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Review Article

Prosthodontic management of pediatric patients

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ABSTRACT

Loss of teeth in children may lead to both functional and esthetic problems. Absence of teeth in both anterior and posterior regions may lead to malfunctions in mastication and proper pronunciation. The common complications that occur when missing teeth are present and not replaced includes adjacent tooth migration, loss of alveolar bone, and irregular occlusion. Premature loss of teeth may develop complexes and low esteem, leading to insecurities considering the sensitive nature of children. It should also be taken into consideration that prosthetic appliance should not hinder the growth of orofacial system and must meet necessary functional and esthetic standards as there is active nature of growth in children and adolescents.

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1. Introduction

Early teeth loss, both deciduous and permanent, can result in functional problems in children, for instance malfunctions in mastication, improper teeth placement or eruption and hindered pronunciation. This also causes esthetical issues. Children may develop complexes and low self esteem, leading to insecurity. They can even be bullied or mocked. Since children are frequently affected psychologically by the undesirable appearance of diseased, damaged, or missing teeth, one should not allow chronologic age to prevent performing whatever treatment is necessary to provide proper function and aesthetics.¹ Successful prosthodontic treatment can be provided for young patients aging from 12 to 14 years.² Prosthodontics in children is more difficult because of the anatomy, erupting teeth, growth patterns, patient cooperation and understanding. Pediatric patients are to be followed-up more often than adult patients since they need procedures like relines or refits of removable prosthesis because of growth patterns. There are various prosthodontic treatment options which

will be rendered to a patient with missing teeth. However, careful diagnosis and understanding of the clinical findings is necessary for the success of the treatment.

1.1. Causes of tooth loss in children

The most common cause of tooth loss in children is due to caries. It can also be caused due to infection, trauma, congenital anomalies like cleft lip and palate or may be due to systemic disorders for instance like osteopetrosis, radiation damage, neoplasia etc.

1.2. Need of pediatric prosthodontics

Premature tooth loss in children may develop complexes and low esteem leading to insecurities considering the sensitive nature of children hence prosthodontics in pediatric plays an important role. It helps to restore better masticatory functions and efficiency rehabilitation along with taking into consideration the pulp protection. It also aids in proper speech function. Prosthesis must maintain optimal and appropriate development of teeth and their eruption, as well as maintain growth of the dental arches,

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and facial bones. Prevention of detrimental habits, provision of space maintenance and fixation of loosen teeth after trauma are also situations where pediatric prosthodontics is a necessity.

1.3. Preprosthetic preparation³

This predominantly emphasizes on extraction of grossly decayed tooth both deciduous and permanent but if decayed tooth are restorable they can be utilized as a retentive aid for overdenture fabrication. Ridge augmentation treatment or vestibuloplasty for small flat ridges like in cases ectodermal dysplasia and surgical correction of cleft lip and cleft palate are also included in the preprosthetic preparation of a pediatric patient along with alveolectomy for sharp bony spicules is done while taking care of the permanent tooth bud. Removal of exostosis or tori should also be considered in preprosthetic preparation.

1.4. Prosthodontics interventions

Prosthodontics rehabilitation with crowns are indicated only when other conservative treatments cannot be performed and have been proven to be ineffective.

Dental crowns are indicated for patient with fractured teeth, tooth after pulpal therapy, for restoring multi surface caries especially in patients with high caries risk, teeth with extensive wear, developmental defects, also teeth that require to act as an abutment for space maintainer and in patient with bruxism.

1.5. Crowns in pediatric dentistry⁴

1. Preformed metal crown
2. Open faced stainless steel crowns
3. Preveneered stainless steel crowns
4. Strip crowns
5. Pedo Jacket crowns
6. New millennium crowns
7. Polycarbonate crowns
8. Zirconia crowns

1.6. Fixed partial denture

Fixed partial dentures is a tooth borne partial denture that is to be permanently attached to teeth that provide support to the restorations. In a child, when a tooth is lost the space maintenance supposed to be provided immediately to avoid tipping or rotation of the abutment teeth or eruption of the opposite teeth.

