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Treatment Of Vertical Maxillary Excess

A Project Submitted to

The College of Dentistry, University of Baghdad, Department of Orthodontics in Partial Fulfillment for the Bachelor of Dental Surgery

By

Sabreen Mujbil Kadhum

Supervised by:

Assistant professor Haider Mohammed Ali Ahmed

B. D. S, M.Sc. (orthodontics).

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Certification of the Supervisor

I certify that this project entitled "Treatment of maxillary excess" was prepared by the fifth- year student **Sabreen Mujbil Kadhum** under my supervision at the College of Dentistry/University of Baghdad in partial fulfilment of the graduation requirements for the Bachelor Degree in Dentistry.

Signature:

Supervisor's name: Assistant professor Haider Mohammed Ali

Date:

Dedication

First and foremost, I must acknowledge my limitless thanks to Allah ,the Ever-Magnificent the Ever-Thankful help and bless.

This project is dedicated to our family especially my brother, who have never failed to provide us with moral and financial support, as well as meeting all of our requirements during the time we were developing our system and taught us that even the most difficult endeavor can be completed if approached in little steps.

This project is dedicated to my supervisor ***Dr. Haider Mohammed****, to all those who have worked tirelessly to assist us in complete and lastly I want to thank myself.*

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List of Contents

List of Figures

List of Abbreviations

LFS	Long face syndrome
MVE	Maxillary vertical excess
ML	Mandibular body base
FIG	Figure
SNA	Sella-Nasion-Point A
SNB	Sella-Nasion-Point B
ANS	Anterior nasal spine
PNS	Posterior nasal spine
GO-ME	Gonion-Menton
TAHF	Total anterior facial height
LAFH	Lower anterior facial height
UAFH	Upper anterior facial height
Go-Gn	Gonion-Gnathion
NA-POG	nasion-point A-pogonion
Co-A	Condylon- Point A
LLSAN	levator labii superioris alaeque nasi
VTO	visual treatment objective

Introduction

Vertical maxillary excess is defined as excessive growth of the maxilla and associated dentoalveolar structures in an inferior direction, which can occur in the total maxilla, posteriorly, and/or anteriorly **(Naini ., 2017).**

This clinical condition can lead to a long face, a gummy smile, and occasionally an open bite. Shortening a long face of an individual with vertical maxillary excess has been challenging. Generally, adult patients with skeletal malocclusion require treatment with a combination of orthodontic and orthognathic surgery, such as a Le Fort I osteotomy **(Capelozza Filho *et al*., 2006).**

The treatment objective in a patient having sufficient potential for growth should be to restrain and control maxillary descent and prevent eruption of posterior teeth. When the severity of vertical deformity is so great that reasonable correction cannot be obtained by growth modification or camouflage, the combination of orthodontics and orthognathic surgery may provide the only viable treatment. Despite being described extensively in the orthodontic literature the long face morphology still remains unclear **(Bansal *et al*.,2015).**

The total Le Fort I osteotomy has a wide range of applications, and segmental osteotomies can also play an important role. The anatomical structures of the maxilla are characterized by a thin bone layer in between facial buttresses, the nasal cavity, maxillary sinuses, and bones with a variety of thicknesses that require special handling in planning, soft tissue access, osteotomy techniques, fixation, and tissue handling **(Ehrenfeld *et al* ., 2012)**.

Various factors have been described to contribute to the etiology of vertical maxillary excess. They include: heredity, genetic disorders, habits and various syndromes affecting growth of mandible. Treatment of the vertical dimension of the face is one of the most challenging in orthodontics and a proper diagnosis and treatment plan **(Fotis *et al*.**, **1984(.**

Aim of the study

The aim of this study is to review literatures concerned about vertical maxillary excess regarding etiology, diagnosis, treatment options and protocols.

Chapter I: Review of literature

1.1 Nomenclature:

A variety of terms have been used for excessive vertical craniofacial growth, such as the long face syndrome, vertical maxillary excess, idiopathic long face, skeletal open-bite, high angle, hyperdivergent, dolichofacial and adenoid face, although these terms often refer to the same clinical condition, the multiplicity of terms suggests considerable morphological variation within each facial type **(Sirwat and Jarabak, 1985; Collett and West, 1993)**

1.2 Prevalence

Two of the largest studies on the prevalence of skeletal facial types were conducted in the United States, and both included the study of a large orthodontic patient sample, the long face pattern was found to be prevalent in both studies at around 22%. The prevalence of these vertical development patterns varied greatly depending on Angle's malocclusion categorization, with the highest proportion (35%) appearing in the Class III sample, followed by the Class I (32%), Class II Division 1 (30%),and Division 2 (18%) group **(Proffit et al., 1990; Bailey *et al.*, 2001; Willems *et al.*, 2001).**

1.3 Etiological factors

More than the contribution of a single factor it is a multitude of factors together that contribute to this syndrome **(Ramesh *et al*., 2017).**

The Etiological factors have been outlined as follows:

1.3.1 Genetic factors

An abnormal genetic growth pattern is thought to be the most common cause of MVE, whereas environmental factors affect the intensity of symptoms (**Prittinen, 1997**).

