

Smile care: compassionate prevention, pursuit of excellence

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Abstract

If beauty is power then smile is its sword! Smile designing is a process whereby the complete oral hard and soft tissues are studied and evaluated and certain changes are brought about which will have a positive influence on the overall aesthetics of the face. Smile aesthetics are related to the form, texture, colour, and alignment of the anterior teeth as well as to intraoral soft tissues, lips and facial aesthetics. Smile designing in paediatric is just not about cosmetics and improving self-confidence as well as

orthodontic treatment in young children, prevention of parafunctional habits and aesthetic treatment of caries and trauma. Certain conditions such as crowding, crossbite, protruding teeth, open bite, caries and trauma may be easier to address and corrected with aesthetic approach through smile designing. The aim of poster presentation is to focus on recent advancement in smile designing to improve the treatment in paediatrics.

Keywords: Smile Designing, developmental anomalies, caries, dental trauma, orthodontic tooth movement

Introduction

Smile, a person's ability to express a range of emotions with the structure and movement of the teeth and lips, can often determine his / her confidence to perform in the society.¹ A beautiful smile provides greatest attributes, chain reaction of smiling back, positive image, trustworthy, healthy alignment of teeth also promotes disease free state which promotes growth and development, aesthetic and also prevents parafunctional habits, speech impediments and skeletal deformities. Factors affecting smile of a child might be in the form of developmental defects, early childhood caries, trauma while walking and learning to drive bicycle, malalignment of teeth while eruption of permanent teeth and gingival pigmentation which require to improve smile. Smile designing is the process whereby the oral hard and soft tissues are studied and evaluated and certain changes are brought about which will have positive influence on the overall aesthetics of the face. The goal of an esthetic makeover is to develop a peaceful and stable masticatory system where the teeth, tissues, muscles, skeletal structures and joints all function in harmony (**Peter Dawson**).²

The **American Academy of Pediatric Dentistry (AAPD)** recognizes that paediatric dentists are uniquely qualified to manage the oral health care needs of children with heritable dental developmental anomalies. These children have multiple, complex problems as their dental conditions affect both form and function of tooth structures, tooth vitality, tooth sensitivity, vertical dimension and aesthetics can have significant psychological impact. These conditions may be present early in life and require both immediate intervention and management of a protracted nature including coordination of multi-disciplinary care. In the primary dentition, the dental treatment of affected children aims to ensure

favourable conditions for the eruption of the permanent teeth as well as for the normal growth of the facial bones and the temporomandibular joints.³ **Sapir S et al. (2001)**⁴ said that in the early primary dentition it appears to be the most immediate problems and soon after eruption it is generally necessary to protect the primary molars with stainless steel crowns. **Shrestha A et al. (2015)**⁵ said that early management of the peg-shaped laterals is necessary due to psychological problems in children as well as for the proper development of the stomatognathic system. When permanent first molars and anterior teeth erupt orthodontic and prosthetic assessment is essential with the advance in techniques and increase in availability of various dental materials. Many studies have shown the use of glass ionomer cements, composite resin veneers, porcelain veneers, stainless steel crowns, lab-fabricated crowns and/or over dentures can restore the affected teeth. **Dhaded S et al. (2015)**⁶ said anomalies such as gemination and fusion can cause tooth malalignment, spacing problems, arch asymmetry, unacceptable appearance, periodontal involvement and impedes the eruption of the adjacent tooth which can be corrected by selective grinding, surgical separation, root amputation or extraction followed by the prosthesis in cases where pulp chambers are not connected.

Similarly, early childhood caries develops a negative psychological impact and complex problem such as loss of tooth structure and vitality, tooth sensitivity thus affecting the form and function of the tooth, aesthetics and speech in child while involving posterior teeth also causes loss of vertical dimension and function results in poor health of a child; since to be treated with effective means to improve the child health.⁷ Early childhood caries can be defined as "the presence of one or more decayed (non-cavitated or cavitated lesions), missing teeth (due to caries) or filled tooth surfaces in any primary tooth in a child 72 of months