Its indications include missing teeth, root canal treated teeth, congenitally abnormal or missing teeth and to achieve proper function and aesthetics but the contraindication comprises of the age of patient, whether it is a long edentulous span and also excessive bone loss in area of missing teeth.

1.7. Resin bonded retainers

It was first introduced by Rochette in 1973. This prosthesis is most ideal to be given in a young patient as the preparation of the teeth is minimal reducing any damage to the pulp but these bridges cannot withstand stronger occlusal forces or cannot replace more number of teeth.

1.8. Removable partial denture

It is indicated in long edentulous span contraindicated for fixed partial denture, distal extension cases, weak periodontal support of remaining teeth, and purpose of attaining cross arch stabilization, severe bone loss, and replacement of teeth soon after extraction however, it is contraindicated where aesthetics are primary concern replacing less number of anterior teeth and also for patients who cannot maintain removable partial denture.

The removable partial denture can be easily relined and refitted. It can be used as space maintainers. They are also easy to fabricate and not very expensive but patient cooperation is essential as it is a removable prosthesis and should be motivated to wear the prosthesis.

1.9. Complete denture

Complete denture proves to be very useful to the patients suffering from acquired anodontia or congenital absence of teeth. However prosthesis needs to be replaced periodically to avoid any restriction of skeletal growth.

Complete extraction of primary teeth due to anodontia resulting from rampant caries. Prosthetic rehabilitation at this stage is necessary to reinstate masticatory function, appearance and muscle function; to maintain and improve phonetics; prevent development of deleterious oral habits; and, to minimize possible psychological disturbances. Complete denture fabrication similar to that in adults.⁵

1.10. Overdentures in children⁶

Overdenture is defined as any removable dental prosthesis that covers and rests on one or more remaining natural teeth, the roots of natural teeth, and/or dental implants; a dental prosthesis that covers and is partially supported by natural teeth, natural tooth roots, and/or dental implants.⁷ It is a complete or a partial removable denture prosthesis supported by retained roots to provide support, stability, tactile and proprioceptive sensation.

The retained roots or teeth are called abutments that are treated to receive the overdenture. The abutments usually require intentional root canal treatment as the coronal structure is reduced to receive the denture. Presence of abutment teeth helps in preserving bone and improves proprioception. As the support is derived from the abutment teeth and the denture bearing mucosa, the stability and retention of the dentures is superior compared

to conventional dentures.

Masticatory efficiency is increased, speech is enhanced and there is increased psychological support for the patient but greater cooperation from the child is needed since it requires more clinical visits.

2. Developmental Anomalies

2.1. Cleft lip and palate

The cleft lip and palate deformity is a congenital defect of the middle third of the face, consisting of fissures of the lip and / or palate.

Cleft palate (1841): 1. A congenital fissure or elongated opening in the soft and/or hard palate; 2. an opening in the hard and/or soft palate as a result of improper union of the maxillary process and the median nasal process during the second month of intrauterine development.⁷ Feeding problems related to cleft lip makes it more difficult for an infant to suck on a nipple and cleft palate may cause breast milk to be accidentally taken up into the nasal cavity. Dental problems include congenitally missing teeth, hypodontia, hyperdontia, oligodontia enamel hypoplasia, poor periodontal support, early loss of teeth. Speech Problems include poor pronunciation of bilabial, labiodental, linguoalveolar sounds.

2.1.1. Prosthetic management⁸

Prosthetic Appliance for Cleft Palate Patients:

1. Prosthesis in infancy period:
 - (a) Feeding obturator,⁹
 - (b) Premaxilla positioning appliances,
 - (c) Nasal conformer,⁹
 - (d) Naso alveolar moulding^{10,11}
 - (e) Palatal lift prosthesis,
 - (f) Speech aid or speech bulb prosthesis (3rd and 4th given in adult patient also
2. Obturator: Palatal obturator with solid or hollow bulbs meatus
3. Prosthesis for tooth replacement: • Removable prosthesis • Complete dentures prosthesis • Fixed prosthesis • Implant prosthesis

2.2. Ectodermal dysplasia^{12,13}

It is a congenital defect of two or more ectodermal structures and their appendages.

