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Twin Block appliance. A Systematic Review.

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Corresponding Author:
Dr. Martina Mezio,
Attender, Department of Oral and Maxillo Facial Sciences, Sapienza, Orthognathodontics Unit - Rome- Italy - Italy

Submitting Author:
Dr. Martina Mezio,
Attender, Department of Oral and Maxillo Facial Sciences, Sapienza, Orthognathodontics Unit - Rome- Italy - Italy

Other Authors:
Dr. Denise Giovannoni,
Attender, Department of Oral and Maxillo Facial Sciences, Sapienza, Orthognathodontics Unit - Rome- Italy - Italy

Dr. Ludovica Caterini,
Attender, Department of Oral and Maxillo Facial Sciences, Sapienza, Orthognathodontics Unit - Rome- Italy - Italy

Dr. Martina Dari,
Attender, Department of Oral and Maxillo Facial Sciences, Sapienza, Orthognathodontics Unit - Rome- Italy - Italy

Dr. Elisa Pacella,
Attender, Department of Oral and Maxillo Facial Sciences, Sapienza, Orthognathodontics Unit - Rome- Italy - Italy

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Author(s): Mezio M, Giovannoni D, Caterini L, Dari M, Pacella E

Abstract

Functional appliances have been used for long time in the treatment of Class II Division 1 malocclusions. Several varieties of functional appliances are currently in use whit the aim to improve skeletal imbalances. Alteration of maxillary growth, possible improvement in mandibular growth and position, and change in dental and muscular relationships are the expected effects of these functional appliances. One of the more popular functional appliances used today is the Twinblock. Twin block, compared to other functional devices, can promote mandibular growth and also allows to work on the vertical component of malocclusion. The appropiate timing of treatment and patient collaboration are crucial to achieving a satisfactory therapeutic result.

Introduction

Malocclusions of class II can manifest in various skeletal and dental configurations[1,2,3,4,5]. Most Class II patients have a deficiency in the anteroposterior position of the jaw. Functional appliance therapy has become an increasingly popular method of correcting Class II malocclusion. Several varieties of functional appliances, such as bionator[6], FR-2 of FrÃ¤nkel[7,8], Herbst[9], Twin Block, have been used for many years in the treatment of Class II Division 1 malocclusions to improve skeletal imbalances.

The Twin-block was developed to correct Class II malocclusions characterized in part by mandibular skeletal retrusion[10,11]. The Twin Block functional appliance was invented by William J. Clark in 1982. It consists of a double acrylic resin plaque anchored with delta ganges on the first molars and first premolars, a vestibular arch from the right canine to the left one, a bite block, inclined by 65-70 Â° that causes a mandibular advance. The lower resin plaque has a first molar delta claps and ball claps placed in the interproximal areas anteriorly. The Â bite block are placed mesially at the distal marginal edge of the second premolars. These separate plates make the twin block appliance different from other removable functional appliances, which are basically monoblocks. The appliance is constructed from bite registrations taken with the incisors in an end-to-end position[12,13,14,15].

Other auxiliary elements such as transverse expansion screws can be added Â in case of contraction of the upper jaw, whereas screws and sagittal springs can be added to recover arc space. To facilitate the correction of the maxillary protrusion may be associated with extraoral traction or traction with intermesholar clamps applied on upper vestibular arch bends and on lower molar claps.

The twin block is less bulkyÂ than other functional devices and this could improve patient compliance,Â major freedom in mandibular movements and speech disturbance is minimized[16]. Patient cooperation is one of the most important factors for successful functional appliance treatment.Â

Materials and Methods

This review was designed to study the mandibular skeletal and dentoalveolar changes produced by the Twin Block appliance. Especially to underline the effects of Twing Block on the vertical component of malocclusion. The systematic review of literature has been performed on the principal medical databases: PubMed,Scopus.Â The keywords used were *Twin-block therapy, skeletal growth, mandibular growth, vertical changes. functional appliances, dentoalveolar effects.* Following the search, 40 articles were selected.

Discussion

Skeletal and dentoalveolar effects

The main objective of Twin-block therapy is to increase mandibular growth by stimulating increased growth at the condylar cartilage[17].

The biological responsiveness of the condylar cartilage depends on the growth rate of the jaw. However, the jaw growth rate is not constant throughout the life but has a peak during puberty[18]. Better results are obtained when the treatment with functional device coincides with the growth peak[19,20].

Several methods can be used to calculate the peak of skeletal growth, these biological indicators include increase in body height[21,22], skeletal maturation of the hand and the wrist,31 dental development and eruption[23,24], menarche, breast and voice changes[25], and cervical vertebrae maturation[26,27].

Some authors demonstrated only small changes in mandibular growth and concluded that it was not affected by treatment with functional appliances[28.29]. On the other hand, other authorsÂ suggested that there may be significant influences on mandibular growth after timely intervention[30,31,32].

