Review Article

Implants in Paediatric Dentistry – "A Dubious Affirmation"

Singh G, Kohli A, Katiyar A, Gupta K, Mehrotra A, Dwivedi A

Abstract: The psychological trauma after loss of a permanent tooth is an unimaginable fondle, which cannot be perceived by anyone except the person in loss and the dental surgeon. The replacement of teeth by implants is usually restricted to patients with completed craniofacial growth; hence if the person in loss falls to be a child or an adolescent, it is definitely a nightmare for a Paediatric Dental Surgeon. A replacement of the lost permanent tooth by implants is an obvious treatment modality of today in adult population but in children or adolescents, use of implants is yet a restriction dilemma. An implant is an artificial tooth root that is placed to support the replaced tooth or bridge, having being required in people who have lost their tooth/teeth due to trauma, dental caries, periodontal disease or some other reason. This article reviews the implant insertion in children and adolescents and their practicability, stipulation and success in unfavourable potential effects like growth, permanent tooth bud trauma, displacements, impactions and interrupted permanent tooth eruption and other multi-dimensional restrictions.

Keywords: Adolescent; Anadontia; Dental implants; Ectodermal dysplasia; Hypodontia, Oligodontia.

INTRODUCTION

The replacement of teeth by implants is usually restricted to patients with completed craniofacial growth[1] hence if the person in loss falls to be a child or an adolescent, it is definitely a nightmare for a Paediatric Dental Surgeon. A replacement of the lost permanent tooth by implants is an obvious treatment modality of today in adult population but in children or adolescents, use of implants is yet a restrictional dilemma. An implant is an artificial tooth root that is placed to support the replaced tooth or bridge, having being required in people who have lost their tooth/teeth due to trauma, dental caries, periodontal disease or some other reason. However, in children who suffer from extended hypodontia, adontia, oligodontia or congenital syndromes as ectodermal dysplasia, the use of impants have become popular due to esthetic and functional reasons. This also reduces the potential psycho-social handicaps of the children.[2]

Growth is a dynamic process with stable pattern of changes resulting in the increased physical change of mass during the course of development. It is an important factor when planning implant placement in children and adolescents. No reliable indicator is available to determine when growth has ceased, although a good quality method is the use of serial cephalometric radiograph taken 6 months apart with superimposed orthodontic tracings. If no changes occur over a period of 1 year, one may assume that growth is complete.[3]

Dental implants for children are a new treatment modality. There are two primary concerns: (i) First, if implants are present during several years of facial growth, there is a danger of them becoming embedded, relocated, or displaced as the jaw grows. (ii) The second area of concern is the effect of prosthesis on growth. Design changes must be incorporated into such prosthesis to compensate for growth changes.[4]In a paediatric patient apart from unfavourable factors for implant placement like growth, permanent tooth bud trauma, displacements, impactions and interrupted permanent tooth eruption and other multi-dimensional restrictions, there exist a few favourable factors too like excellent local blood supply leading to undisputable uncomplicated osseous healing and a positive immunological resistance.

Quadrant wise implant placement knowledge is a must when treating a child or adolescent using implant. Maxillary anterior quadrant is an important area for consideration due to traumatic tooth loss and frequent congenital tooth absence. Vertical and antero-posterior growth changes in this area are substantial. The vertical growth of the maxilla exceeds all other dimensions of the growth in this quadrant; therefore

premature implant placement can result in the repetitive need to lengthen the transmucosal implant connection which leads to poor implant-to-prosthesis ratios.[5] Maxillary posterior quadrant is subject to same general growth factors described for the maxillary anteroposterior area. An additional growth factor is transverse maxillary growth at midpalatal suture region, which produces rotational growth that anteriorizes the position of the maxillary molars. Placement of osseointegrated dental implants in the maxillary posterior quadrant is best delayed until the age of 15 years in females and 17 years in males.[6]

Mandibular anterior quadrant is the best site for the placement of an osseointegrated implant before skeletal maturation as this area presents fewer growth variables. The closure of the mandibular symphyseal suture occurs during the first 2 years of life. Prosthesis supported by dental implants in the anterior mandible should be of a retrievable design to allow for an average increase of dental height of 5-6 mm as well as the anteroposterior growth. The dynamic growth and development of the posterior mandible quadrant in the transverse and anteroposterior dimensions coupled with its rotational growth presents multiple treatment concerns. Placement of osseointegrated implants in the posterior mandibular quadrant hence should be delayed until skeletal maturation.[6]

DISCUSSION

Edentulism is usually associated with the aging patient. However, total or partial tooth loss also affects young individuals too. A little is known about the outcome of the osseointegration procedure in young patients, and until now, only a limited number of case presentations have been reported. A retrospective review of a limited number of adolescents with implants was conducted to compare the behaviour of these implants with studies in which implants had been placed in growing animals. Growth of the facial skeleton is also reviewed. Implants placed in the growing alveolus behave like ankylosed teeth and become submerged as the surrounding bone grows. Cessation of facial growth should occur prior to implant placement in adolescents.[7]

Skeletal and dental growth results in dramatic changes in all three dimensions during active growth. Experimental evidence and the behavior of ankylosed teeth suggest that an osseointegrated object remains stationary in the bone surrounding it and does not move or adapt to bone remodelling. Growth changes may result in the burying or loss of implants depending on the placement site. Hence, implants placed in the early mixed dentition have a poor prognosis of continued usefulness through puberty. When placed early, implants may disturb growth or have to be replaced. Implants placed during late puberty or early adulthood has the best change for long-term usefulness.[8]