age or younger. In children younger than 3 years of age, any sign of smooth-surface caries is indicative of severe early childhood caries (S-ECC).⁸ **Van Houte J et al. (1972)**⁹ said that indigenous oral microorganisms are those bacteria that have a significant pathogenic potential for the host. **Anusavice KJ. (2005)**¹⁰ suggested traditional method- “drill, fill and bill” dentistry for dental caries and it is still widely practiced all over the world in spite of minimally invasive treatment approaches. **Tagg JR et al. (2003)**¹¹ concluded the application of avirulent *Streptococcus mutans* to control dental caries. Replacement therapy involves the use of a harmless effector strain (*Streptococcus mutans* strain BCS3-L1) that is permanently colonized in the host’s microflora to prevent the colonization or outgrowth of a particular pathogen. *S. mutans* strain BCS3-L1 is a genetically modified effector strain designed for use in replacement therapy to prevent dental caries. **Koga T et al. (2002)**¹² described mucosal host defenses can be induced by immunization to interfere with the colonization of *mutans streptococci*. Anticaries vaccines operate on the principle of reducing the population of the indigenous bacteria that are associated with the caries disease process. The two-step process of vaccine development involves identification of specific antigens of *mutans streptococci* against which protective immune responses can be induced and the application of an immunization treatment method that will sustain adequate levels of salivary antibodies. Key antigens include streptococcal surface proteins that control attachment to tooth surfaces and glucosyltransferases that produce adhesive glucans from sucrose. Oral application of specific antibodies against selected antigens of *mutans streptococci* (passive immunization) has produced promising results.

The **CDC (Centers for Disease Control and Prevention)** in **2001** issued recommendations regarding the use of fluoride to prevent and control dental caries. Use of supplementary fluoride modalities is particularly appropriate during anterior tooth enamel development (age <6 years).¹³ **Marinho VC et al. (2002)**¹⁴ concluded that topical fluorides (mouthrinses, gels or varnishes) used in addition to fluoride toothpaste achieved a modest caries reduction of 10% as compared to toothpaste alone and the combined use of fluoride gel and a fluoride mouthrinse resulted in a prevention of 23%. **Zimmer S et al. (2001)**¹⁵ conducted a randomized controlled clinical trial on high-risk children who received professional tooth cleaning and an application of 0.1 percent NaF fluoride varnish four times per year and concluded that it might not be possible to prevent caries in high-risk children by means of the professional tooth cleaning and application of 0.1 percent NaF fluoride varnish program. **Klimek J et al. (1985)**¹⁶ demonstrated a caries (DFS) preventive effect of 46% with a program who received professional tooth cleaning and an application of 2.26% fluoride varnish (Duraphat, Colgate Hamburg) in the subjects were 12–13 years old when they entered the program and exhibited an average caries risk. **Makinen KK et al. (1995)**¹⁷ reported a significant reduction in caries increment for children who were given a xylitol-containing chewing gum for up to five times per day. **Naaman R et al. (2017)**¹⁸ said that the pit and fissure sealants are an effective means of preventing pit and fissure caries in primary and permanent teeth. Dentists should therefore be encouraged to apply pit and fissure sealants in combination with other preventive measures in patients at a high risk of caries. Different sealants used are resin-based sealants, glass ionomer cement-based sealants and polyacid-modified resin-based sealants.

Dental traumatic injury is an injury that results from an external force that involves the teeth, the alveolar portion of the maxilla or mandible and the adjacent soft tissues causing significant function, speech, aesthetic loss, trauma to permanent successor (turner's tooth) and psychological effect thus affecting the quality of life of a child in both primary and permanent dentition. The greatest occurrence of DTI to the primary dentition is when motor coordination is developing and children are more susceptible to falls. The reported prevalence of traumatic injuries in primary teeth varies among different studies and ranges between 11% and 30%.¹⁹⁻²² Traumas of the deciduous dentition, which occur mostly in the anterior region, result in luxation in 62-69% of cases, intrusion comprises 8-22% of all luxation injuries. 1 to 3 years is the most susceptible age group for intrusion injuries of primary incisors.²³ **Gupta M (2011)**²⁴ said that to prevent further injury to the developing successor, avulsed primary teeth should not be replanted and in case of intrusion, to allow spontaneous re-eruption except when displaced into the developing successor extraction is indicated in order to protect permanent successor. Avulsed permanent teeth should be replanted as soon as possible and stabilized for 7–10 days, or up to 2 weeks to improve the quality of life in a child.²⁵⁻²⁸ If the tooth cannot be replanted within 5 min, it should be stored in a medium that will maintain vitality of the periodontal ligament fibers. Transportation media for avulsed teeth include (in order of preference of media): Viaspan, Hank's balanced salt solution (HBSS) (tissue culture medium), cold milk (skim or low fat), saliva (buccal vestibule, under the tongue or in a cup with patient's spit, physiological saline or water.²⁹⁻³¹ **Turkistani J et al. (2011)**³² said that passive repositioning (allowing re-eruption to its pre-injury position especially in teeth with immature root formation), active repositioning (with traction) or surgical

repositioning and then stabilizing the tooth in its anatomically correct position in permanent dentition. Prophylactic endodontic treatment is initiated using a temporary filling with Ca(OH)₂ within the first 3 weeks of the traumatic incident, because there is considerable risk for pulp necrosis, pulp canal obliteration, and progressive root resorption. Immature permanent teeth that are allowed to reposition spontaneously demonstrate the lowest risk for healing complications.^{33,34}