Innate growth potentials are regulated by genetic constitution of the body. For example control of sagittal, transverse and vertical dimensions are usually inherited in the family such as Hapsburg jaw. Growth and growth rotations occurring in late maturation period are also attributed to the genetic pool of the patient. Facial types such as hyper and leptoprosopic allow the vertical eruption of molars, thus causing an excessive vertical skeletal pattern **(Torres *et al*., 2012).**

Different heritability estimates have been reported for various vertical dimensions of the face. For instance, the heritability of total face height is reported to range from 0.8 to 1.3, while that of the lower anterior face is between 0.9 and 1.6. In contrast, the heritability of the posterior and upper anterior face height ranges from 0.2 to 0.9 and 0.2 to 0.7, respectively However, heritability studies have a variety of limitations that could explain some of the disparities in the literature. Because these estimations are often produced under a variety of environmental conditions, it's difficult to extrapolate the results from one sample to the next or even within the same sample over time **(Amini and Farahani, 2009).**

1.3.2 Pattern of Jaw Growth

The pattern of vertical facial development is strongly related to the rotation of both jaws. The rotational patterns of growth are quite different for individuals who have long face type of vertical development, jaw rotations caused by vertical condylar growth have been studied previously and it has been concluded that if

growth of maxillary sutures and the maxillary or mandibular alveolar processes exceeds vertical condylar, a backward rotation occurs, and the face becomes longer **(Issacson *et al*., 1971).**

In long-face individuals, who have excessive lower anterior face height, the palatal plane rotates down posteriorly, often creating a negative rather than the normal positive inclination to the true horizontal. The mandible shows an opposite, backward rotation, with an increase in the mandibular plane angle (Fig.1) **(Proffit,. 2019).**

The mandibular changes result primarily from a lack of the normal forward internal rotation or even a backward internal rotation. The internal rotation, in turn, is primarily centered at the condyle. This type of rotation is associated with anterior open bite malocclusion and mandibular deficiency because the chin rotates back as well as down). In these individuals, growth at the condyle is restricted.The interesting result in three cases documented by Björk and Skieller was backward rotation centered in the body of the mandible, rather than the backward rotation at the condyle that is seen in individuals of the classic long- face type **(Proffit, 2019).**

It is now clear that the majority of the growth disturbances that contribute to the long face morphology occur below the maxillary plane **(Filho *et al*., 2010).**

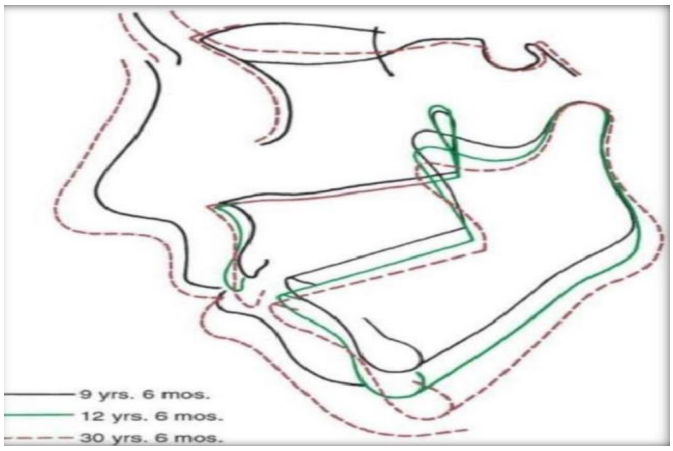

Figure 1: Cranial base superimposition showing the pattern of jaw rotation in an individual with the long-face pattern of growth **(Proffit, 2019).**

1.3.3 Nasal airway obstruction and mouth breather

Normal respiratory activity influences the development of craniofacial structures by adequately interacting with mastication and swallowing which favor harmonious growth **(Yamada *et al*., 1997).**

According to Moss's functional matrix concept nasal breathing is fundamentally vital for normal growth and proper development of the whole craniofacial complex **(Ramesh *et al*., 2017).**

Kilic and Oktay in (2008), have observed that the continuous airflow passing through the nasal passage and nasopharynx during unobstructed breathing produces a constant stimulus for both the lateral growth of maxilla as well as for lowering of the palatal vault. Several authors have found that long face individuals have a narrower nasopharynx than other facial types. The presence of any obstacle in the respiratory system, for example, in the nasal or pharyngeal regions, causes respiratory obstruction and forces the patient to breathe through the mouth **(Ramesh *et al*., 2017).**

Mouth-breathing leads to a change in posture to compensate for the decrease in nasal airflow and to allow respiration **(Josell, 1995).**

This results in a lower position of the mandible, and a lower or an anterior position of the tongue, usually associated with lower orofacial muscle tonicity **(Valera *et al*., 2003).**

This will cause abnormality and disharmony in the growth and development of orofacial structures, including narrowing of the maxilla, lower development of the mandible, and protrusion of the upper incisors and also alteration of the head in relation to the neck **(Rubin, 1980).**

