Feb 27, 2017

"Monday Morning Pearls of Practice by Bobby Baig"

baig@buildyoursmile.com

Prosthodontic Associates
2300 Yonge St, suite 905
Toronto, M4P1E4
www.buildyoursmile.com

Review: Dental Implant Placement and Skeletal Maturity: Part 1

Introduction:

1. The most appropriate, earliest age for placement of dental implants is generally held to be the age at which skeletal growth is thought to cease. The end of adolescence and the beginning of young adulthood coincide with the exhaustion of growth potential, but adaptive changes of the jaws continue throughout life. Until recently it was thought that adaptation has little clinical effect on implants.
2. Comparatively; Use of dental implants is normal in patients with ectodermal dysplasia and the influence of maxillary and mandibular skeletal and dental growth on the stability of those implants. For these patients,it is recommended that while deciding the optimal individual time point of implant insertion, the status of skeletal growth, the degree of hypodontia, and extension of related psychological stress should be taken into account in addition to the status of existing dentition and dental compliance of an adolescent patient. Both of above scenarios will be discussed in detail in this new letter.

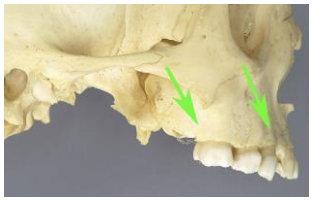
Normal Growth of the Jaw:

Maxilla: Growth of the maxilla is characterized by remodeling in a posterosuperior direction while simultaneously being displaced in the opposite anteroinferior direction (Fig. 1).

Mandible: Is characterized by displacement away from its articulation in the glenoid fossae as the condyles and rami relocate in a posterosuperior direction (Fig. 2).

Natural tooth movement occurs as a result of eruption and of being carried along passively with the maxilla and mandible, both of which undergo displacement anteroinferior during craniofacial morphogenesis (Fig.3). Tooth movement facilitates adaptation to changing anatomic relationships as the entire craniofacial assembly changes during this period of great flux.

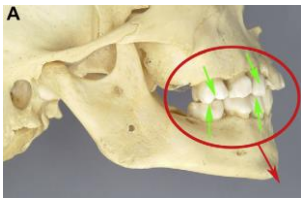
All Pictures are courtesy of R Carmichael at al; 2008 AOMS Clin N Am 1-9

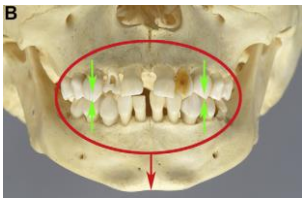
1 a) 

1b) 

2) 

1. Growth of the maxilla: by remodeling posterosuperiorly and simultaneous displacement anteroinferiorly.1 A) Lateral view. (B) Anterior view.
2. Growth of the mandible: by relocation of the condyles and rami posterosuperiorly and displacement anteroinferiorly.

3 a) 

3 b) 

3. Natural tooth movement is a net result of eruption (green arrows) and passive displacement anteroinferiorly (red arrow). (A) Lateral view. (B) Anterior view.

Adolescents and Dental Implants Therapy:

1. Owing to an absence of a periodontal ligament, implants behave like ankylosed teeth; that is, they remain stationary and do not erupt together with adjacent teeth. In failing to move together with erupting teeth, implants were found to inhibit local growth and development of the alveolar process.
2. A 3-year prospective clinical study in adolescents with congenitally missing teeth verified that implants do not move during growth of the jaws, and undergo relative submergence of a magnitude proportional to the amount of residual jaw growth.
3. Submergence of an implant is disadvantageous for a number of reasons. (fig 4a and 4b)
   A) An intraocclusion occurs, which disrupts carefully constructed occlusal relationships and leads to compensatory eruption of opposing teeth and tipping of adjacent teeth.
   B) A vertical discrepancy develops between the mucosal margin of the implant and the gingival margins of adjacent teeth.

4. A 

B 

4: Implant-supported crowns at sites 1.1 and 2.1 in a 22-year-old male demonstrate submergence, an upwardly curved distortion of the intercuspid occlusal plane, discrepancies of the marginal gingivae, compensatory eruption of the mandibular incisors, and mesial tipping of the maxillary lateral incisors and canines. (A) Frontal view. (B) Maxillary occlusal view.

4. Submergence of an implant or an ankylosed tooth appears not to be a passive phenomenon; rather, it exerts an inhibitory effect on eruption of neighboring teeth, the force of which diminishes with distance.
5. The distance over which this field effect is seen is usually restricted to one or two teeth on either side of a submerged implant, and depending on the degree of residual alveolar growth remaining at the time of implant placement, disruption of the occlusal plane can be severe.

Implant Submergence and Esthetic and Occlusal Outcome:

1. In general, the damage caused by implant submergence is not correctable. Although it may be possible to revise or replace the restoration to correct an occlusal discrepancy, the crown/root ratio of the replacement restoration may become unfavorable.
2. In addition, the esthetics of a replacement crown generally will be worse than the original because a soft tissue margin discrepancy cannot be corrected.
3. Moreover, because the field effect disrupts normal local alveolar growth, the submergence and tipping of adjacent teeth cannot be corrected orthodontically without accentuating the implant submergence, aggravating the accompanying esthetic and occlusal defects, and compounding attachment loss of the orthodontically extruded implant-adjacent teeth (Fig. 5).

5. 

