Gingival Diseases in Childhood-A Review

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Abstract

Children are exposed to various gingival diseases, similar to those found in adults, yet differ in some aspects. These diseases could be plaque or non-plaque induced, familial, or may be associated with a systemic condition. It is crucial to diagnose and manage gingival diseases as early as possible as they have the potential to further progress, causing a severe breakdown of periodontal support. Consequently, the final result may lead to tooth loss at an early age, which in turn will affect the nutrition and overall development of a pediatric patient. Therefore, greater emphasis is given to the prevention, early diagnosis, and treatment of gingival disease in children. As a dentist, it is necessary to be able to distinguish and differentiate all possible gingival conditions to successfully manage them. By establishing excellent oral hygiene habits in children, which will carry over to adulthood, the risk of periodontal disease is lowered. This paper will review various gingival conditions that are found in children, their main clinical features and management.

Index terms— gingival diseases in children, plaque induced gingivitis, non-plaque induced gingivitis, early diagnosis, pediatric gingivitis.

1 Introduction

eriodontal disease may have its origins in childhood. Studies confirm a high prevalence of gingival inflammation in children, which may progress to periodontitis, resulting in the loss of primary and permanent teeth. Therefore, promptly diagnosing and treating gingival diseases in childhood may reduce the risk of carrying forward the disease in adulthood. Gingival diseases affecting children may be broadly classified into Dental Plaque-induced and Non-plaqueinduced gingival diseases (table 1). 1

2 III.

Associated with nutritional deficiency:

? Ascorbic Acid Deficiency Gingivitis

3 C. Modified by medications

4 I. Drug-induced gingival enlargement conditions (rare)

? Pemphigus vulgaris? Kindler syndrome ? Lichen planus ? Allergic reaction ? Wegener's Granulomatosis

5 I. Gingival Abscess

Modified from Armitage GC: Development of a classification system for periodontal diseases and conditions, Ann Periodontol 4:1, 1999

Gingiva of children is different in many aspects. Gingiva of the primary dentition generally appears as pale pink, but less pale than that of an adult. 2 The marginal gingival is also more vascular and contains fewer connective tissue cells. 3 The thinner, more red appearingepithelium with a lesser degree of keratinization may

be interpreted as mild inflammation. 3 The width of attached gingiva is less variable in the primary dentition, causing fewer mucogingival problems 3 ; however, the width increases with age. 4 Stippling in children usually appears at about 3 years of age without significant inter-arch difference. 5 Interdental papilla is broad buccolingually and narrow mesiodistally. 6 The junctional epithelium tends to be thicker of the primary dentition than the permanent. 7 Gingival sulcular depth ranges from 1-2 mm which is shallowerthan that found in adults. 8 There are normal physiological changes associated with tooth eruption that may appear as agingival pathology and must be distinguished. The gingival prominence caused by the crown of an underlying erupting tooth is firm and pink, with mild inflammation from mastication; however an eruption cyst will presents as a bluish or deep red enlargement of the gingiva over the erupting tooth 6 . The gingival margin of a newly erupted tooth appears rounded, edematous and reddened and may mimic gingivitis. This paper will present various dental plaque and non-plaque induced gingival diseases affecting children and adolescents.

6 II.

7 Dental Plaque-Induced Gingival Diseases

Chronic gingivitis is common in children and adolescents, where inflammation is generally limited to the marginal gingiva with undetectable loss of bone or connective tissue attachment 6 . The primary cause is dental plaque related to poor oral hygiene. 6 Clinical features include red linear inflammation, increased vascularization, swelling, and hyperplasia 9 . Bleeding and increased pocket depth are found less frequently in children than in adults, but may be observed in severe gingival hypertrophy or hyperplasia. 9 Calculus deposits are rarely seen in infants but may increase with age 6 ; however, children with cystic fibrosis have higher incidences of calculus, which may be caused by increased salivary calcium and phosphate concentrations 10 .

Plaque control procedures 11 in the primary dentition can be accomplished by rubber-cup coronal polishing (if no calculus is evident) or by selective supragingival scaling (if calculus is evident); however as permanent teeth erupts, additiontargeted sub-gingival scaling may also be necessary. Oral hygiene measures should be instructed to parents and children in terms that both understand. The dynamic process of developing manual dexterity impacts the ability of a child to perform expected procedures. Children are encouraged to use a simple scrub technique; more refined brushing techniques can be introduced during adolescence. Flossing should be added to the home care routine as interdental contacts develop, and is usually not indicated in the primary dentition stage. Antimicrobial mouth rinses for chemical plaque control are not indicated in very young children because of the risk of ingestion.