Respiratory needs are the primary determinant of the posture of the jaws and tongue (and of the head itself, to a lesser extent). Therefore it seems entirely reasonable that an altered respiratory pattern, such as breathing through the mouth rather than the nose, could change the posture of the head, jaw, and tongue. This in turn could alter the equilibrium of pressures on the jaws and teeth and affect both jaw growth and tooth position. To breathe through the mouth, one must lower the mandible and tongue and extend (tip back) the head. If these postural changes were maintained, three effects on growth would be expected: (1) anterior face height would increase, and posterior teeth would super-erupt; (2) unless there was unusual vertical growth of the ramus, the mandible would rotate down and back, opening the bite anteriorly and increasing overjet; and (3) increased pressure from the stretched cheeks might cause a narrower maxillary dental arch. **(Proffit, 2019).**

The association has been noted for many years: the descriptive term adenoid faces has appeared in the English literature for at least a century, and probably longer **(Proffit, 2019).**

1.3.4 Muscle weakness

In a number of muscle weakness syndromes, the facial appearance produces a caricature of the typical long face patient. This observation led to the idea of weak mandibular elevator muscles must cause the long face pattern. If the muscles were weak, biting force would decrease, allowing the posterior teeth to erupt too much and the mandible to rotate downward. Although adult long face patients do have below-normal occlusal forces. pre-adolescent children who already can be recognized a long face types do not. The long face patients appear not to gain muscle strength during adolescence, at least in the mandibular elevators, as do normal individuals **(Proffit and Field, 1983).**

1.3.5 Oral habit

Oral habits such as abnormal function or size of the tongue and digit sucking have been associated with the classical traits of the long face morphology. Non-nutritive sucking in the first few years of life is consistently associated with vertical malocclusions such as an anterior open bite. These non-nutritive sucking habits are often not limited to the vertical plane, but may also affect the transverse dimension manifesting as posterior crossbites **(Cozza *et al*., 2005).**

(Thomaz *et al*., 2012), used anthropometric points to describe facial morphology, and found a high prevalence of severe facial convexity in adolescents who had been breastfed for relatively short periods and exhibited prolonged mouth-breathing habits that persisted until after the age of 6 to years 9.

1.4 Diagnosis of maxillary vertical excess

1.4.1 Extra oral Examination

An examination of facial features includes the assessment of: end face facial proportions, profile divergence, nose shape, lip competence and length, and a chin profile. An examination of vertical proportions of the facial skeleton in patients with the long MVE reveals elongation of the maxillary segment of the face associated with a skeletal open bite (Fig. 2) **(Wolford *et al.*, 1981; Angelillo *et al.*, 1982; Sobieska *et al.*, 2015).**

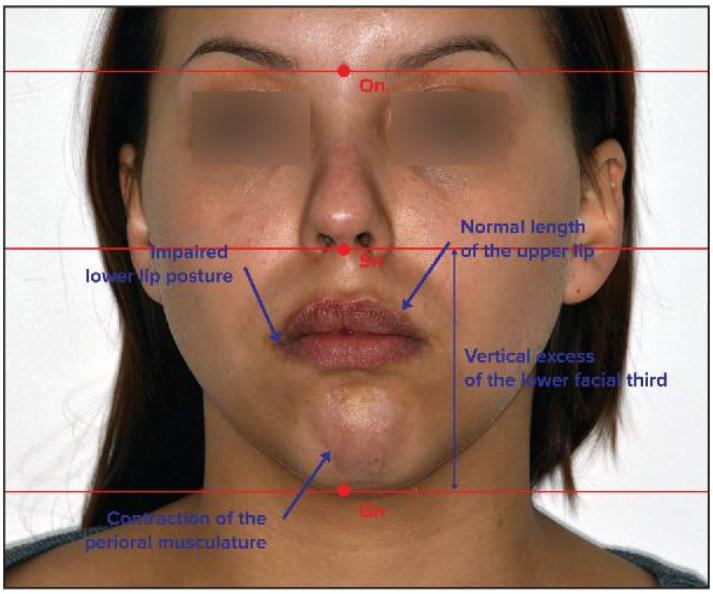

Fig. 1. An extra-oral examination of a female patient with the long

Figure 2: An extra-oral examination of a female patient with the long face syndrome. **(Sobieska et al., 2015)**

The analysis of the maxillary face includes an assessment of the rate of the upper lip to the upper incisors at rest and while smiling, and a lip competence test. Patients with MVE demonstrate excessive exposure of the upper incisors when lips are at rest and while smiling, excessive exposure of the gingivae while smiling, the

so-called gummy smile, lack of lip competence at rest, drooping corners of the mouth and excessive tension of the mentalis muscle at an attempt to close the lips, a long, humped nose with narrow nostrils is also of note (Fig. 3) **(Angelillo *et al.*, 1982; Wolford *et al.*, 1981; Sobieska *et al.*, 2015).**

