BÖLÜM 4

DENTAL GENİŞLETME

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TARİHÇE

Kraniofasiyal büyümede ilk olarak transversal yöndeki büyüme (yüz genişlikleri), ikinci olarak sagittal yöndeki büyüme (yüz derinlikleri) ve son olarak da vertikal yöndeki büyüme (yüz yükseklikleri) tamamlanmaktadır (1). Büyümenin transversal yönde erken durması sonucu ortaya çıkan maksiller darlıklar Hipokrat tarafından binlerce yıl önce tanımlanmıştır (2). Dental darlıklar üst çenede daha belirgin iken, dilin alt çene arkını destekleyici etkisi ve büyüme sırasında alveoler kemiğe önemli ölçüde genişletici kuvvet uygulaması gibi nedenlerle alt çene ark formu korunmaktadır (1, 3).

Dental arkların genişletilmesine yönelik ilk ortodontik aygıt 1728 yılında Pierre Fauchard tarafından geliştirilen at nalı şeklindeki gümüş şerit olan Bandeau apareyidir (4). Bu apareyin diş çapraşıklıklarını düzelttiği bildirilmiştir. Bandeau apareyi, Angle tarafından geliştirilen E-ark apareyinin temelini oluşturmuştur (4, 5).

1757 yılında, hem Pierre Fauchard'ın öğrencisi hem de Fransa Kralının Diş Hekimi olan Etienne Bourdet, Fauchard'ın Bandeau apareyinin ağızda kararması nedeniyle gümüş yerine altın şeritleri tercih etmiş ve lingual genişletme plakları

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Literatür incelendiğinde; önceki çalışmalar arasında tedavi yaklaşımları, çalışma tasarımı ve hasta sayısı gibi kriterler açısından çokça farklılık olması nedeniyle üst çene darlığıve/veya posterior çapraz kapanışların erken dönem tedavisine yönelik standart bir yaklaşımın olmadığı anlaşılmaktadır (82). Bununla birlikte, birçok çalışmada posterior çapraz kapanış tedavilerinin genellikle 9 yaşından önceki süt veya erken karışık dişlenme döneminde yapıldığı görülmektedir (26, 27, 48,69,93).

Üst çene darlığı ve/veya posterior çapraz kapanış vakalarında dental genişletme planlanırken maloklüzyonun tipi ve şiddeti, hasta yaşı ve uyumu, kullanılacak genişletme apareyinin tipi, apareyin başarı oranı ve dentoalveoler etkileri, tedavi süresi, apareyin olası yan etkileri ve maliyet gibi faktörler birlikte değerlendirilmelidir. Bununla birlikte tüm bu faktörlerin hepsine olumlu yanıt veren bir tedavi yaklaşımı ve apareye ait herhangi bir bilimsel kanıt bulunmamakla birlikte erken karışık dişlenme döneminde hem sabit hem de hareketli dental genişletme apareylerinin üst çene darlığı ve/veya posterior çapraz kapanışların tedavisinde yüksek başarı oranıyla etkili olduğu bildirilmiştir (82).

Alt çenede de erken karışık dişlenme döneminde, henüz daimi kanin dişler sürmeden yapılan genişletmenin stabil olacağı vurgulanmaktadır (94). Buna karşılık daimi kaninlerin sürmüş olduğu daha ileri dönemde ise; alt çenede interkanin mesafede en fazla 1 mm genişletme yapılması önerilmekte, bu miktarın üzerinde yapılan genişletmelerin stabil olmayacağına dikkat çekilmektedir.

KAYNAKLAR

1. Nanda R, Snodell SF, Bollu P. Transverse growth of maxilla and mandible. *Seminars in Orthodontics.* 2012;18(2):110-117. doi:10.1053/j.sodo.2011.10.007.
2. Timms DJ. *Rapid Maxillary Expansion*, Chicago: Quintessence Publishing Co., Inc; 1981.
3. Swinehart DR. The importance of the tongue in the development of normal occlusion. *American Journal of Orthodontics and Dentofacial Orthopedics*. 1950;36(11):813-30.
4. Guez C. *A Contemporary Perspective on Tooth Extraction in Orthodontics,* Chapel Hill, NC: University of North Carolina at Chapel Hill Graduate School; 2015.
5. Green J. The origins and evolution of fixed orthodontic appliances. *Dental Nursing*. 2014;10(9):524-8.
6. Wahl N. Orthodontics in 3 millennia. Chapter 1: Antiquity to the mid-19th century. *American Journal of Orthodontics and Dentofacial Orthopedics*. 2005;127(2):255-9.
7. Weinberger BW. Historical résumé of the evolution and growth of orthodontia. *The Journal of the American Dental Association*. 1934;21(11):2001-21.
8. Wahl N. Orthodontics in 3 millennia. Chapter 2: Entering the modern era. *American Journal of Orthodontics and Dentofacial Orthopedics*. 2005;127(4):510-5.
9. Phulari BS. *History of Orthodontics*. New Delhi, London, Philadelphia, Panama: JayPee Brothers Medical Publishers (P) LTD; 2013.
10. Peterson KH. *Changes in the Maxillary Arch Length Accompanying Rapid Palatal Expansion,* Master's Theses 2426, Chicago: Loyola University; 1970.
11. Timms DJ. The dawn of rapid maxillary expansion. *The Angle Orthodontist*. 1999;69(3):247-50.
12. Philippe J. How, why, and when was the edgewise appliance born? *Journal of Dentofacial Anomalies and Orthodontics*. 2008;11(1):68-74.

