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CASE REPORT

Characteristic Variants in Long Faces with Increased Anterior Facial Height

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Abstract

Facial characteristics are affected by facial proportions, growth pattern, facial heights and smile of the patients. Long face syndrome usually presents with an increased lower anterior and total anterior facial height, a gummy smile, a hyperdivergent growth pattern and decreased facial height. However, there are many variations in the posterior facial height and the growth pattern. There can be patients having an increased anterior facial height with increased or average posterior facial height, or an average and reduced mandibular plane angle. This paper aimed at reviewing the various characteristic facial variants of an increased anterior facial height. This article reviews three such variants of an increased anterior facial height. It particularly highlights the variant with increased anterior and posterior facial height and the modification in the treatment of such cases. The most common treatment option for the normally occurring variant of hyperdivergent growth pattern with a reduced posterior facial height is surgical superior impaction of the maxilla. But, for the variant with increased posterior facial height with hyperdivergent growth pattern is not the same as following superior impaction, the mandibular autorotation will not be stable in such variants due to genetically engrammed strong muscular patterns.

Keywords: Anterior facial height; mandibular plane angle; gummy smile; hyperdivergent; Posterior facial height.

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INTRODUCTION

Orthodontic treatment should aim at achieving functional treatment goals along with improved facial harmony. A normal face was defined as a face having facial features in balance and harmony as proposed by Angle. He also stated that the balance and harmony is maintained if the dentitions have a normal occlusion.[1] Normal growth leads to normal growth of the face. An abnormal growth would affect the development of normal facial features.[2] Facial proportions is one of the ways of quantifying a well balanced or normal face . Facial heights and growth patterns also determine the proportion and balance of a face.[3] In a well-balanced aesthetically pleasing face, the total anterior facial height (Na-Me) is categorized into 45 % of the nasal height or upper facial height (Na-ANS) and 55 % of the lower anterior facial height (ANS-Me). [4] If the lower anterior facial height increases, this ratio is greater than 45:55 % and results in long faces. The subjective evaluation of the face was termed ' ‘Poor” by Wylie and Johnson when the ramal height was reduced and the mandibular plane angle increased. [5,6] For a harmonious facial appearance, the distance from the hairline to glabella should be one/third of the total facial height and equal to the mid third (Distance of glabella to subnasale) and lower third (distance of subnasale to menton). [7] Horizontal lines close to the hairline (trichion), the forehead (glabella), the nasal base (subnasale), and the bottom border of the chin (menton) traditionally divide the face into three halves (Fig. 3). The three elements of a pleasant face should be roughly equal in appearance. [3] Clinically, the soft tissue vertical 1/3rds should be equal. An increase in lower one thirds indicate leptoprosopic faces according to facial index given by Martin and Saller in 1957. [8]

The facial proportions will either have increased or decreased. This is contributed by an increase in anterior or posterior facial heights or a combination of both. These features are generally seen in patients with long face syndrome.[8]

Common features of patients with long face.[9]

- ➢ An increased anterior total facial height
- ➢ An increased lower anterior facial height predominantly
- ➢ A hyperdivergent growth pattern
- ➢ An increase in gonial angle
- ➢ An increased anterior and posterior dental heights
- ➢ A decreased posterior facial height
- ➢ A decreased ramal length

It is commonly an increase in the lower thirds of the face that contributes to a gummy smile or vertical maxillary excess. When smiling, a gingiva exposure of 0-2 mm is regarded as appropriate, as is a maxillary incisor edge exposure of 2-4 mm when the lips are at rest. When a person smiles, more than 2 mm of gingival exposure is considered excessive gingival display, or Gummy Smile.[10] Smile is one of the major factors influencing facial harmony. The smile arc is the relationship between the inner contour of the lower lip and a hypothetical curve traced along the borders of the maxillary anterior teeth in a posed smile. [11] Taking Smile arc into consideration during treatment plan is very essential in defining the final aesthetics of the face of the patient.

Ha et al proved that lower facial height increased anteriorly has a strong impact on the development of long faces. [12] But an increase in the vertical facial dimensions is associated with facial height anteriorly as well as posteriorly. [13] Anterior facial height alone cannot govern the vertical facial type. Bjork proved that the changes in the posterior facial height determine the change in the mandibular autorotation. [14] A study by Wang et al proved that the posterior facial height plays a pivotal role in determination of the vertical facial proportions while anterior facial height has a tendency of undergoing intrinsic growth. [15]

In light of these findings, this comparative study aimed at assessing the variants of long faces. It aimed at evaluating patients with an increased anterior facial height having variable posterior facial heights and growth patterns. It also aimed at comparing the cephalometric variables in the possible scenarios. The objective of this comparative study was to highlight possible treatment options for cases with these different variants of an increased anterior facial height.