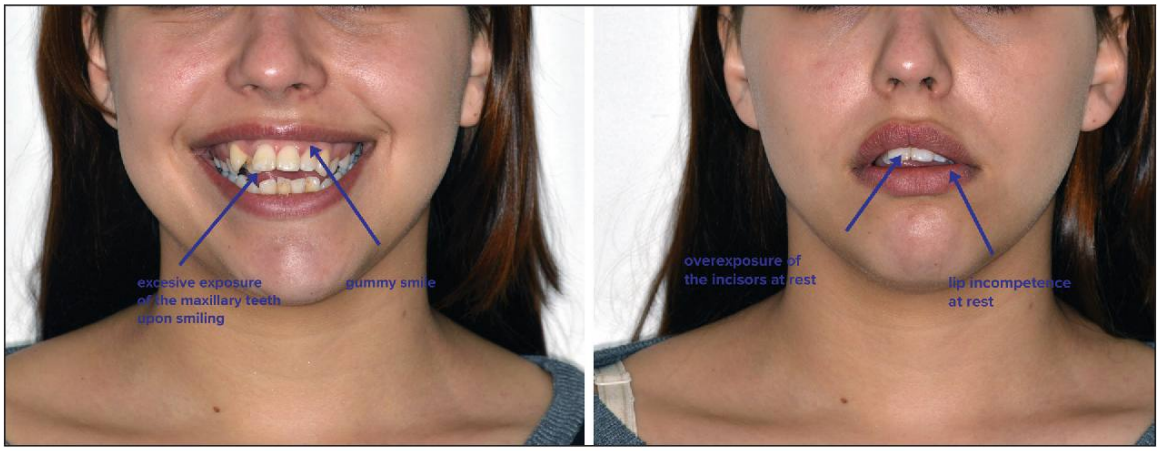

Fig. 2. An extra-oral examination of a female patient with the long face syndrome

Figure 3: An extra-oral examination of a female patient with the long face syndrome. **(Sobieska et al., 2015)**

An analysis of the facial profile demonstrates a typical direction of the facial skeleton growth in a patient with MVE. The profile is convex, oblique posteriorly, there is no chin prominence and it is an effect of posterior rotation of the mandible caused by excessive vertical maxillary growth it results in mandibular rotation towards the bottom and back. The subnasal area is flat and cheeks are not filled **(Wolford *et al.*, 1981; Angelillo *et al.*, 1982).**

An examination of the mandibular inclination towards the Frankfurt plane is helpful in the LFS diagnosis and it is performed by placing a dental mirror along the inferior mandibular border (Fig. 4). A steep mandibular plane coexists with high

anterior facial height, namely with a tendency towards a skeletal open bite **(Proffit *et al*., 2009).**

Figure 4: An extra-oral examination of a female patient with the long face syndrome. **(Sobieska et al., 2015)**

1.4.2 Intra Oral Examination

Excessive vertical maxillary growth combined with mandibular rotation towards the bottom and back manifests with excessive eruption of the lateral teeth and normal or excessive eruption of the anterior teeth. Approximately 60% of patients have a partial anterior open bite, and the remaining patients present compensatory eruption of the incisors resulting in a closed bite in the anterior section **(Proffit, 2009).**

There is a high correlation between a vertical maxillary position and vertical and anteroposterior mandibular position. Rotation of the mandible towards the back and bottom usually results in the Angle Class II (71% of patients), even with a normal size of the mandible, the Angle Class I was observed in 13.2% (skeletal Class III rotating to Class I), whereas Class III in 15.8% of patients. Posterior rotation of the mandible resulting in verticalisation of the lower incisors during growth contributes to an increased incidence of crowded lower incisors in patients with LFS. In 34.2% of patients there is a partial lateral cross bite associated with maxillary narrowing, and a narrow, high palate, and it may be a result of chronic breathing through the mouth that is often observed in patients with the long face syndrome **(Cardoso *et al.*, 2002).**

1.5 Cephalometric findings

A cephalometric analysis is a tool necessary to locate and determine a degree of skeletal disturbances that may result from excessive vertical growth of the condylar process and/or excessive vertical maxillary growth **(Wolford *et al.*, 1981). Fields *et al*(1984)** three cephalometric criteria that are used together to diagnose the long face syndrome they are**:**

– increased GoGn:SN angle (the angle of the maxillary base plane inclination GoGn gonion-gnathion with regard to the base of the anterior cranial fossa – SN – sella- nasion).

– increased total anterior facial height – N-Me (a linear distance between nasion and menton points).

– reduced percentage ratio of the upper face to the lower face – a percentage ratio between linear measurements: N-ANS:ANS-Me (nasion-spina nasalis anterior: spina nasalis anterior-menton).