13. Spiro JC, J. Alfredo AL. Orthopedic and orthodontic applications of the quad-helix appliance. *American Journal of Orthodontics and Dentofacial Orthopedics.* 1977;72(4):422-428.
14. Bench RW. The Quad Helix Appliance. *Seminars in Orthodontics.* 1998;4(4):231-237.
15. Arndt WV. Nickel Titanium Palatal Expander. *Journal of Clinical Orthodontics*. 1993;27(3):129-137.
16. Mossaz-Joëlson K, Mossaz CF. Slow maxillary expansion: a comparison between banded and bonded appliances. *The European Journal of Orthodontics*. 1989;11(1):67-76.
17. Halıcıoğlu K, Yavuz İ. Literatür derlemesi: Üst çene genişletmesinde apareyler ve felsefeler. *Atatürk Üniversitesi Diş Hekimliği Fakültesi Dergisi*.2011(4):32-9.
18. Silva Filho OG, Santamaria Jr M, Filho LC. Epidemiology of posterior crossbite in the primary dentition. *Journal of Clinical Pediatric Dentistry*. 2007;32(1):73-8.
19. Altuğ AT, Kurt G, Şahbaz EB. Cerrahi Destekli Hızlı Üst Çene Genişletmesi. Özdiler E. (ed.) *Güncel Bilgiler Işığında Ortodonti* içinde. Ankara: Gümüş Kitabevi;2015. p.613-614.
20. Haas AJ. Rapid expansion of the maxillary dental arch and nasal cavity by opening the midpalatal süture. *The Angle Orthodontist*. 1961;31(2):73-90.
21. Motoyoshi M, Shirai S, Yano S, Nakanishi K, Shimizu N. Permissible limit for mandibular expansion. *The European Journal of Orthodontics*. 2005;27(2):115-20.
22. Cotton LA. Slow maxillary expansion: Skeletal versus dental response to low magnitude force in Macaca mulatta. *American Journal of Orthodontics and Dentofacial Orthopedics*. 1978;73(1):1-23.
23. Urbaniak JA, Brantley WA, Pruhs RJ, Zussman RL, Post AC. Effects of appliace size, arch wire diameter, and alloy composition on the in vitro delivery of the quad-helix appliace. *American Journal of Orthodontics and Dentofacial Orthopedics*. 1988;94(4):311-6.
24. Barber AF, Sims M. Rapid maxillary expansion and external root resorption in man: A scanning electron microscope study. *American Journal of Orthodontics and Dentofacial Orthopedics*. 1981;79(6):630-52.
25. Vardimon AD, Graber TM, Voss LR, Lenke J. Determinants controlling iatrogenic external root resorption and repair during and after palatal expansion. *The Angle Orthodontist*. 1991;61(2):113-22.
26. Boysen B, Cour KL, Athanasiou AE, Gjessing PE. Three-dimensional evaluation of dentoskeletal changes after posterior cross-bite correction by quad-helix or removable appliances. *British Journal of Orthodontics*. 1992;19(2):97-107.
27. Hermanson H, Kurol J, RÖnnerman A. Treatment of unilateral posterior crossbite with quad-helix and removable plates. A retrospective study. *The European Journal of Orthodontics*. 1985;7(2):97-102.
28. Schiffman PH, Tuncay OC. Maxillary expansion: a meta analysis. *Clinical Orthodontics and Research*. 2001;4(2):86-96.
29. Agostino P, Ugolini A, Signori A, Silvestrini-Biavati A, Harrison JE, Riley P. Orthodontic treatment for posterior crossbites. *Cochrane Database of Systematic Reviews*. 2014(8).
30. Quinzi V, Mummolo S, Bertolazzi F, Campanella V, Marzo G, Marchetti E. Comparison of Mandibular Arch Expansion by the Schwartz Appliance Using Two Activation Protocols: A Preliminary Retrospective Clinical Study. *Journal of Functional Morphology and Kinesiology*. 2020;5(3):61.
31. McNamara JA, Brudon WL, Kokich VG. *Orthodontics and Dentofacial Orthopedics.* 1st ed. Ann Arbor: Needham Press; 2001.
32. O'Grady PW, McNamara Jr JA, Baccetti T, Franchi L. A long-term evaluation of the mandibular Schwarz appliance and the acrylic splint expander in early mixed dentition patients. *American Journal of Orthodontics and Dentofacial Orthopedics*. 2006;130(2):202-13.
33. Wendling LK, McNamara Jr JA, Franchi L, Baccetti T. A prospective study of the short-term treatment effects of the acrylic-splint rapid maxillary expander combined with the lower Schwarz appliance. *The Angle Orthodontist*. 2005;75(1):7-14.
34. Santos RL, Pithon MM, Souza MMG, Bolognese AM, Souza Araújo MT. Evaluation of palatal arches made from low-nickel stainless steel wire. *Brazilian Journal of Oral Sciences*. 2009;8(3):149-53.

