Minimal inhibitory concentration to kill a bacteria) for two weeks.