

Evaluation of Anterior Open Bite Correction Using Three Techniques in a Group of Egyptian Adolescents

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By

Naela Mohamed Ali Al-Mogahed

Assistant lecturer of orthodontics Sana'a University

B.D.S, (Damascus)

M.Sc (Cairo)

Department of Orthodontics
Faculty of Oral and Dental Medicine
Cairo University

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SUPERVISORS

Prof.Dr. Sayed Abdel - Hamid Hafez

Professor of Orthodontics,

Department of Orthodontics

Faculty of Oral and Dental Medicine,

Cairo University

Dr. Amany Hassan Abdel - Ghany

Assistant Professor of Orthodontics,

Department of Orthodontics

Faculty of Oral and Dental Medicine,

Cairo University

المشرفون

استاذ دكتور/ سيد عبدالحميد حافظ

أستاذ تقويم الأسنان

قسم تقويم الأسنان

كلية طب الفم والأسنان

جامعة القاهرة

الدكتورة/ أماني حسن عبدالغني

أستاذ مساعد تقويم الأسنان

قسم تقويم الأسنان

كلية طب الفم والأسنان

جامعة القاهرة

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نائلة محمد علي المجاهد
مدرس مساعد بقسم تقويم الأسنان جامعة صنعاء
بكالوريوس طب الفم والأسنان جامعة دمشق
ماجستير تقويم الأسنان جامعة القاهرة

كلية طب الفم والأسنان
جامعة القاهرة

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DEDICATION

This work is dedicated:

- *To soul of my loving parents.*

- To my supportive and encouraging family, my husband:

DR. Abdullah

- To my wonderful children

Maram

Mayar

Nael

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INTRODUCTION

Open bite malocclusion has long been considered one of the most difficult orthodontic problems to correct because its etiology is complicated and multifactorial. It is defined as a condition of malocclusion in which some teeth cannot be brought into contact, when the jaws are closed. It may cause social and psychological distress as well as functional problems in related patients.

An open bite develops as a result of interaction of many etiologic factors, both hereditary and environmental. According to Bjork (1947)¹² genetic and environmental factors which stimulate the vertical growth of the molar region which are not compensated by condyle growth, result in an anterior open bite. Similarly, forces that impede eruption in the incisal region also result in an anterior open bite. Nagan and Fields (1997)⁷⁹ reported that, it is important to distinguish between dental open bite and skeletal open bite which can be achieved by careful cephalometric evaluation.

Open bites can be related to skeletal, dental and soft tissue effects and generally contains a combination of these factors. Sometimes it is possible to identify the specific etiologic factors, but especially in open bite cases of skeletal origin, the factors responsible for the malocclusion cannot be identified easily. Skeletal open bites show more molar and incisor eruption than dental open bites does and the excessive dentoalveolar heights increase the severity of the malocclusion. It has been mentioned that a steep mandibular plane, an obtuse gonial angle, increased lower face height and counterclockwise rotation of the palatal

plane were parameters of skeletal anterior open bites. On the other hand, parameters of dentoalveolar open bites were divergent maxillary and mandibular occlusal planes, mesial inclination of posterior teeth and lack of a normal curve of Spee in the lower arch. Prolonged sucking habits and hyperdivergent facial characteristics are significant risk factors for anterior open bite in the mixed dentition. Abnormal tongue posture and tongue thrust also can be involved in the establishment of alveolar and skeletal discrepancies concurrent with vertical problems.

Various treatment modalities have been proposed for the correction of anterior open bites. According to the etiology and severity of the case treatment may start from self-correction, removable, functional and fixed appliances to surgical intervention in severe skeletal cases. A conventional approach is to inhibit the vertical maxillary growth or to intrude maxillary molars with headgear; other treatment devices including vertical pull chincups Arat and Arman (2005)⁷, vertical elastics Cal-Neto et al (2006)¹⁷, posterior bite blocks Iscan and Sarisory (1997)⁵⁹, transpalatal arches Park et al (2006)⁸⁶, posterior magnets Torres et al (2006)¹¹⁴, multiloop edgewise arch wires, miniplate anchorage Park et al (2003)⁸⁸ and Park et al (2006)⁸⁶, orthodontic treatment Cal- Neto (2006)¹⁷ and various orthognathic surgery combinations and any combination thereof.

Treatment of open bite in the early mixed dentition should be directed toward the control of the abnormal habits and elimination of dysfunction using screening appliances or to redirect growth using extra oral orthopedic appliances. In late mixed dentition any orthopedic therapy may be unsuccessful; the open bite should be corrected by intrusion of

posterior teeth and/or extrusion of anterior teeth. This can be achieved using fixed appliances through vertical elastics or extrusion arch wires.

The extrusion arch is a term that was coined to describe the reverse action of the already existing and well-established intrusion arch. According to Isaacson and Lindauer (2001)⁵⁸ the extrusion arch is a very efficient and effective way to close anterior open bites. The vertical elastic has been the most commonly used, the extrusion arch, however, gives the orthodontist the ability to close anterior open bites without patient compliance and the open bite closure should come from just the maxillary teeth moving down, just the mandibular teeth moving up, or both.

In 1998⁽⁸⁴⁾ Nanda et al. used the reverse configuration of the Connecticut Intrusion Arch (CIA) for incisor extrusion. They reported that the CIA which is fabricated from a nickel titanium alloy provides the advantages of shape memory, springback and light continuous force distribution. It incorporates the characteristics of the utility arch as well as those of the conventional intrusion arch.

Literatures were deficient regarding the craniofacial effects of the extrusion arch wires in treatment of anterior open bite. Therefore it was the aim of this study to investigate and compare the skeletal and dentoalveolar effects of three different strategies for treatment of anterior open bite, the CIA (Connecticut Intrusion Arch), Counter Arch and Vertical Elastics.