Maxillofacial growth and development in a preadolescent female patient with ectodermal dysplasia following oral rehabilitation with maxillary and mandibular endosseous dental implants is reported. Four maxillary and 4 mandibular implants were successfully integrated and restored at 8 years of age. Growth analysis 12 years later revealed that the implants followed maxillary and mandibular growth displacement. Minor impaction of the maxillary implants was observed, and mandibular implants were affected by the mandibular growth rotation, which led to a change in implant inclination.[9]

Implantation of 0.5X1.5 mm titanium pins in the jaw of children under longitudinal cephalometric studies reported that the majority of implants were stable. Pins in the path of erupting teeth and pins placed near bone surface undergoing resorption were displaced and pins placed in the areas of apposition bone growth gradually became embedded.[10, 11] A study with n=34 patients (mean age = 15.1 years) 42 implants and post-loading follow up (mean = 35.5 months) reported 90% success rate. The reported study also quoted the post-loading complications like ankylotic nature of dental implant and also the failure to respond to the vertical growth of the adjacent teeth and alveolus.[12] Another 5year study was reported using cylindrical and/or screw implants in adolescents ranging from 15-19 years of age in 135 patients and a success rate of >96% over 5 years of study.[13]

CONCLUSION: Edentulism is a tough situation for a patient and a tricky one for the dental surgeon. Edentulism in an adult is manageable as growth in adults occurs very slowly and over decades rather than rapidly as seen in children. Implant placement is majorly affected by the growth changes when used in children and adolescents. Hence, due to these three dimensional changes and their effects on implant placements there are a very few reported cases and reviews because of hesitation in performing such tedious procedure and a major probability of failure in form of embedded, ankylosed or lost implants. Therefore more serious emphasis should be paid on the timing, site, age and skeletal growth during the implant placement in paediatric dentistry. On an account of conducting such an expensive and tedious treatment in a child or an adolescent will add on to psychological anxiety in the child as well as the parents.

Author affiliations: 1. Dr. Garima Singh, MDS, Reader, 2.Dr. Anil Kohli, MDS, Professor& HOD, 3. Dr. Aahish Katiyar , MDS, Reader, 4. Dr. Kirtija Gupta, MDS, Reader, Dept. Of Pedodontics & Preventive Dentistry Rama Dental College, Hospital & Research Centre Kanpur, U.P, India. 5. Dr Ankur Mehrotra, MDS, Reader Department of Prosthodontics Rama Dental College, Hospital & Research Centre Kanpur, U.P, India. 6. Dr. Amit Dwivedi, PG Student, Dept. Of Pedodontics & Preventive Dentistry Rama Dental College, Hospital & Research Centre Kanpur, U.P, India.

REFERENCES

1. https://en.wikipedia.org/wiki/Dental_implant
2. Shobha T, Procedures required for restoration. In: Text Book of Pedodontics, 2ND edn. New Delhi: Paras Medical Publisher; 2009. P. 315-327.
3. Brahmin JS. Dental Implants in Children. Oral Maxillofacial Surg Clin N Am 2005;17:375-381.
4. Oesterle LJ, Cronin RJ Jr, Ranly D. Maxillary implants and the growing patient. Int J Oral Maxillofac Implants 1993;8:377-87.
5. Mishra SK, Chowdhary N, Chowdhary R. Dental implants in growing children. J Indian Soc Pedod Prev Dent. 2013 Jan-Mar;31(1):3-9.
6. Cronin RJ Jr, Oesterle LJ. Implants use in growing patients. Dent Clin North Am 1998;42:1-35.
7. Westwood RM, Duncan JM. Implants in adolescents: a literature review and case reports. Int J Oral Maxillofac Implants, 1996 Nov-Dec;11(6):750-5.
8. Oesterle LJ, Cronin RJ Jr, Ranly DM . Maxillary implants and the growing patient. Int J Oral Maxillofac Implant.1993;8(4):377-387.
9. Becktor KB, Becktor JP, Keller EE. Growth analysis of a patient with ectodermal dysplasia treated with endosseous implants: a case report. Int J Oral Maxillofac Implants. 2001 Nov-Dec;16(6):864-874.
10. Bjork A. Growth of the maxilla in three dimensions as revealed radiographically by the implant method. Br J Orthod 1977;4:53-64.
11. Bjork A. Variation in the growth pattern of the human mandible. A longitudinal radiographic study by the implant method. J Dent Res 1963;42:400-411.
12. Ledermann PD, Hasell TM, Hefti AF. Osseointegrated dental implants as alternative therapy to bridge construction or orthodontics in the young patients seven years of clinical experience. Pediatr Dent 1993;15:327-333.
13. Prachar P, Vanek J. Tooth defects treated by dental implants in adolescents. Scr Med (Brno) 2003;76:5-8.

Corresponding Author:
Dr. Garima Singh, Reader
Dept.of Pedodontics and Preventive Dentistry
Rama Dental College, Hospital and Research Centre, Kanpur – 208024, Uttar Pradesh, India.
Contact no:8576888444
Email: drgarima.pedodontia@gmail.com

How to cite this article: Singh G, Kohli A, Katiyar A, Gupta K, Mehrotra A, Dwivedi A. Implants in Paediatric Dentistry – "A Dubious Affirmation." Rama Univ J Dent Sci 2016 June;3(2):18-20.

Sources of support: Nil
Conflict of Interest: None declared