The cases will be discussed under the following three headings:

- ➢ Patient with increased anterior facial height and decreased posterior facial height on a hyperdivergent skeletal jaw base
- ➢ Patient with increased anterior and posterior facial height on a hypodivergent skeletal jaw base
- ➢ Patient with increased anterior facial height with normal posterior facial height and normodivergent jaw base

CASE PRESENTATION

Informed written consent was obtained from the patients included in this study.

CASE 1

VARIANT 1

PATIENT WITH INCREASED ANTERIOR FACIAL HEIGHT AND DECREASED POSTERIOR FACIAL HEIGHT ON A HYPERDIVERGENT SKELETAL JAW BASE

Diagnosis:

A 21-year-old female patient was diagnosed with a long face and increased anterior facial height, gummy smile had the following cephalometric characteristics (Table 1).

- ➢ An increased lower anterior facial height
- ➢ An increased total anterior facial height
- ➢ A reduced posterior facial height
- ➢ A reduced ramal length
- ➢ Increased anterior upper and lower dental heights, reduced lower posterior dental heights, increased upper posterior dental height
- ➢ Decreased jarabak ratio
- ➢ An increased mandibular plane angle

The facial balance in case 1 could be categorized into the poor category owing to an increase in the ratio to greater than 45:55 %, indicating an increase in the facial height, a decreased ramal length and increased mandibular plane angle (Figure 1 A).

FIGURE 1A: LATERAL CEPHALOGRAM

The increase in the lower facial thirds of this patient and a high clinical FMA (Frankfort mandibular plane angle) corresponds to the increase in lower anterior facial height (Figure 1B), total anterior facial height and a high mandibular plane angle, respectively (Figure 1 A and C). The features enlisted for this case are most commonly seen in patients with long.

FIGURE 1B & FIGURE 1C : FRONTAL VIEW & PROFILE VIEW

Probable Treatment options for this variant of increased anterior facial height:

- ➢ Le-fort 1 maxillary superior impaction
- ➢ Intrusion of the entire maxillary arch using temporary anchorage devices (TAD's)

As there is increased in upper anterior and posterior upper dental heights, an impaction of the maxilla superiorly will help in mandibular autorotation and a reduction in lower anterior facial height, reducing the mandibular plane angle improving the overall facial aesthetics

CASE 2

VARIANT 2

PATIENT WITH INCREASED ANTERIOR AND POSTERIOR FACIAL HEIGHT ON A HYPODIVERGENT SKELETAL JAW BASE.

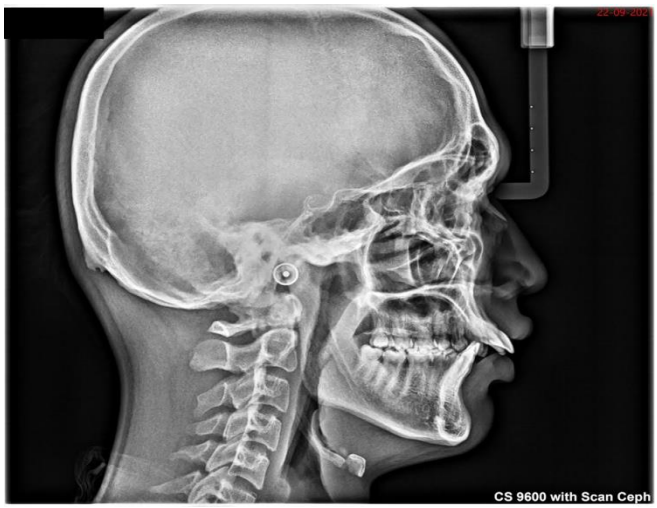
Diagnosis:

A 24-year-old male patient was diagnosed with a long face and increased anterior facial height; gummy smile had the following cephalometric characteristics (Table 1).

- ➢ An increased lower anterior facial height
- ➢ An increased total anterior facial height
- ➢ An increased posterior facial height
- ➢ An increased ramal length
- ➢ Increased upper and lower anterior and posterior dental heights
- ➢ Increased jarabak ratio
- ➢ A decreased mandibular plane angle

The facial balance in this case could be categorized into the fair category due to an increased ramal length and decreased mandibular plane angle (Figure 2A). This variant falls in between variant 1 and 3.

FIGURE 2 A: LATERAL CEPHALOGRAM



The increase in the lower facial thirds of this patient corresponds to the increase in lower anterior facial height (Figure 2B), total anterior facial height. A reduced mandibular plane angle corresponds to the low - average clinical FMA of the patient (Figure 2 A and C). Patient has an uncharacteristic increased posterior facial height.

FIGURE 2B & FIGURE 2C: FRONTAL VIEW & PROFILE VIEW

Probable treatment options for this variant of increased anterior facial height:

- Intrusion of upper and lower anteriors using TADs for intrusion arches in an attempt to reduce the increased overbite and upper anterior tooth show along it can also help in reducing the increased lower anterior facial height owing to increase in anterior upper and lower dental heights.
- In such cases superior impaction of the maxilla is not an advisable treatment plan as posterior facial height cannot be altered due to its genetically programmed nature. An attempt of autorotation of the mandible will not be stable long term as it is governed by a strong musculature owing to the horizontal growth pattern.

