Oral health and management of children with systemic diseases:

***Down syndrome:***

(please refer to the slides while studying, the record I have starts from here, I missed the first 5 minutes)0

***Consideration for dental treatment:***

1. Difficult **access for dental services**. Limited physical access to buildings such as patients on wheel chair.
2. Limited practitioner willingness to provide care
3. Lack of practitioner knowledge and confidence to treat patients with down syndrome in addition to the financial burden.

The second problem is **communication**, most of patients with down syndrome have mental retardation ranging from mild to severe, they may have hearing or visual disability or speech problems, so non verbal communication doesn’t always work with these children, we can use simple language and provide one concept at the time , sometimes these children can be managed at the dental clinic but most of the time we go for general anesthesia or sedation to manage these patients specially if there dental needs are multiple .

For the **behavioral management**, you can use the tell show do technique but be careful if these children cannot see, so use the tell feel and do. We have to keep the appointment as short as possible. General anesthesia and sedation are options if other behavioral management approaches didn’t work, however the general anesthesia is not without risks, because patients with down syndrome are prone to respiratory tract infections, and its difficult to do intubation because there neck is short and there tongue is large, there nasal passages are usually obstructed, and they also have something called Atlanto axial instability (read about it) its something special and unique to patients with down syndrome and it makes general anesthesia a real risk.

And for the **cardiac status**, 50% of down syndrome patients have cardiac problems, so there is always a risk of infective endocarditis, there is always a need for prophylactic antibiotic, and this indicates the importance of excellent oral hygiene so not to endanger the patient.

And now for the **periodontal diseases**, Why patients with down syndrome are more prone to periodontal diseases?

1) The periodontal pathogens can colonize in the early childhood in patients with down syndrome, so if we took a normal patient and a patient with down syndrome, you can clearly see that these pathogens colonize more in patients with down syndrome.

2) Also because of their compromised immune system. They have reduced chemotaxis of the WBC’s, they have diminished phagocytic ability, deficient T cell function and abnormal bacteriocidal activity. And as you know these form the first line of defense against any infection. So when all of them are defective this means that the child is going to be more prone to the disease. The bacteria is present and the immune system is not effective in addition to that, the oral hygiene is poor, the manual dexterity is also poor, in addition to that the plaque is accumulating and the bacteria is increasing and the open mouth posture and mouth breathing, because as we said before, the muscles of the facial expression and the masticatory muscles have poor tone so usually we have open mouth posture, this means breathing through the mouth this will lead to xerostomia which will reduce the cleansing capacity of the saliva. So these factors are the reason why patients with down syndrome are more prone to periodontal diseases.

For the **dental caries**, patients with down syndrome have LOW levels of caries (low caries prevalence) , because they have higher salivary pH, and higher salivary bicarbonate levels, low streptococcus mutans counts, microdontia, hypodontia , spaced dentition, delayed eruption, shallow fissures. So all these factors will reduce the risk of caries, however several dietary habits can lead to rapid progression, and we never consider patients with down syndrome a low caries risk, they are always a HIGH risk even though they have these factors , they are still considered as high caries risk, why? Because they are given a nursing bottle to take to bed, they are weaned off the bottle at an older age, they are given less parental health with oral hygiene, usually the parents are overwhelmed with other conditions that the child has, they are given syrup medications for repeated respiratory tract infections. All of these factors means that these children will develop caries sooner or later. So intense oral hygiene instructions and the high caries risk protocol should be followed up with patients with down syndrome.

For the malocclusion, children with down syndrome has posterior and anterior crossbites, anterior open bite and incisal class 3, and the feasibility of the orthodontic treatment depends on the severity of the malocclusion, ability to cooperate with treatment, ability to cope with appliance, and the effect of oral musculature on possible relapse after treatment. So all these factors should be considered before starting orthodontic treatment.

***Dental management:***

* Early contact with the dental team as early as 6 months but no later than 18 months of age.
* Regular dental visits are very important
* Developing a preventive program including regular periodontal treatment and monitoring.
* Oral hygiene instructions to the patient and the parent
* Advice regarding the use of antimicrobial agents.
* Appropriate dietary management.
* Use of sugar free medications as possible so we can reduce the risk of caries.