Clinical manifestations of ectodermal dysplasia are -Hair -hypotrichosis, partial or total alopecia, Nails -dystrophic, hypertrophic, abnormally keratinized, Teeth -enamel defect or absent, Sweat glands -hypoplastic or aplastic.

Dental abnormalities- range from hypodontia to anodontia of the primary or permanent teeth (with or without cleft lip and cleft palate), associated with hypoplasia of the alveolar bone structure.

2.2.1. Treatment considerations

Removable prosthodontics: removable partial dentures, overdentures, complete dentures.

Implant prosthodontics: Kearns et al suggested that transfer growth at the mandibular symphyseal suture usually ceases in the first six months of life. For this reason, there should be no difficulties with the placement of implants in the anterior mandible.

2.3. Amelogenesis imperfect (AI)¹⁴

It is a hereditary defect of enamel affecting both the primary and permanent dentition.

2.3.1. Treatment considerations

Primary dentition - aims to ensure favorable conditions for the eruption of the permanent teeth as well as for the normal growth of the facial bones and the temporomandibular joints Upon eruption of the primary molars, stainless steel crowns are placed to prevent the development of caries and the attrition of defective enamel, while maintaining adequate space and vertical dimension of occlusion. In the primary anterior teeth, polycarbonate crowns, resin modified glass ionomers (RMGI), prefabricated crowns (stainless steel crowns with or without esthetic facing) or direct composite resin can be used as alternative restorations.

Mixed dentition - definitive treatment cannot be rendered until complete eruption of the permanent dentition.

Permanent dentition - final treatment often starts as soon as clinical height of the crown and the gingival tissue has been stabilized and the pulp tissues have receded.

2.4. Dentinogenesis imperfect¹⁵

It is a hereditary condition that affects both primary and permanent dentition. Clinically the primary and permanent dentition may show teeth with amber, gray, yellow, brown, purple, or bluish translucent discoloration.

2.4.1. Management strategies

Primary dentition: Stainless steel crowns on posteriors to maintain occlusal vertical dimension. Composite facing or composite strip crowns can be used to improve aesthetics. Overdentures and overlay dentures can be given if teeth are attrited till gingiva.

Mixed dentition: Stainless steel crowns on permanent molars. Celluloid strip or polycarbonate crowns can be given as an interim measure for permanent anteriors.

2.4.2. Permanent dentition

Cast occlusal onlays on first permanent molars and the premolars to help minimize tooth wear and maintain occlusal vertical dimension. Overdentures can be given in situations where severe tooth wear has occurred

2.5. Early childhood caries¹⁶

ECC is 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.

2.5.1. Prosthodontic management

They can be treated using temporary crowns, stainless steel crowns for primary molars and premolars. Esthetically pleasing crowns on anteriors should be given or removable partial denture is the alternative choice.

2.5.2. Maxillofacial prosthesis¹⁶

The maxillofacial prosthesis replaces, restores or rehabilitates orofacial structures that may be congenitally missing or malformed by using non living materials to enhance and restore the form and anatomy. This prosthesis helps to rehabilitate, mastication, deglutition, speech and oral aesthetics.

2.5.3. Dental implants^{17,18}

Implants in children are indicated in children suffering from extended hypodontia, oligodontia, congenital syndrome [ectodermal dysplasia]. In anterior mandible, alveolar growth seems relatively small when teeth are missing; therefore more suitable site of insertion of implants is anterior mandible whereas in maxilla, implants cannot participate in maxillary growth process resulting in unpredictable implant dislocations during growth as they behave very similar to ankylosed tooth. Transversal growth of maxilla occurs mostly at midpalatal suture & if implant construction cross the midpalatine suture it will result in growth restriction. Insertion in growing maxilla should be avoided until early adulthood.