35. Agarwal A, Mathur R. Maxillary expansion. *International Journal of Clinical Pediatric Dentistry*. 2010;3(3):139-46.
36. Coffin WH. A generalized treatment of irregularities. *The American Journal of Dental Science*. 1882;15(11):495-504.
37. Fränkel R. Decrowding during eruption under the screening influence of vestibular shields. *American Journal of Orthodontics and Dentofacial Orthopedics*. 1974;65(4):372-406.
38. Fränkel R. The guidance of eruption without extraction. *The European Journal of Orthodontics*. 2007;29(suppl_1):i107-i13.
39. Bingöl Sİ, Burçak K. Sınıf II Malokluzyonların Tedavisinde Fonksiyonel Apareylerin Yeri. *ADO Klinik Bilimler Dergisi*.9(1):1581-92.
40. Owen III AH. Morphologic changes in the transverse dimension using the Fränkel appliance. *American Journal of Orthodontics and Dentofacial Orthopedics*. 1983;83(3):200-17.
41. Crozat GB. Possibilities and use of removable labio-lingual spring appliances. *International Journal of Orthodontia and Oral Surgery*. 1920;6(1):1-7.
42. Proffit, WR, Fields Jr HW, Sarver DM. *Contemporary Orthodontics.* 5 th ed. Missouri: Mosby Inc., an affiliate of Elsevier Inc; 2013.
43. McInaney JB, Adams RM, Freeman M. A nonextraction approach to crowded dentitions in young children: early recognition and treatment. *Journal of the American Dental Association*. 1980;101(2):251-7.
44. Zimring, J .F. and Isaacson, R.J. Forces produced by rapid maxillary expansion: III. Forces present during retention. *The Angle Orthodontist.* 1965;35(3):178-186.
45. Henry R. Slow maxillary expansion: a review of quad-helix therapy during the transitional dentition. *Journal of Dentistry for Children*. 1993;60(4):408-13.
46. Birnie D, McNamara T. The quadhelix appliance. *British Journal of Orthodontics*. 1980;7(3):115-20.
47. Vizzotto MB, De Araújo FB, Dias da Silveira HE, Boza AA, Closs LQ. The Quad-Helix Appliance in the Primary Dentition–Orthodontic and Orthopedic Measurements. *Journal of Clinical Pediatric Dentistry*. 2007;32(2):165-70.
48. Bell RA, LeCompte EJ. The effects of maxillary expansion using a quad-helix appliance during the deciduous and mixed dentitions. *American Journal of Orthodontics and Dentofacial Orthopedics*. 1981;79(2):152-61.
49. Corbridge JK, Campbell PM, Taylor R, Ceen RF, Buschang PH. Transverse dentoalveolar changes after slow maxillary expansion. *American Journal of Orthodontics and Dentofacial Orthopedics*. 2011;140(3):317-25.
50. Yaseen SM, Acharya R. Hexa Helix: Modified Quad Helix Appliance to Correct Anterior and Posterior Crossbites in Mixed Dentition. *Case Reports in Dentistry*. 2012;2012:1-5.
51. Goshgarian R. Orthodontic Palatal Arch Wires. *United States Patent and Trademark Office.* Washington:1974. Patent No: 3,792,529.
52. Tsetsilas M, Konermann A-C, Keilig L, Reimann S, Jäger A, Bourauel C. Symmetric and asymmetric expansion of molars using a Burstone-type transpalatal arch. *Journal of Orofacial Orthopedics*; 2015. p. 377-90.
53. Haas SE, Cisneros GJ. The goshgarian transpalatal bar: A clinical and an experimental investigation. *Seminars in Orthodontics.* 2000;6(2):98-105.
54. Baldini G, Luder H. Influence of arch shape on the transverse effects of transpalatal arches of the Goshgarian type during application of buccal root torque. *American Journal of Orthodontics and Dentofacial Orthopedics*. 1982;81(3):202-8.
55. Raucci G, Pachêco-Pereira C, Grassia V, d'Apuzzo F, Flores-Mir C, Perillo L. Maxillary arch changes with transpalatal arch treatment followed by full fixed appliances. *The Angle Orthodontist*. 2015;85(4):683-9.
56. Rickettsa RM. A statement regarding early treatment. *American Journal of Orthodontics and Dentofacial Orthopedics*. 2000;117(5):556-8.
57. Harberson VA, Myers DR. Midpalatal süture opening during functional posterior cross-bite correction. *American Journal of Orthodontics and Dentofacial Orthopedics*. 1978;74(3):310-3.