 ***Autistic spectrum disorder (ASD):***

Now we are going to talk about another syndrome which is Autistic spectrum disorder (ASD):

This is a relatively new condition, it was first described in 1943, it is characterized by abnormal emotional and social behavior and linguistic development. It occurs in 2-15 : 10000 live births with males more commonly affected, and it is usually diagnosed before 3 years of age, and usually the parents are the first to recognize this condition.

For the ***diagnostic criteria*** ( 3 main things that has to be present in the child to confirm the diagnosis):

1. Restricted stereotypical behavior (repetition) (repeats movements that is obvious)
2. Qualitative impairments in social interaction (the child doesn’t interact with surrounding people)
3. Qualitative impairments in communication (language) (child doesn’t develop language – late in speech- )

For the picture in the slide no.22, the doctor asked which one has ASD. We can’t tell, there are no distinctive facial features, on the opposite of Down syndrome; ASD has no distinctive facial features you can’t know unless the patient starts to interact, no eye contact for example.

For the ***etiology***, the exact etiology of autistic spectrum disorder is yet not known. However, they believe that there is an interaction between genetic vulnerability and prenatal insults. This is the proposed etiology but its not definitive.

For the ***inheritance***, its not a must that one of the parents has ASD so the child will be affected, it may be related to low IQ of the father or mother, or delayed speech in the mother or father , or anything in the history of the parents that indicates they have something abnormal in brain function can lead to autism in their children.

***Oral health status and dental needs of children with autism:***

More authors find caries susceptibility and prevalence of periodontal disease is not different from non autistic individuals and maybe even lower. But several factors might increase caries risk:

1. Soft and sweet food preference (as we said they tend to repeat, not only for movements, but also if they liked something they stick to it, and if they like something they like it to the most, so if they like sweet food they will stick to it).
2. Poorer masticatory abilities
3. Food pouching (they keep food for long time in their mouth)

All these factors increase the risk of dental caries.

***Challenges to the dental team:***

* Reduced ability to communicate
* Uneven intellectual development
* Repetitive body movements
* Hyperactivity and limited attention span
* Tactile and auditory hypersensitivity and may have exaggerated reactions to light and odors
* Self injurious behavior (they have high threshold to pain so they can injure their selves without feeling)

***Clinical management considerations :***

* AD is a heterogeneous disorder (ranges from mild to severe)
* Communicative behavior management doesn’t always work
* Desensitization
* Gradual and slow exposure to the dental environment
* Appointment structure ( if we see them very early before other patients, or late after the other patients, and short visits, very slow and gradual dental treatment)

It is very important that the patient with autism to see the same dentist , hygienist, the same nurse every time because they like repetition. So in mild cases they can be treated in the dental clinic, but in more severe cases we tend to go for general anesthesia.

***Attention Deficit Hyperactivity Disorder (ADHD):***

It is a neurodevelopmental disorder characterized by a definite behavioral pattern that might impair the affected individual’s performance in the social, educational, or work environments.

***The characteristics of this condition:***

1. Inappropriate levels of inattention.
2. Hyperactivity and impulsivity.
3. Inability to pay attention to details.
4. Difficulty organizing tasks.
5. Restlessness or inability to remain sitting in appropriate situations.

Regarding the ***etiology*** of ADHD , it is also a combination of genetic and environmental factors that alter the developing brain, resulting in structural and functional abnormalities.

Neuroimaging studies indicate that ADHD is a result of abnormal anatomical functioning and connectivity in certain parts of the brain, which means the patient, has genetic vulnerability in addition to environmental insults which leads to actual damage in the brain. For the environmental insults it could be due to maternal mental disorders, violence, stress, smoking, and drinking alcohol in the prenatal period, premature birth also might be an environmental insult in ADHD.

For the ***diagnosis***, there is no biological marker or a test that tells you that this child has ADHD, it is based on the child’s clinical history and the effect of the behavioral symptoms on their network of relationships so the diagnosis is complemented by the neuropsychological assessment or neuroimaging of the brain or MRI or CT scan of the brain that will indicate the actual damage in the brain of children with ADHD.

***ADHD challenges:***

ADHD was to be related with a higher frequency of non-cavitated caries lesions at the age of 10 years, a study was done on ADHD children and the result was high levels of caries, but was it related to ADHD or to the factors that lead to ADHD such as violence, stress, smoking, … so the association is not clear, we don’t know if it’s related directly to the ADHD or to the factors that caused ADHD. ADHD might be associated with higher levels of MIH.