1.5.1 Assessment of sagittal apical bases

Examinations of patients with LFS demonstrate a normal sagittal position of the maxilla with regard to the anterior cranial fossa (SNA angle) and its normal length (a linear measurement between Co-A points **(Filho *et al*., 2010).**

The evaluation of the anteroposterior maxillary position in relation to the cranial base is extremely important when planning procedures related to orthognathic surgery in order to assess the need to change its position. However, each case should be carefully analyzed, as there are studies demonstrating a posterior position of the apical base of the maxilla in patients with LFS **(Capelloz *et al*., 2007).**

Excessive vertical maxillary growth affects the rotation of the mandible towards the bottom and back (posterior rotation) and it manifests with a posterior position of the mandible in relation to the cranial base, namely a reduced SNB angle in cephalometric measurements. Additionally, the ANB angle is also increased, and it indicates a posterior relation of the mandibular position in relation to the maxilla **(De Oliveira *et al*., 2013).**

A posterior position of the mandible affects an increase in the NA-Pog angle indicating the skeletal profile convexity **(Capelloz *et al*., 2007).**

1.5.2 Vertical analysis of the facial skeleton

The angle of the inclination of the mandibular base plane to the anterior cranial plane (SN- NL) is within the normal, and it indicates normal maxillary inclination. In the long face syndrome all disturbances are located below the cranial base plane (ANS-PNS), and it is an important diagnostic criterion (**De Oliveira *et al*., 2013)**. The mandibular structure is typical of patients with posterior rotation described by Björk. **(Janson *et al*., 1994).**

The mandibular body is narrow, the angle is obtuse, the ramus is short and narrow, and chin prominence is poorly defined. The mandibular length measured between Co-Gn points may be normal **(Filho *et al*., 2010).**

Cephalometric measurements in patients with the long face syndrome demonstrate an increase in theGoGn:SN angle – mandibular inclination in relation to the anterior cranial fossa. Additionally, the percentage ratio of the posterior and anterior facial height is also reduced – SGo:NMe% is below 58%. Moreover, the intermaxillary angle (described as B, MM, NL/ML angle) is also increased – it is between the mandibular base plane (Go-Gn) and the maxillary base plane (ANSPNS) **(Schendel *et al*., 1976)**.

It is an angle of clinical importance, and its mean value is 26°.When the value of this angle exceeds 32°expanded diagnostic radiology tests are recommended. It is recommended to monitor the value of the base angle in patients with the long face syndrome who are still in the growth phase, by performing cephalometric scans every six months in order to initiate orthodontic treatment in due time and prevent progression of this syndrome **(Prittinen , 1997).**

The following are also observed in a cephalometric analysis in patients with the long face syndrome **(Schendel *et al*., 1976):**

– increased total anterior facial height (TAHF) a linear measurement between N and Me points (nasion and menton)

– normal upper anterior facial height (UAFH) a linear measurement between N and ANS points (nasion and spina nasalis anterior)

– increased lower anterior facial height (LAHF) a linear measurement between ANS-Me points (spina nasalis anterior and menton).

– increased percentage ratio of lower anterior facial height to total anterior facial height (LAFH/TAHF%)

1.6 Treatment

The clinician must address the three-dimensional dentoalveolar and skeletal problems that present in long face syndrome. Treatment modality depends on the growth potential of the patient when he reports as well as the severity of the dysplasia **(Bansal ., 2015).**

1.6.1 Patient with Potential Growth

The primary objective of treatment in a growing child with a long face problem is to restrain and control that area. If vertical movement of the posterior teeth (which is due to a combination of jaw growth and eruption) could be controlled well enough, downward and backward rotation of the mandible could be prevented, and it might even be possible to produce upward and forward rotation of the mandible as growth continues. The long face growth pattern is hard to modify,

and it persists until late in the teens; therefore treatment must continue over many years. **(Bansal *et al.*,2015)**

1.6.1.1 High-Pull Headgear to the Molars

High-pull headgear to the molars (figure 5) maintains the vertical position of the maxilla and inhibits eruption of the maxillary posterior teeth **(Firouz M *et al.*,1992).**

Figure 5: High-pull headgear to the molars **(Proffit *et al.*, 2019).**

1.6.1.2 High pull Headgear with bite blocks

An alternative method for controlling vertical development is to block the eruption of the maxillary and mandibular teeth. A functional appliance can be designed that will force the mandible open to an increased vertical rest position.

The force of the mandible attempting to return to its original vertical rest position is transmitted to the maxilla and the teeth in both arches. This results in mandibular growth being directed forward because no dental eruption has occurred to increase the vertical dimension with less growth in lower and total face height (Fig. 6). (**John *et al* .،2019)**

Figure 6: Activator with bite blocks fitted with headgear tubes **(Bansal *et al*., 2015).**

1.6.1.3 High-Pull Headgear to a Functional Appliance with Bite Blocks

The most aggressive approach to maxillary vertical excess and a Class II jaw relationship, which has been recommended as a way to treat the most severely affected long-face patients, is a combination of high-pull headgear and a functional appliance with posterior bite blocks to anteriorly reposition the mandible and control eruption (Fig. 7). **(Proffit *et al*., 2019).**