58. Carano A, Testa M. The Spring Jet for slow palatal expansion. *Journal of Clinical Orthodontics*. 1999;33(9):527-31.
59. Corbett MC. Slow and continuous maxillary expansion, molar rotation, and molar distalization. *Journal of Clinical Orthodontics*. 1997;31(4):253-63.
60. Marzban R, Nanda R. Slow maxillary expansion with nickel titanium. *Journal of Clinical Orthodontics*. 1999;33:431-41.
61. Paul R, Kapoor TJ, Malhotra V, Nayak UK, Bhatt S. Efficacy of Nickel-Titanium Palatal Expanders. *Journal of Indian Orthodontic Society*. 2011;45(4):243-50.
62. Ferrario VF, Garattini G, Colombo A, Filippi V, Pozzoli S, Sforza C. Quantitative effects of a nickel-titanium palatal expander on skeletal and dental structures in the primary and mixed dentition: a preliminary study. *The European Journal of Orthodontics*. 2003;25(4):401-10.
63. Raju P, Bhattacharya P, Gupta A, Garg J, Agarwal D. Maxillary expansion by nickel titanium palatal expander in cleft palate patient. *Journal of Dr NTR University of Health Sciences*. 2014;3(5):51-4.
64. Gianolio A, Cherchi C, Lanteri V. Rapid and slow maxillary expansion: a posteroanterior cephalometric study. *European Journal of Paediatric Dentistry*. 2014;15(4):415-8.
65. Lanteri C, Beretta M, Lanteri V, Gianolio A, Cherchi C, Franchi L. The Leaf expander for non-compliance treatment in the mixed dentition. *Journal of Clinical Orthodontics*. 2016;50(9):552-60.
66. Gianolio A, Lanteri C, Lanteri V, Cherchi C. A New Device For Calibrated Maxillary Expansion: The Ni-Ti Memoria® Leaf Spring Activated Expander. *Leone America's Ortho News*. 2015;1(38):1-10.
67. Bell RA. A review of maxillary expansion in relation to rate of expansion and patient's age. *American Journal of Orthodontics and Dentofacial Orthopedics*. 1982;81(1):32-7.
68. Storey E. Tissue response to the movement of bones. *American Journal of Orthodontics and Dentofacial Orthopedics*. 1973;64(3):229-47.
69. Sandikçiolu M, Hazar S. Skeletal and dental changes after maxillary expansion in the mixed dentition. *American Journal of Orthodontics and Dentofacial Orthopedics*. 1997;111(3):321-7.
70. Claro CAdA, Abrão J, Reis SAB, Fantini SMd. Correlation between transverse expansion and increase in the upper arch perimeter after rapid maxillary expansion. *Brazilian Oral Research*. 2006;20:76-81.
71. Oshagh M, Momeni Danaei S, Hematiyan M, Hajian K, Shokoohi Z. Comparison of dental arch changes and patients' discomforts between newly designed maxillary expansion screw and slow expansion procedures. *Journal of Dentistry*. 2012;13(3):110-9.
72. Thilander B, Myrberg N. The prevalence of malocclusion in Swedish schoolchildren. *European Journal of Oral Sciences*. 1973;81(1):12-20.
73. Hesse KL, Årtun J, Joondeph DR, Kennedy DB. Changes in condylar position and occlusion associated with maxillary expansion for correction of functional unilateral posterior crossbite. *American Journal of Orthodontics and Dentofacial Orthopedics*. 1997;111(4):410-8.
74. Kennedy DB, Osepchook M. Unilateral posterior crossbite with mandibular shift: a review. *Journal-Canadian Dental Association*. 2005;71(8):569-73.
75. Miyawaki S, Tanimoto Y, Araki Y, Katayama A, Kuboki T, Takano-Yamamoto T. Movement of the lateral and medial poles of the working condyle during mastication in patients with unilateral posterior crossbite. *American Journal of Orthodontics and Dentofacial Orthopedics*. 2004;126(5):549-54.
76. Turpin DL. Good time for discussion of early treatment. *American Journal of Orthodontics and Dentofacial Orthopedics*. 2000;118(3):247.