Plaque induced gingival enlargementoccursdue to prolonged plaque exposure which may be complicated by local factors like mouth breathing, or orthodontic appliances. 12 Clinically, it ranges from pale and fibrotic to red and friable. 12 There is localized or generalized enlargement of the interdental papilla and/or gingival margin. 12 Meticulous plaque control is required, and sometimes, gingivectomy or gingivoplasty may be indicated. 12 Eruption gingivitisis a temporary type of gingivitis seen in young children during teeth eruption. 13 Tooth eruption itself does not cause gingivitis; infact it is the inflammation associated with plaque accumulation around erupting teeth is common 7 . Eruption gingivitis is usually mild which requires no treatment other than improved oral hygiene. 13 Mouth breathingand lip incompetence may result in increased plaque and gingival inflammation which is often limited to the gingiva of the maxillary incisors due to frequent drying out of the gingiva. 11,14 Treating the cause of mouth-breathing may resolve the problem for example gingivitis secondary to mouth breathing caused by allergic rhinitis can be treated by antihistamines 6 and incompetent lips can be corrected by orthodontic treatment.

Crowding gingivitisis due to irregular arrangement of the dentition, preventing self-cleansing of the mouth. It is worse in children who do not brush their teeth regularly. Oral hygiene instructions and orthodontic treatment can alleviate the gingivitis. 11 Gingival changes due to orthodontic appliances can occur within 1 to 2 months of appliance placement due to difficult plaque removal. 11 Changes are generally transient, rarely producing long-term damage to periodontal tissues. 11 Use of special toothbrushes (e.g. powered tooth brushes) and additional cleaning tools may be recommended for better plaque control 15 .

Pubertal gingivitispeaks at 9 to 14 years of age and generally subsides after puberty. 7 Hormonal changes during puberty accentuates the vascular and inflammatory response to dental plaque 9 and also alters reactions of plaque-microbes 16 that could explain this modified gingival response. Frequently, it presents as enlargement, bleeding and inflammation in interproximal areas without concomitant increase in plaque levels affecting both males and females. 17 It generally subsides after puberty however severe cases are treated by improving oral hygiene 13 , removing all local irritants 13 , restoration of carious teeth 13 and improving nutritional status (e.g. administration of 500mg of ascorbic acid orally for 4 weeks 19).

Diabetes mellitusType 1 occurs more frequently in children and adolescents than Type 2 . Gingival inflammation and periodontitis are more prevalent and severe in affected children with poor metabolic control than in unaffected individuals. 20 Premature tooth loss and impaired immune response to oral flora occurs in severe cases. Treatment includes-controlling diabetes, disease prevention 21 and early training and motivation of children to maintain efficient plaque control21, 22 .

Leukemiais the most common type of cancer in children, and acute lymphoblastic leukemia is the commonest amongst them. It is accompanied by oral symptoms that include acute gingival enlargement, ulceration, bleeding

and infection. 23 These patients have low tissue-resistance to infection, owing to decreased circulating leukocyte count, which is further complicated by cytotoxic drugs (interfere with epithelial cell replication) that are used in the treatment of leukemia. Therefore, rigorous plaque control measures must be implicated both before commencing cytotoxic treatment and during medical treatment. 22,24 Gingivitis associated with vitamin C deficiencycan lead to edematous and spongy gingiva, spontaneous bleeding, and impaired wound healing. 12 The underlying deficiency must be corrected, along with plaque control. 12 Drug-induced gingival enlargementcan occur in children taking anticonvulsants (phenytoin, 25,26 valproate 26), calcium channel blockers (nifedipine 26 , diltiazem 26 , verapamil 26), and immunosuppressives (cyclosporine A 27). Although complicated by increased plaque along the gingival margin, t features of this condition differ from that of chronic marginal gingivitis. 9 The clinical features are very similar irrespective of the drug involved. The first signs of change usually appears 3 to 4 months after drug administration. Enlargement appearsmulberry-shaped, pink, firm and stippled in patients with good hygiene, however, in subjects with pre-exiting gingivitis, or a poor standard of plaque control, the enlarged tissues shows classical signs of gingivitis 3 . To manage such enlargement, strict oral hygiene instructions and scaling must be implemented. 3 Severe cases inevitably need to be surgically excised and re-contoured (gingivectomy and flap surgery). 3 A follow-up program is essential to monitor plaque control and to detect any recurrence, in which case drug modification may be needed. 3