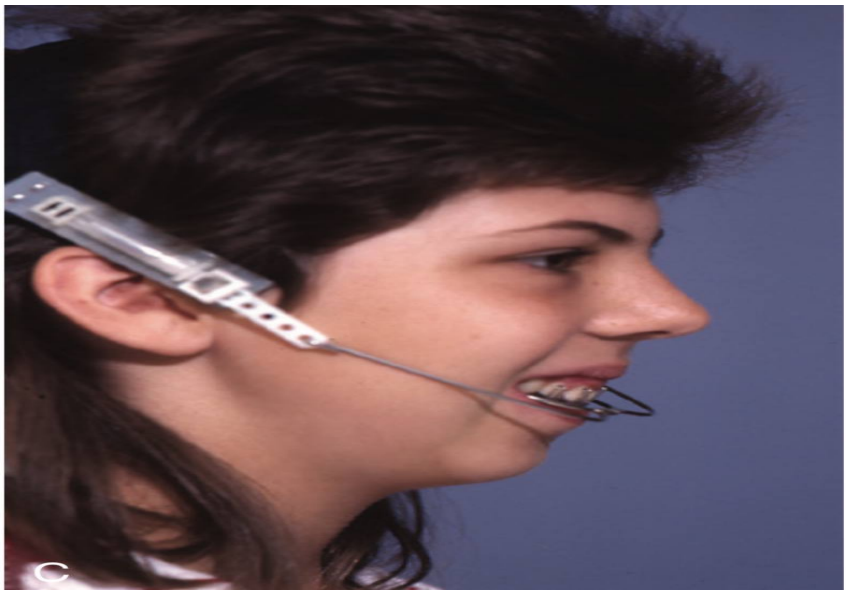

Figure 7: High-pull headgear with the face bow inserted into tubes in a functional appliance with bite blocks **(Proffit *et al*., 2019).**

1.6.1.4 A fixed lingual arch

(FLA) was also cemented to the mandibular arch for maintenance of the leeway space. Even though the leeway space may not always be available,19 the FLA can be used to control the vertical dimension during the growth period. After 6 months, correction of the Class II malocclusion was observed. No other appliance was used during this period **(Ram S *et al*., 2015).**

1.6.1.5 High-Pull Headgear to a Maxillary Splint

A more effective headgear approach for children with excessive vertical development is the use of a plastic occlusal splint to which the face bow is attached **(Orton HS *et al*., 1992).**

1.6.2 Patients with questionable growth potential

A camouflage treatment plan based on retraction of the upper incisors by extraction of premolars does nothing to help correct the vertical problem. As the upper incisors are retracted they extrude and the nasolabial angle will increase. The fact that vertical growth continues into the late teens can be both a problem and a potential opportunity. A problem exists because the growth pattern tends to further worsen the long face deformity without treatment. An opportunity is present because at least some growth potential usually is present in long face adolescents which can be modified to meet the treatment goals. However, growth modification after the adolescent growth spurt is more a theoretical possibility as it is almost impossible to get adolescents to wear a functional appliance with bite blocks and headgear regularly enough to really control vertical growth. Anterior open bite in adolescents (adults) often can be corrected with orthodontic treatment. Ideally, this would be accomplished by intruding the posterior teeth which is now a possibility with temporary anchorage devices. However, long term stability and the biological limits of safe intrusion which can be achieved are yet to be established. **(Scheffler *et al*., 2014).**

It has been claimed that a multiloop edgewise appliance, in conjunction with anterior vertical elastics, can produce posterior intrusion and therefore a true correction of the skeletal problem. Even though these results often are stable, recent

reports demonstrate what one would expect from the mechanics of the appliance; the open bite correction occurs almost totally by elongating the incisor teeth **.**In this borderline situation, a lower border osteotomy of the mandible to bring the chin upward and forward can greatly improve both dental and facial esthetics, because the lower lip relaxes and moves up as the chin is elevated **(chew MT., 2006).**

1.6.3 Patients with little or no growth potential

For long face patients with no prospect for successful growth modification, surgery is probably the only treatment option. Orthodontic camouflage does nothing to improve the excessive facial height and can even further worsen it. A patient with a genuine long face problem who does not accept a surgical treatment protocol is better off without any treatment **(Proffit *et al*., 2003).**

1.6.3.1 Treatment Progress

I. Orthognathic surgery

a. Pre Surgical Phase

Preparing the dentoalveolar arches for orthognathic surgery necessitated leveling and alignment of teeth, decompensating the retroclination of lower incisors, and achieving ideal arch form that allows surgical expansion through median maxillary split **(Saleh *et al*., 2018).**