***ADHD dental management considerations:***

* Usually these children are difficult to treat in the dental clinic because of their continued movement.
* Behavioral management techniques might be effective but in general they are very difficult to handle.
* Nitrous oxide sedation might be beneficial and sometimes general anesthesia is the last resort to treat these children especially if their dental needs are extensive.

***Congenital Heart Disease (CHD):***

It is very common, and we define it as a defect in the structure of the heart and great vessels that is present at birth, the kid is born with this problem. **Children with CHD are at increased risk of developing oral disease, and are at increased risk from the systemic effects of oral disease**, it’s a very important information and it doesn’t only apply to CHD, it applies to all medical conditions in children. They are more prone to develop caries , their medical condition will increase their risk to caries, and the caries will be dangerous.

***Challenges for the dental team:***

* Lack of awareness of the importance of oral health by their families.
* Family is usually overwhelmed with the cardiac condition so they don’t pay attention to dental caries.
* The need to gain weight prior to surgery.
* They take sugar based medications.
* Dental anxiety due to previous hospitalization (white coat syndrome).
* Sometimes it could be associated with other syndromes that make these children difficult to treat in the dental clinic for example mental retardation.
* Dental defects of developing dentition.
* There is always a risk of developing endocarditis.

***CHD dental management:***

Ideally, We should have a very good level of awareness, and to see the child as soon as possible in the first 6 months, we may have no teeth but it is very important to talk to parents about what to expect and to give them the needed advice and to make them aware of the importance of oral health. Prevention is always important, definitive treatment is preferable to temporary or short-medium term solution. Poor prognosis of first permanent molars (FPM’s) we extract them immediately we don’t need to keep those teeth, the life of the child is more important than restoring and maintaining a poor prognosis FMP. And non pharmacological behavioral management vs. sedation or general anesthesia.

***Asthma*** :

Is a chronic inflammatory disorder, manifesting with episodes of chest tightness, coughing, shortness of breath and wheezing. Medications includes bronchodilators and anti-inflammatory agents.

***Oral and dental health of children with asthma:***

* They have reduced salivary flow related to the medications they take.
* Increased caries risk associated with the reduced salivary flow.
* Gingivitis
* Erosion.
* candida.
* orofacial abnormalities including increased facial height due to mouth breathing, higher palatal vaults, greater overjet and higher prevalence of crossbites).

***Management of asthma:***

Management is easy and straight forward, the most important thing that they have the inhaler with them, if It is with them then its safe. However you should ask the parents what trigger the asthma such as anxiety or stress, so you have to know all the factors that trigger the attack and avoid it, in addition to the presence of bronchodilator or corticosteroid to be in the safe side.

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There is a part in the previous lecture we will continue talking about it now, about MIH. Which is very important.

MIH is defined hypomineralization of one to four of the permanent first molars frequently associated with affected incisors. The prevalence ranges between 3.6 – 25 %, out of 4 children 1 is affected. The prevalence in Jordan is 17.6% which is relatively high. First permanent molars are always involved (FPM), if one of the molars is severely affected this means that the molars on the other arch might be involved. When more molars are affected this increase the chance that incisors are affected.

***Diagnostic criteria of MIH:***

1. demarcated opacities (well aligned opacities, yellow or creamy or yellowish or brownish)
2. post eruption breakdown
3. atypical restorations
4. extracted first permanent molars FPMs

***clinical appearance of MIH:***

* demarcated opacities of different colors , usually limited to the incisor or cuspal 1/3
* clear and distinct border with adjacent enamel
* white creamy opacities are less severe than yellow brown opacities
* the enamel surface is intact with varying degree of subsurface porosity
* significant subsurface porosity leads to post eruptive breakdown (PEB)
* the cause of MIH is exactly still not known. And why one molar not all the molars still not known too that’s why the etiology of MIH is very complex-

classification of MIH, the dr don’t want us to memorize them, just know that we have types of MIH, it could be mild , moderate or severe. The differences between the types mainly depends on no PEB to very moderate break down to severe PEB to know that there is no sensitivity of a caries of a mild type , while in severe types everything is present such as PEB, sensitivity, caries , defective atypical restorations.