8 III.

9 Non-Plaque Induced Gingival Diseases

Primary herpaticgingivostomatitis is an acute infectious disease of the gingiva caused by herpessimplex viruses (HSV) Type-1 most commonly affecting children between 2-5 years of age.28Clinical features include febrile illness, headache, malaise, oral pain, mild dysphagia, and cervical lymphade-nopathy 3,9,13,28,29 . Gingivitis is the most striking feature, with markedly swollen, erythematous, friable gums 3,13,29 The goal of treatment isto make the patient comfortable, and to prevent secondary infections or worsening systemic illness. Supportive management involves bed rest, eating a soft diet, and maintaining adequate hydration and treating pyrexia using paracetamol suspension. 3,29 Secondary infection of ulcers is prevented using chlorhexidine. 3 Systemic treatment includes antivirals (acyclovir) and analgesics (acetaminophen). Topical anesthetics may also be used; however, do not speed healing. 3,13,29 Candidiasisis caused by candida albicans following a course of antibiotics or as a result of congenital or acquired immunodeficiences. In neonates, infection can be contracted during passage through vagina. It is less common in children and is rarely associated with a healthy child. 30 It presents as raised, furry, white patches, which if removed leaves bleeding underlying surface. 13 Infants can be treated topically by a suspension of 1mL (100,000 U) of nystatin 4 times a day. Older children can be treated using clotrimazole troches or nytatin pastilles. Severe cases can be managed by systemic fluconazole (infants-suspension 6mg/kg or less per day; older children-100mg tablet for 14 days). 13 Catarrhal gingivitis (streptococcal gingivitis)is caused by hemolytic streptococcus. Clinical features include fever, headache, myalgia, and arthralgia 31 . The gingiva is painful, appears red, soft and friable, and tend to bleed spontaneously. Improved oral hygiene, mouthwashes and antibiotics are recommended for treatment. 31 .

Acute necrotizing ulcerative gingivitis (ANUG) is a broad anaerobic infection caused by fusiform bacteria, spirochetes, and other gram-negative anaerobic organisms. **??**.29,32 Malnutrition, stress, lack of sleep are few predisposing factors. 29,32 It is common in young children in less-developed countries. ANUG is rapid in onset and very painful. "Punched out" ulceration and necrosis occur in the interdental papillae and marginal gingival, covered by yellowish-grey pseudomembranous slough. 3 Eventually, involve the alveolar crest and may progress to necrotizing ulcerative periodontitis in immuno-compromised individuals as recurrence is inevitable. Treatment include intense oral hygiene, professional plaque removal, mouthwash rinse (0.5% hydrogen peroxide -removal of necrotic tissues and 0.2% chlorhexidine-prevents plaque formation), antibiotics (penicillin or metronidazole), and NSAIDs for pain. 33 Congenital epulisis a rare gingival tumor that occurs along the alveolar ridge in newborns, without additional congenital malformations or associated teeth abnormalities. Clinically presents as a smooth, welldefined erythematousmass arising from gum pad. Small lesions may regress and larger lesions must be resected, as they often interfere with airway and cause feeding difficulties. The un-erupted teeth are not affected usually. 34 Congenital gum synechiaepresents as unilateral or bilateral adhesions between the maxilla and mandible in the form of fibrous bands that makes feeding, swallowing and respiration difficult soon after birth. Early treatment is recommended which involves excision of alveolar bands. If not treated, it may result in TMJ ankylosis, restricted jaw growth and overall growth may also be affected (restricted feeding).

Traumatic lesionscan be factitious, iatrogenic or accidental and can occur as a result of chemical physical or thermal injury. 37 Toothbrush abrasion due to faulty brushing technique is very common which presents as painful ulceration with surrounding erythematous halo. These may usually get superinfected by normal mixed flora of oral cavity when these ulcers may get covered with yellowish exudates. 33 Initial professional cleaning followed by cessation of toothbrushing for 7-10 days is recommended, during which child should rinse 2 times daily with 0.1% chlorhexidine. 33 The right brushing technique must also be taught to the child.