CASE 3

VARIANT 3

PATIENT WITH INCREASED ANTERIOR FACIAL HEIGHT WITH NORMAL POSTERIOR FACIAL HEIGHT AND NORMODIVERGENT JAW BASE

Diagnosis:

A 23 year old male patient was diagnosed with a long face and increased anterior facial height, gummy smile had the following cephalometric characteristics (Table 1).

- An increased lower anterior facial height
- An average total anterior facial height
- An average posterior facial height
- An average ramal length
- Reduced dental heights except upper anterior dental height is average.
- Average jarabak ratio
- An average mandibular plane angle

The facial balance in this case could be categorized into the good category owing to an adequate ramal length and average mandibular plane angle in spite of the increase in the anterior facial height. (Figure 3D)

FIGURE 3A: LATERAL CEPHALOGRAM

The increase in the lower facial thirds of this patient (Figure 3A) corresponds to the increase in lower anterior facial height and total anterior facial height. The average mandibular plane angle corresponds to the average clinical FMA (Figure 3 A and C).

FIGURE 3B & FIGURE 3C : FRONTAL VIEW & PROFILE VIEW

DISCUSSION

The main highlight of this comparative study is to report variants of long face with an increased facial height.

CASE I:

Figure description: An increased lower third of the face, increase in the lower facial height, flattened non consonant smile arc, excessive gingival show anteriorly and posteriorly

Cephalometric features: The patient has classical features of patients with long face syndrome. Increased anterior facial height, reduced posterior facial height corresponding to the reduced ramal length and steep mandibular plane angle. The increased anterior and posterior upper dental heights, reduced posterior facial height coupled with increased lower anterior dental height and facial height makes it ideal for Le-fort 1 superior impaction of maxilla.

Treatment plan: Superior impaction of maxilla is ideal for this case to address the excessive gummy smile, improve the smile arc by intrusion of the maxilla [16]. The smile arc can be improved along with the reduction of mandibular plane angle and reduction of facial height making it more towards an aesthetically pleasing face.

A nonsurgical option can be intrusion of the upper arch using a temporary anchorage system anteriorly and posteriorly. [17] Over intrusion of the incisors should be avoided using utility arches and reverse curves as it might again lead to flattening of smile arcs. [18]

CASE II:

Figure description: An increased lower third of the face, increase in the lower facial height, flattened non consonant smile arc, excessive gingival show anteriorly and posteriorly along with a short upper lip. The other features presented by these patients are lip trap as clearly appreciated in the lateral cephalogram.

Cephalometric features: The patient has increased anterior facial height, increased posterior facial height corresponding to the increased ramal length and hypodivergent mandibular plane angle. The increased upper and lower anterior dental heights, increased lower posterior dental height along with increased posterior facial height coupled with and facial height makes it ideal for some kind of intrusion movement.

Treatment plan: As the subject has a hypodivergent growth pattern along with genetically engrammed strong musculature, [19] an autorotation of mandible following superior impaction of maxilla is not recommended. Its long term stability will be questionable.[20] Such patients also tend to have a strong symphysis. Attempting to auto rotate the mandible will only further have the probability of increasing the freeway space. The only stable treatment option could be to anteriorly intrude the segment and end in Class II malocclusion.

CASE III:

Figure description: Increased lower third of the face corresponds to increased anterior dental height. Patient also has a gummy smile and a flat non consonant smile arc.

Cephalometric features: Average Mandibular plane angle and average upper anterior dental height present. All other dental heights are marginally reduced. Posterior facial height is also average.

Treatment plan: The above parameters suggest that the increase in the facial third can be acceptable. As the upper dental height is average, the gummy smile can be managed with other alternative measures like gingivectomy [21] or intrusion of anteriors alone. This facial variant with an increased facial height is an acceptable compromise.

Clinical implication: These three variants were chosen for this case series in an attempt to highlight the variant 2. An increase in anterior and posterior facial height should not be treated conventionally by superior impaction of the entire maxilla followed by autorotation of the mandible as high chances of relapse prevail due to strong genetic muscle engramming and chances of increased freeway space post treatment. Such cases should be addressed by only intruding the upper anteriors and accept a Class II malocclusion.

Limitations: This study took into account only three patients. A large-scale study with cases having similar variants of anterior facial height needs to be conducted.

CONCLUSION

This article highlights the possible characteristic facial variants of an increase in anterior facial height. An increased lower anterior facial height does not always necessarily mean a high mandibular plane angle, reduced posterior facial height as is the most common notion. There can be various combinations of the posterior facial height and the mandibular plane angle as discussed in the three variants above.

CONFLICT OF INTEREST:

There are no conflicts of interest.

GRANT SUPPORT AND FINANCIAL DISCLOSURE:

None.

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