5. Mutilation of maxillary occlusion in a 21-year-old female caused by residual dentoalveolar growth subsequent to placement of a dental implant to replace a congenitally missing maxillary left second premolar at age 15. The implant had been placed to provide orthodontic anchorage. Apparent fenestration of buccal bone and exposure of metal collar are related to surgical placement.

4. This situation underscores the importance of ensuring that residual growth has been exhausted before implant placement is attempted, except in some situations where dentoalveolar growth is expected to be minimal or where the value afforded by an anchored prosthesis outweighs the disadvantage of local growth inhibition.

References for the above newsletter:

1. Andreasen JO, Kristerson L, Nilson H, et al. Implants in the anterior region. [chapter 20]. Andreasen JO, Andreasen FM. Textbook and colour atlas of traumatic injuries to the teeth, 3rd edition. Copenhagen (Denmark):Munksgaard; 1994. p. 693.
2. Behrents R. Atlas of growth in the aging craniofacial skeleton. Monograph 18. In: Carlson DS, Ribbins KA. Craniofacial growth series. Ann Arbor (MI): University of Michigan Growth Series, Center for Human Growthand Development; 1986. p. 20–40.
3. Bernard JP, Schatz JP, Christou P, et al. Long-term vertical changes of the anterior maxillary teeth adjacent to single implants in young and mature adults. A retrospective study. J Clin Periodontol 2004;31(11):1024–8.
4. Bishara SE, Treder JE, Damon P, et al. Changes in the dental arches and dentition between 25 and 45 years of age. Angle Orthod 1996;66(6):417–22.
5. Bjork A, Skieller V. Normal and abnormal growth of the mandible. A synthesis of longitudinal cephalometric implant studies over a period of 25 years. Eur J Orthod 1983;5(1):1–46.
6. Bjork A. Sutural growth of the upper face studied by the implant method. Eur J Orthod 2007;29(Suppl 1):I82–8.
7. Chung LK, Hobson RS, Nunn JH, et al. An analysis of the skeletal relationships in a group of young people with hypodontia. J Orthod 2000;27(4):315–8.
8. Cronin RJ Jr, Oesterle LJ. Implant use in growing patients. Treatment planning concerns. Dent Clin North Am 1998; 42(1):1–34.
9. Enlow DH. Handbook of facial growth. 3rd edition. Philadelphia: WB Saunders Company; 1990. p. P46–54. Enlow DH, Hans MG. Essentials of facial growth. Philadelphia: WB Saunders Company; 1996. p. 29–68.
10. Fenton CC, Nish IA, Carmichael RP, et al. Mandibular reconstruction in a child with soft tissue matrix expansion grafting following ablation of a metastatic retinoblastoma. J Oral Maxillofac Surg 2007;65(11):2329–35.
11. Flores-Mir C, Nebbe B, Major PW. Use of skeletal maturation based on hand-wrist radiographic analysis as a predictor of facial growth: a systematic review. Angle Orthod 2004;74:118–24.
12. Forsberg CM, Eliasson S, Westergren H. Face height and tooth eruption in adultsda 20-year follow-up investigation. Eur J Orthod 1991;12(4):249–54.
13. Guckes AD, Scurria MS, King TS, et al. Prospective clinical trial of dental implants in persons with ectodermal dysplasia.J Prosthet Dent 2002;88:21–7.
14. HaÅN gg U, Taranger J. Maturation indicators and the pubertal growth spurt. Am J Orthod 1982;82(4):299–309.
15. HaÅN gg U, Taranger J. Height and height velocity in early, average and later maturers followed to the age of 25: a prospective longitudinal study of Swedish urban children from birth to adulthood. Ann Hum Biol 1991;18(1):47–56.
16. Iseri H, Solow B. Growth displacement of the maxilla studied in girls by the implant method. Eur J Orthod 1990;12(4): 389–98.
17. Iseri H, Solow B. Continued eruption of maxillary incisors and first molars in girls from 9 to 25 years, studied by the implant method. Eur J Orthod 1996;18(3):245–56.
18. Iseri H, Solow B. Change in the width of the mandibular body from 6 to 23 years of age: an implant study. Eur J Orthod 2000;22(3):229–38.
19. KuroÅNl J, OÅN dman J, et al. Treatment alternatives in young patients with missing teeth. Aspects on growth and development.
20. In: Koch G, Bergendal T, Kvint S. Consensus conference on oral implants in young patients: state of the art.
21. JoÅN nkoÅN ping (Sweden): Institute for Postgraduate Dental Research; 1996. p. 77–107.Nodal M, Kjaer I, Solow B. Craniofacial morphology in patients with multiple congenitally missing teeth. Eur J Orthod 1994;16(2):104–9.
22. Oandman J, GroÅN ndahl K, Lekholm U, et al. The effect of osseointegrated implants on the dento-alveolar development. A clinical and radiographic study in growing pigs. Eur J Orthod 1991;13(4):279–86.
23. Oesterle LJ, Cronin RJ Jr. Adult growth, aging, and the single-tooth implant. Int J Oral Maxillofac Implants 2000;15(2): 252–60.
24. Taranger J, HaÅN gg U. The timing and duration of adolescent growth. Acta Odontol Scand 1980;38(1):57–67.
25. Tarlow JL. The effect of adult growth on an anterior single-tooth implant: a clinical report. J Prosthet Dent 2004;92(3): 213–5.
26. Thilander B, OÅN dman J, GroÅN ndahl K, et al. Osseointegrated implants in adolescents. A three year study. Ned Tijdschr
27. Tandheelkd 1995;102(4):383–5.