Factitious gingivitis (Gingivitis artefacta) is a self-inflicting physical injury of gingiva that could be habitual, accidental or psychological in origin. 3 , 38The minor form is caused by rubbing or picking of the gingival with fingernail or abrasive foods while, the major form is more severe and widespread, involving deeper periodontal

tissues. 3 Other areas of the mouth may be involved, as well as extra-oral injuries found on the scalp, face or limbs. Management includes removal of irritation source, habit correction, and wound dressings. 3,38 In major cases, psychological or psychiatric consultation may be advised. 3,38 Hereditary gingival fibromatosis is a rare overgrowth usually transmitted as dominant trait 40 . Enlarged gingival tissues are usually normal, pink, firm and leathery with little inflammation and involves attached, interdental and marginal gingiva. 39,40,41 There may be esthetic or functional problems, such as mal-positioning of teeth, prolonged retention of primaryteeth and delayed eruption of permanent successors. 41 In addition, the hyperplastic regionproduces conditions favorable for accumulation of dental plaque causing secondaryinflammatory changes. 41 Treatment include removal of hyperplastic tissues by conventional gingivectomy. 42 Strawberrygingivitisis gingival manifestation of Wegener's Granulomatosis, a necrotizing granulomatous vasculitis affecting upper and lower respiratory tract and kidney 44 which may also affect pediatric age group45.

Oral manifestations include the gingiva exhibiting erythema and enlargement,typically described as "strawberry gums". 43,46 Treatment include administration of immunosuppressives like prednisolone and cyclophosphamide 43,44 for which child patient must be referred without delay for medical evaluation and management 43 .

IV.

10 Conclusion

To summarize, the differences in the causation and pathogenesis of gingival diseases in children are as varied as their adult counterpart with similar clinical Gingival Diseases in Childhood-A Review presentations of gingival bleeding, pain and swelling. Nevertheless the importance of recognizing these gingival manifestations in childhood can give a clue towards an underlying pathology like nutritional deficiency, immunological disease or even a leukemic state. Therefore the thorough knowledge of gingival diseases in childhood and their treatment contributes not only towards better oral care but also augments a comprehensive general pediatric care of the individual. Kindler syndrome is an autosomal recessive disorder 47 that may present with oral lesions that are clinically consistent with desquamative gingivitis, along with Cutaneous neonatal bullae, poikiloderma, photosensitivity, and acral atrophy. 48 Traditional nonsurgical periodontal treatment can be beneficial for treating gingival menifestations. 47 Pericoronitisis inflammation of gingival covering partially erupted tooth (most commonly third molars). 12 Food entrapment creates an ideal environment for bacterial growth leading the pericoronal flap to become inflamed and swollen. 12 The enlarged flap, traumatized by occlusion, is very painful. Debridement, chlorhexidine irrigation and antibiotics are used for management. 12 Gingival abscessis an acute, localized, painful lesion of marginal gingiva or interdental papilla, caused by anembedded foreign objects. 12 Treatment is done by debridement, drainage and chlorhexidine irrigation. 12

1

Table1-Gingival Diseases: Classification		
Dental Plaque-induced Gingival Diseases		Non-plaque-induced Gingival Diseases
A. Gingivitis Associated with Dental Plaque Only		A. Gingival diseases of Viral origin
		? Primary Herpetic
I.	Without local contributing factors:	Gingivostomatitis
		B. Gingival diseases of Fungal origin
? Chronic gingivitis		? Acute Candidiasis (Thrush,
? Plaque-Induced gingival enlargement		Candidosis, Moniliasis)
		? Linear gingival erythema
II.	With local contributing factors:	C. Gingival diseases of Bacterial origin
		? Acute necrotizing ulcerative
? Eruption gingivitis		gingivitis (ANUG)
? Mouth breathing		? Streptococcal infection
? Crowding gingivitis		(Catarrhal gingivitis)
? Gingival Changes Related to Orthodontic Appliances		D. Congenital gingival Anomalies
		? Congenital gum synechiae
		? Congenital epulis

Figure 1: Table 1 :

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