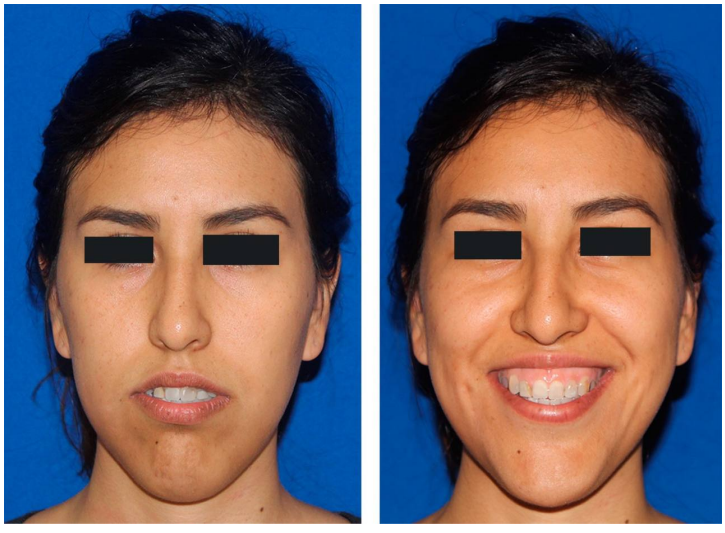

Figure8: Pre-surgical Extraloral images (**León, G. V. R., 2021)**

b. Surgical Approach (Proffit *et al*., 1991).

1. LeFort I osteotomy to superiorly reposition the maxilla. When the maxilla moves up the mandible rotates around the horizontal condylar axis to move up with it, so that the chin moves upward and forward. Indirectly, the maxillary surgery repositions the mandible.

2. Mandibular ramus osteotomy to bring the lower jaw forward and upward, which could be accomplished in an open-bite patient. The position of the maxilla would not be altered at all. 3. Mandibular inferior border osteotomy to reposition the chin upward and forward. Rarely is this procedure adequate by itself in an adult, but it is a useful adjunct to either of the other two surgical possibilities**.**

(a)

(b)

Figure 9– (a) Le Fort I osteotomy, (b) osteosynthesis **(Meger *et al*., 2017)**

c. Post-surgical Phase

Maintaining normal anterior overjet and overbite, plus ideal incisors, canines, and molar relationship during this phase is crucially important. The healing of bony parts during detailing of occlusion and any minor corrections if they ever exist is the key for success at this stage. Full-time wear of heavy elastics for 2 weeks after surgery to assure full dental interdigitating, arch symmetry, and stable treatment outcome. 4 month later, the appliance was removed, and the necessary retainers were constructed, the prosthodontist took good care of the four maxillary incisors upon the patient's request. Follow up for almost 5 years was planned, and the interdisciplinary approach yielded realistic adequate treatment o utcome (**Saleh *et al*., 2018).**