***How to differentiate between MIH and Enamel hypoplasia?***

Ameloblasts are the cells that produces enamel, so it goes through 3 stages:

1st stage is to lay down the matrix

2nd stage is to mineralize the matrix

3rd stage is the maturation

So enamel hypoplasia the ameloblast gets damaged and the enamel is not break down in that area, so when the tooth erupts, the enamel is missing in that area and a regular margin would be obvious between the normal enamel and the are with no enamel. While in MIH the tooth erupts and the surface is intact because the enamel has been laid down but not mineralized , so what happens is that the tooth erupts and after it erupts because of the occlusal loads it causes breakdown, but the margin between the absent enamel and the normal enamel will be irregular.

***MIH etiology:***

No definitive etiology but these could be :

1. birth trauma/ anoxia
2. childhood illness ( respiratory tract infections, febrile illness, otitis media)
3. medications ( Amoxicillin in the first year of life)
4. pollutants : dioxins, polychlorinated hydrocarbons

***clinical implications:***

* discomfort and sensitivity
* unexpectedly fast caries development
* post eruptive breakdown
* explanation to parents/child to inform them that the problem is only to the FPMs and the rest of the teeth will develop normally.

***Management:***

Risk identification, if you review the medical history of a child at the age of 0-3 years and discovered that there is something significant in the medical history, for example birth hypoxia and the child got incubation for a long time, multiple respiratory tract infection , or any other etiological factors then you will think that this child will be at risk of developing MIH. What can we do? We have to follow the child very closely as soon as the first molars erupt so we will be able to diagnose them. The best age for diagnosing MIH is at 8 years , however we can diagnose it earlier. Why 8 years? Because all the molars and the incisors will be erupted and we can examine them properly. The tooth should be minimally wet to be able to diagnose MIH.

If you diagnosed the child with MIH early so now you can start with the remineralization and desensitization . what is the problem with MIH? The child complains of sensitivity , so the child stops brushing and plaque accumulates and caries develops and then post eruptive breakdown will happen and we enter the cycle.

Remineralization and desensitization could be done with topical fluoride application or tooth mousse (CPP-ACP). They are very very effective in reducing the child’s sensitivity. When applying fluoride, it will replace the hydorxyapetite with fluroapetite which is stronger .

We can prevent caries at PEB by instituting thorough oral hygiene home care program and reduce the cariogenicity and erosivity of diet, and the placement of pit and fissure sealents in partially and fully erupted FPM.

***What are the difficulties that we face?***

1. Difficulties in achieving anesthesia , because these FPMs are sensitive so the intensity of nerve supply increases, so this tooth becomes very sensitive.
2. Difficulty in managing child’s behavior. Children with MIH are exposed to dental treatment 10 times than normal children.

These two problems can be solved by treating the patient with nitrous oxide and general anesthesia.

1. Determining how much affected enamel to remove ( all affected enamel vs. very porous enamel)
* If we remove all the effected enamel this means we removed most of the tooth structure which will make the tooth weak, and if we only removed the porous enamel this would result in placing my margins on unsound tooth structure and those margins are prone to deteriorate and we will have secondary caries and leakage.

***Restorative materials:***

1. Glass ionomer (GIC)
2. Resin modified glass ionomer (RMGIC)

They have good properties, but the main thing is that those 2 materials are not recommended in stress bearing areas and they can only be used as a temporary solution. so they are not a definite restoration however we use them in temporizing.

1. Resin composite is esthetic with high wear resistance, it adhere to tooth structure , its technique sensitive. Its material of choice when the defective enamel is well demarcated and supragingival margins and when no cuspal involvement.
* Composite needs etching, if Im etching an abnormal enamel I will not get a good structure for microadhesion , so if I want to place a composite restoration on a tooth with MIH I have to remove all the affected enamel and place the margins of my composite restoration on sound tooth structure.
1. SSC (full coverage) and they are usually the treatment of choice because they prevent further tooth deterioration, they control tooth sensitivity, the establish correct interproximal contacts and proper oclusal relationships, they are not technique sensitive or costy as cast restorations. They are the best choice for MIH when we have extensive damage. When there is no damage at all , we place fissure sealent. For limited damage we use composite of glass ionomer.
2. Partial and full coverage indirect adhesive or cast crowns and onlays, they are considered in the late mixed and permenant dentition, but they are difficult to place in young children because of the short clinical crowns, large pulp horns,long treatment time and cost, in addition to the limited child cooperation.

The last slides will be continued in the next lecture.

Thank you and sorry for any mistake, please refer to the slides. And please note that the doctor was reading the slides and I did my best. Good luck.