Sandler[33] reported an average increase in the distance from articulation to gnathion of 2.4 mm during a 12-month period of Twin-block treatment, Mills and McCulloch[34] shows an increase of 4.2 mm and increase in mandibular length of 2,7mm.

The greater increase in total mandibular length Â was associated with significant increases in the height of the mandibular ramus and in the length of the mandibularÂ body in the group treated at the peak.

The greater additional growth of the mandible is concomitant with significant changes in the direction of condylar growth. Patients show significantly more backward direction of growth in the mandibular condyle, as revealed by the significant opening of the mandibolar angle.

Lund and Sandler[33] also noted distal movement of the upper molars, an increase in mandibular length, as significant increases in both anterior and posterior facial height and a slight inhibition of forward maxillary growth, some proclination of the lower incisors and lingual tipping of the upper incisors.

Robertson[35] suggested that the principal changes that occurred with functional appliance therapy were dentoalveolar, including distalization of the upper molars and retroclination of the upper incisors, along with mesial movement of the lower molars and proclination of the lower incisors.

The lingual tipping of the maxillary incisors could be caused not only by the contact of the lip musculature during Twin-block treatment, but also by the vestibolar arch, which might come into contact with the incisors during sleeping[36,37]. The most apparent dentoalveolar effect was proclination of the mandibular incisors and was probably a result of the mesial force on the mandibular incisors induced by protrusion of the mandible[38].Twin-block therapy produces an efficient reduction in the overjet and a remarkable correction in the molar relation. Both the distal movement of upper molars and the mesial movement of lower molars contributed to the correction in molar relation. Mills and McCulloch[16] concluded that the headgear effect caused relative distalization of the maxillary molars during Twin-block appliance treatment.

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Vertical Changes.

Control of the vertical dimension is one of the proposed benefits of the Twin-block appliance[14]. Vertical changes included the delay of eruption of the upper maxillary molars and the enhanced eruption of the mandibular molars[39,40].

The acrylic bite blocks either can inhibit molar eruption in patients with increased facial height (long face) or can be modified to allow posterior dental eruption in patients with reduced facial height (short face). Removing acrylic selectively we allow an increase in the vertical dimension and this an important component of Twin-block therapy[11].

Toth and Mcnamara[36] reported 3.0 mm increase in anterior face height and 3.2 mm increase in posterior face height. Lund and Sandler[33] found 2.6 mm increase in total anterior face height after Twin BlockÂ therapy . Mills and McCulloch[16] noted an increases of 3.8 mm in total anterior face height and 2.9 mm for posterior face heights. Therefore, two-block therapy is indicated in patients with deep bite.

Conclusion

- Major favorable effects induced by Twin Block therapy are obtained during the peak puberty growth.
- Significant increases in mandibular length were observed.
- The dentoalveolar effect consist of lingual tipping of maxillary incisors and vestibolar tipping of lower incisors.
- Significant decreases in overbite and overjet were observed at the end of treatment whit Twin-block.
- A proposed benefit of the Twin-block appliance is the ability to control vertical development, an increase in total anterior face height was observed.Â

References

1. Henry RG. A classification of Class II Division 1 malocclusion. Angle Orthod 1957;27:83-92.

Â 2. Renfroe EW. A study of the facial patterns associated with Class I, Class II, Division 1, and Class II, Division 2 malocclusions. Angle Orthod 1948;18:12-5.

Â 3. Rothstein TL. Facial morphology and growth from

10 to 14 years of age in children presenting Class II, Division 1 malocclusion: a comparative roentgenographic cephalometric study. Am J Orthod 1971;60:619-20.

Â 4. Craig CE. The skeletal patterns characteristics of Class I and Class II Division 1 malocclusions in norma lateralis. Angle Orthod 1951;21:44-56.

Â 5. Gilmore WA. Morphology of the adult mandible in Class II Division 1 malocclusion and in excellent occlusion. Angle Orthod 1950;20:137-46.

Â 6. Bolmgren GA, Moshiri F. Bionator treatment in Class II, division 1. Angle Orthod 1986;56:255-62.

Â 7. FrÃ¤nkel R. The treatment of Class II, Division 1 malocclusion with functional correctors. Am J Orthod 1969;55:265-75.

Â 8. McNamara JA Jr, Howe RP, Dischinger TG. A comparison of the Herbst and FrÃ¤nkel appliances in the treatment of Class II malocclusion. Am J Orthod Dentofacial Orthop 1990;98:134-44.

Â 9. Wieslander L. Intensive treatment of severe Class II malocclusions with a headgear- Herbst appliance in the early mixed dentition. Am J Orthod 1984;86:1-13.

Â 10. Clark WJ. The Twin-block traction technique. Eur J Orthod 1982;4:129-38.

11. Clark WJ. The Twin-block technique: a functional orthopedic appliance system. Am J Orthod Dentofacial Orthop 1988;93:1-18.