77. Egermark-Eriksson I, Carlsson GE, Magnusson T, Thilander B. A longitudinal study on malocclusion in relation to signs and symptoms of cranio-mandibular disorders in children and adolescents. *The European Journal of Orthodontics*. 1990;12(4):399-407.
78. O'Byrn BL, Sadowsky C, Schneider B, BeGole EA. An evaluation of mandibular asymmetry in adults with unilateral posterior crossbite. *American Journal of Orthodontics and Dentofacial Orthopedics*. 1995;107(4):394-400.
79. Kurol J, Berglund L. Longitudinal study and cost-benefit analysis of the effect of early treatment of posterior cross-bites in the primary dentition. *The European Journal of Orthodontics*. 1992;14(3):173-9.
80. Lindner A. Longitudinal study on the effect of early interceptive treatment in 4-year-old children with unilateral cross-bite. *European Journal of Oral Sciences*. 1989;97(5):432-8.
81. Tsarapatsani P, Tullberg M, Lindner A, Huggare J. Long-term follow-up of early treatment of unilateral forced posterior cross-bite. Orofacial status. *Acta Odontologica Scandinavica*. 1999;57(2):97-104.
82. Petrén S, Bondemark L, Söderfeldt B. A systematic review concerning early orthodontic treatment of unilateral posterior crossbite. *The Angle Orthodontist*. 2003;73(5):588-96.
83. Petrén S, Bondemark L. Correction of unilateral posterior crossbite in the mixed dentition: a randomized controlled trial. *American Journal of Orthodontics and Dentofacial Orthopedics*. 2008;133(6):790. e7-. e13. 99. Riedel RA. A review of the retention problem. *The Angle Orthodontist*. 1960;30(4):179-99.
84. Little RM, Riedel RA, Stein A. Mandibular arch length increase during the mixed dentition: postretention evaluation of stability and relapse. *American Journal of Orthodontics and Dentofacial Orthopedics*. 1990;97(5):393-404.
85. Motoyoshi M, Hirabayashi M, Shimazaki T, Namura S. An experimental study on mandibular expansion: increases in arch width and perimeter. *The European Journal of Orthodontics*. 2002;24(2):125-30.
86. Walter DC. Comparative changes in Mandibuiar canine and first molar widths. *The Angle Orthodontist*. 1962;32(4):232-41.
87. Proffit W, Phillips C, Dann C. Who seeks surgical-orthodontic treatment? *The International Journal of Adult Orthodontics and Orthognathic Surgery*. 1990;5(3):153-60.
88. Mobrici P, Lanteri C, Beretta M, Caprioglio A. Slow maxillary expansion in adult patients: a pilot study. *Mondo Ortodontico*. 2012;37(5):7-13.
89. Bassarelli T, Dalstra M, Melsen B. Changes in clinical crown height as a result of transverse expansion of the maxilla in adults. *The European Journal of Orthodontics*. 2005;27(2):121-8.
90. McNamara Jr JA. Early intervention in the transverse dimension: is it worth the effort? *American Journal of Orthodontics and Dentofacial Orthopedics*. 2002;121(6):572-4.
91. Kutin G, Hawes RR. Posterior cross-bites in the deciduous and mixed dentitions. *American Journal of Orthodontics and Dentofacial Orthopedics*. 1969;56(5):491-504.
92. Clifford FO. Cross-bite correction in the deciduous dentition: principles and procedures. *American Journal of Orthodontics and Dentofacial Orthopedics*. 1971;59(4):343-9.
93. Ranta R. Treatment of unilateral posterior crossbite: comparison of the quad-helix and removable plate. *ASDC Journal of Dentistry for Children*. 1988;55(2):102-4.
94. Lutz HD, Poulton DR. Stability of dental arch expansion in the deciduous dentition. *The Angle Orthodontist*. 1985;55(4):299-315.