3. Conclusion

Childhood and adolescence represent a period of intense growth and development of orofacial system. In such gentle period, replacement of missing teeth is of vital clinical importance, and variety of materials and restoration design options exist to ensure that proper chewing, aesthetics and pronunciation are achieved. Adequate prosthetic restoration in children or adolescents must not in any way hinder proper development of jaw bones, dental arches and permanent teeth, but rather guide and preserve oral tissues in a minimally invasive way to guarantee that acceptable definite restoration can be achieved once adulthood is reached. Frequent check-ups and careful clinical supervision are advised, as well as maintaining adequate oral hygiene of the patient.

4. Conflict of Interest

The authors declare no relevant conflicts of interest.

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None.

References

1. Vulićević Z, Beloica M, Kosanović D, Radović I, Juloski J, Ivanović D, et al. Prosthetics in paediatric dentistry. *Balkan J Dent Med.* 2017;21(2):78–82.
2. McDonald A. McDonald and Avery Dentistry for the Child and Adolescent. 9th Edn.; 2011.
3. Tandon S. Textbook of pediatric dentistry by Shobha Tendon – 3rd Edn. Paras Medical Publishers; 2018.
4. Garg V, Panda A, Shah J, Panchal P. Crowns in pediatric dentistry: A review. *J Adv Med Dent Sci Res.* 2016;4(2):41–6.
5. Marwah N. Pocket Book of pedodontics. 1st Edn. Jaypee Brothers Medical Publishers; 2008.
6. Hugar SM, Shigli AL, Reddy PR, Roshan NM. Prosthetic rehabilitation of a preschooler with induced anodontia-A clinical report. *Contemp Clin Dent.* 2011;2(3):207–10. doi:10.4103/0976-237X.86462.
7. The Glossary of Prosthodontic Terms: Ninth Edition. *J Prosthet Dent.* 2017;117(5S):e1–105. doi:10.1016/j.prosdent.2016.12.001.
8. Kumar P, Raghavan R, Jishnu S, Monisha VS, Raj JS, Sathish S, et al. Prosthetic Consideration in Management of Cleft Lip and Palate Patients. *Sci J Clin Med.* 2016;5(4-1):27–30.
9. Shajahan PA, Raghavan R, Bos R, Geethaprasad T. Prosthodontics Approach for the Fabrication of Feeding Plates in Cleft Palate Patients. *Sci J Clin Med.* 2016;5(4-1):31–6.
10. Chauhan JS, Sharma S. A Simple and Economical Nasal Conformer for Clefts! *J Maxillofac Oral Surg.* 2021;20(1):157–9.
11. Grayson BH, Shetye PR. Presurgical nasolabial moulding treatment in cleft lip and palate patients. *Indian J Plast Surg.* 2009;42:56–61.
12. Raghavan R, Biswas PP, George S, Kunjappan MS. A Stepwise Procedure for the Fabrication of the NAM Appliance Using Grayson's Technique. *Sci J Clin Med.* 2016;5(4-1):1–6.
13. Alowairdhi AA. Prosthodontic management of children with ectodermal dysplasia: A literature review. *Saudi Dent J.* 2019;31:70–1.
14. Pigno MA, Blackman RB, Jr RC, Cavazos E. Prosthodontic management of ectodermal dysplasia: a review of the literature. *J Prosthetic Dent.* 1996;76(5):541–5.
15. Chen CF, Hu JC, Bresciani E, Peters MC, Estrella MR. Treatment considerations for patient with Amelogenesis Imperfecta: a review. *Braz Dent Sci.* 2013;16(4):7–18. doi:10.14295/bds.2013.v16i4.904.
16. Marwah N. Textbook Of Pediatric Dentistry. 3rd Edn. Jaypee Brothers Medical Publishers; 2014.
17. Millet C, Viennot S, Duprez JP. Case report: Rehabilitation of a child with dentinogenesis imperfecta and congenitally missing lateral incisors. *Eur Arch Paediatr Dent.* 2010;11(5):256–60.
18. Moghadam MM. Implant applications for children. *Int J Contemp Dent Med Rev.* 2017;doi:10.15713/ins.ijcdmr.114.

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