12. Clark WJ. The Twin-block technique: part 1. Funct Orthod 1992;9:32-7.

13. Clark WJ. The Twin-block technique: part 2. Funct Orthod 1992;9:45-9.

14. Clark WJ. Twin-block functional therapy. London: Mosby-Wolfe; 1995.

15. Clark WJ. The Twin-block technique. In: Graber TM, Rakosi T, Petrovic AG, editors. Dentofacial orthopedics with functional appliances, 2nd edition. St Louis: Mosbyâ€“Yearbook, Inc, 1997:268-98.

16. Mills C M, McCulloch K J. Treatment effects of the twin block appliance: a cephalometric study. American Journal of Orthodontics and Dentofacial Orthopedics 1998,114: 15â€“24.

17. BjÃ¶rk A. Variations in the growth pattern of the human mandible: longitudinal radiographic study by the implant method. J Dent Res 1963;42:400-11.

18.. EkstrÃ¶m C. Facial growth rate and its relation to somatic maturation in healthy children. Swed Dent J (Suppl) 1982;11:1-99.

19.. Lewis A, Roche AF, Wagner B. Pubertal spurts in cranial base and mandible: comparisons within individuals. Angle Orthod 1985;55:17-30.

20. HÃ¤gg U, Pancherz H, Taranger J. Pubertal growth and orthodontic treatment. In: Carlson DS, Ribbens KA, eds. Craniofacial growth during adolescence. Ann Arbor: Center for Human Growth and Development, The University of Michigan, 1987: Craniofacial Growth Monograph Series; vol 20.

21. Nanda RS. The rates of growth of several facial components measured from serial cephalometric roentgenograms. Am J Orthod 1955;41:658-73

22. Hunter C. The correlation of facial growth with body height and skeletal maturation at adolescence. Angle Orthod 1966;36:44-54.

23. Hellman M. The process of dentition and its effects on occlusion. Dent Cosmos 1923;65:1329-44.

24. Lewis AB, Garn SM. The relationship between tooth formation and other maturation factors. Angle Orthod 1960;30:70-7.

25. Tanner JM. Growth at adolescence, 2nd ed. Oxford: Blackwell Scientific Publications; 1962.

26. Lamparski DG. Skeletal age assessment utilizing cervical vertebrae [dissertation]. Pittsburgh, PA: The University of Pittsburgh; 1972.

27. Oâ€™Reilly M,Yanniello GJ. Mandibular growth changes and maturation of cervical vertebraeâ€”a longitudinal cephalometric study. Angle Orthod 1988;58:179-84.

28. BjoÂ¨rkA. The principles of the Andresen method of orthodontic treatment: a discussion based on cephalometric x-ray analysis of treated cases. Am J Orthod 1951;37:437-58.

29. Pancherz H. A cephalometric analysis of skeletal and dental changes contributing to Class II correction in activator treatment. Am J Orthod 1984;85:125-34.

30. Harris JE. A cephalometric analysis of mandibular growth rate. Am J Orthod 1962;48:161-74.

31. DeVincenzo JP. Changes in mandibular length before, during and after successful orthopaedic correction of Class II malocclusions using a functional appliance. Am J Orthod Dentofac Orthop 1991;99:241-57.

32. Windmiller EC. Acrylic splint Herbst appliance: cephalometric evaluation. Am J Orthod Dentofac Orthop 1993;104:73-84.

33. Lund DL, Sandler PJ. The effects of Twin-blocks: a prospective controlled study. Am J Orthod Dentofacial Orthop 1998;113:104-10.

34. Mills C, McCulloch K. Treatment effects of the Twin-block appliance: a cephalometric study. Am J

Orthod 1998;114:15-24.

35. Â Robertson NR. An examination of treatment changes in children treated with the functional regulator of FraÂ¨nkel. Am J Orthod 1983;83:299-310.

36. Toth LR, McNamara JA. Treatment effects produced by the Twin-block appliance and the FR-2 appliance of FrÃ¤nkel compared with an untreated Class II sample. Am J Orthod Dentofacial Orthop 1999;116:597-609.

37. Gafari J, Shofer FS, Jacobsson-Hunt U, Markowitz DL, Laster LL. Headgear versus functional regulator in the early treatment of Class II Division 1 malocclusion: a randomized clinical trial. Am J Orthod Dentofacial Orthop 1998;113:51-61.

38. Illing HM, Morris DO, Lee RT. A prospective evaluation of Bass, bionator and Twin-block appliances. Part I: the hard tissues. Eur J Orthod 1998;20:501-16.

39. DeVincenzo JP, Huffer RA, Winn MW. A study in human subjects using a device designed to mimic the protrusive functional appliances used previously in monkeys. Am J Orthod Dentofac Orthop 1987;91:213-24.

40. Nelson C, Harkness M, Herbison P. Mandibular changes during functional appliance treatment. Am J Orthod Dentofac Orthop 1993;104:153-61.