Andrade JR et al. (2014)³⁵ said that modulation of orthodontic tooth movement (OTM) is desirable not only to patients for shortens treatment time, but also to practitioners since treatment duration is associated with increased risk of gingival inflammation, decalcification, dental caries and root resorption. **Kumar S et al. (2014)**³⁶ enrolled in his study that it was commonly believed that a patient should not consider visiting an orthodontist until age 12 or so, when all the permanent teeth have erupted. However, recent advances in early orthodontic treatment have made it advantageous for children suffering from some forms of orthodontic or dental jaw deformities to see an orthodontist for the first time by the age of 7 when the permanent first molars and incisors have erupted. Current knowledge raises the possibility of using new therapeutic modalities for modulation of OTM such as laser therapy, vibration (low-intensity pulsed ultrasound), local injections of biomodulators and gene therapy; with the latter being applicable in the near future. They are intended to enhance or inhibit recruitment, differentiation and/or activation of bone cells, accelerate or reduce OTM, increase stability of orthodontic results, as well as assist with the prevention of root resorption.³⁵

Gingival hyperpigmentation appears unaesthetic and unpleasant since under ideal conditions, the gingival margin and the lip line should be congruent or there can be a 1–2 mm display of the gingival tissue.³⁷ It can be

defined as a darker gingival colour beyond what is normally expected and appear unaesthetic.³⁸ Pigmentation is contributed by-products of the physiological process such as melanin, melanoid, carotene, oxyhemoglobin, reduced haemoglobin, bilirubin and iron³⁹ and/or pathological diseases and conditions.⁴⁰ Melanin pigmentation results from melanin granules which are produced by melanoblasts. Gingival depigmentation can be defined as a periodontal plastic surgical procedure whereby the gingival hyperpigmentation is removed or reduced by various techniques. **Alasmari DS. (2018)**⁴¹ described depigmentation process as chemical methods (using agents such as alcohols, phenols and ascorbic acid), surgical methods (gingival abrasion, split thickness epithelial excision, free gingival grafting, acellular dermal matrix allograft), electrosurgery, lasers, cryosurgery, radiosurgery. **Galui S et al. (2019)**⁴² concluded that laser therapy has optimal efficacy in the treatment of gingival hyperpigmentation. Most commonly used lasers for gingival depigmentation are carbon dioxide (CO₂, 10,600 nm) lasers, neodymium: Yttrium, aluminium and garnet (Nd: YAG, 1,064 nm) and diode (980 nm) lasers. **Yussif NM et al. (2019)**⁴³ said that vitamin C is one of the approaches involved in skin depigmentation whether via topical or transdermal or intravenous approaches. Vitamin C is a water-soluble antioxidant and essential nutrient for immune cells and host cells. It was found to be involved in depigmentation due to several factors that not only depend on its direct effect on melanin and melanocytes but also due to the overall effect on the applied tissues. Once vitamin C is introduced to the target tissue, it binds efficiently to melanin due to the reactive oxygen species (ROS), calcium and copper content which causes intracellular deficiency of these items and the inability of cells to produce melanin.

Dental decay, missing teeth and skeletal and jaw deformities could impact child's general health as well as dental health into adulthood. Damaged or missing teeth could also affect speech, self-confidence and emotional development. Confidence is one of the greatest gifts that a parent and society can give to children. Children who lacks confidence will be reluctant to try new or challenging things because they are scared of disappointing others which can prevent them from having a successful career. The enemies of confidence are discouragement, fear, stress and anxiety.⁴⁴ Self-satisfaction, social behaviour and psychological well-being are inter-related. Beautiful smile and appearance are not only linked to child's self-confidence, but can also increase happiness in life since it provides better appearance, more confident, less anxious life, appear more trustworthy and approachable.⁴⁵

Conclusion

In the last few decades, advances in technologies, changes in lifestyle, modifications in diet, longer life expectancy are some of the many factors which have affected the health, aesthetics and development of tooth. Due to change in life style teeth have become more prone to caries, trauma, habits developed due to emotional disturbance of a child leading to skeletal and dental malocclusion and genetics may produce hyperpigmentation of gingiva which affect aesthetic, appearance and social confidence of a child. Early intervention and prevention of jaw, dental and soft tissue anomalies will reduce the fear and anxiety of a child. Counselling of parents regarding prevention of nursing bottle caries, use of recent advances in dentistry such as pit and fissure sealants, carries vaccine, probiotic therapy, protection while bicycling will reduce the chance of caries and trauma respectively in order to develop peaceful and stable masticatory system in relation to teeth, tissues,

muscles, skeletal structures and joints. Thus, with a clear understanding of the implementation of new technologies, methods and advances in medicines accessible to the dentists, we can create a more favorable aesthetic in pediatrics.

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