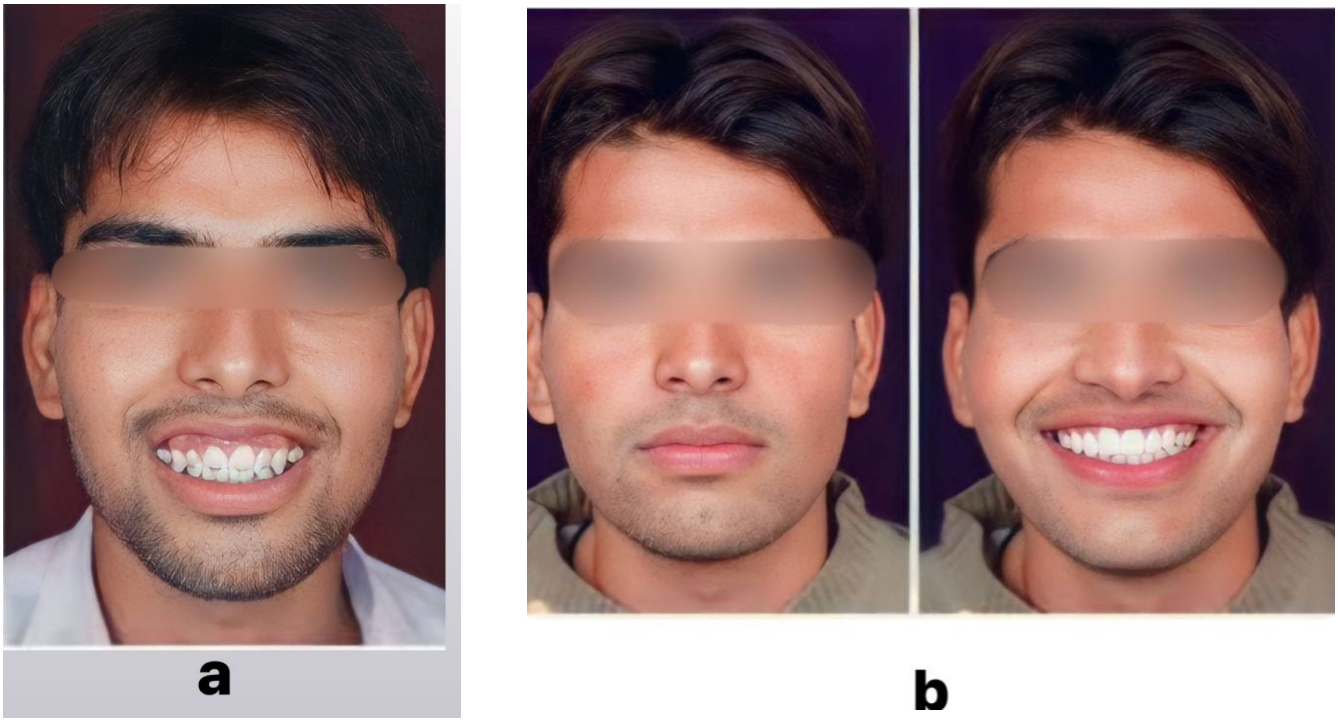

Figure 10: (a) presurgical (b.) postsurgical **(Yadav. S. K. 2014)**

II. Plastic treatment

a. Hyaluronic Acid Infiltration

Diaspro *et al* (2018) proposed what they called "a novel corrective technique" to address the concern of excessive gingival display. The procedure involves injecting a small bolus of hyaluronic acid into the paranasal region to compress the lateral fibers of the levator labii superioris alaeque nasi (LLSAN), which inhibits the motility of its deep portion. This lessen the elevation of the upper lip when smiling, significantly improving a gummy smile. The infiltration

point corresponds to the most cranial part of the nasolabial fold, at around 3 mm lateral to the wing of the alar cartilage (the same anatomical site where it is commonly recommended to inject botulin toxin). Hyaluronic acid infiltration is a valid technique that can be an alternative to botulin toxin injection, although it is not appropriate for all cases of excessive gingival display. It requires an experienced injector with a vast knowledge of anatomy since the substance is infiltrated in a vascularly rich zone**.**

Figure 11: Hyaluronic acid infiltration (A) after injection (B) before injection (**Mercado-Garcia *et al*,. 2021)**

b. Botulin Toxin Injection

Botulin toxin induces muscle paralysis by inhibiting the presynaptic release of acetylcholine at the neuromuscular junction. It is a good alternative to address a gummy smile caused by a hyperactive lip. The toxin infiltrates into the levator labii superioris alaeque nasi (LLSAN) muscles and levator labii superioris on both sides of the face. Around 4 to 6 units of botulin toxin are injected into the following points bilaterally: 2 mm lateral to the alar facial groove, 2 mm lateral to the first

injection point in the same horizontal plane, and 2 mm inferior and between the first two sites also can inject inferior to nose **(Diaspro *et al*,. 2018).**

Figure 12: Botulin Toxin Injection after and before **(Sherwaygardens,.2021)**

Chapter II: Discussion

For each patient who requires orthodontic treatment, the doctor must undertake detailed differential diagnosis. A diagnosis of a malocclusion must consider all three components: facial, dental, and skeletal. Each component must be thoroughly examined and comprehended in order to ask the right questions and make the right diagnostic conclusions, which will lead to an effective treatment plan. Growth is unquestionably a crucial period, with the possibility for both orthopedic and orthodontic adjustments as well as relapse into the original disease. The long face pattern of growth in preadolescent children can be approached in a variety of ways.

The orthodontist must be able to recognize clinical situations and use treatment options skillfully for the benefit of the patient. Patients now have an option that results in both desirable esthetics and appropriate occlusion in adult humans when carried out with good planning, proper execution, and attention to detail when carried out by both the orthodontist and the oral maxillofacial surgeon.

When formulating the treatment plan, an important factor to be considered is which teeth should be intruded. Accurate and quantitative treatment goals regarding intrusion and rotation of the mandible should be set before starting treatment. In a patient with skeletal Class II hyperdivergence and a retruded mandible, both upper and lower arch intrusion are essential to obtaining significant skeletal change. If intrusion is performed in the maxillary arch only, compensatory extrusion of the lower molars often negates the ability of the mandible to autorotate. **(Lin *et al.*, 2008)**

We can also treat this syndrome with surgical technique with Le fort I and using mini plate for patient with little or no growth.

Chapter II: Discussion

An important things we should do post-surgically is to maintain normal anterior overjet and overbite.

Follow up for almost 5 years was planned, and the interdisciplinary approach yielded realistic adequate treatment outcome.

Recently there is another way to treat MVE by non-surgical approach using plastic treatment such as hyaluronic acid injections infiltration this will compress the muscle (levator labii superioris alaeque nasi) and then lessen the elevation of upper lip when smiling.

We can also using Botulin toxin injections which induce muscle paralysis by infiltrates the toxin into the levator labii superioris alaeque nasi muscles and levator labii superioris on both sides of the face and then reduces the gummy smile.

Chapter III: Conclusions and Suggestions

3.1 Conclusions:

The long face morphology is well-documented in orthodontic literature. This abnormality has been linked to a number of clinical and cephalometric characteristics. It has a multifaceted etiology that includes both genetic and environmental elements. The open bite version of the condition is the focus of the majority of studies. The long face development pattern is difficult to change in growing people, and it can last until late in adolescence; as a result, treatment with headgear or functional appliances must be continued for many years. Surgical intervention is the only viable option for people whose growth has slowed.

3.2 Suggestion:

1. Conduct surgery study to the prevalence of MVE among Iraqi adult.
2. Conduct a surgery study to evaluate patient satisfaction with surgical approach treatment.
3. Cross-sectional study to evaluate the non-surgical approach of MVE management.

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