



Proposition of two cephalometric angles for assessing lip position

Propuesta de dos ángulos cefalométricos para evaluar la posición labial

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ABSTRACT

The present study was conducted in order to propose two angles for the assessment of the anteroposterior position of the upper and lower lips, taking as a reference stable bone structures thus avoiding soft tissue reference points that vary according to age such as the nose and chin. **Material and methods:** 114 lateral headfilms from skeletal class I, II and III patients were traced. The proposed angles were measured. For the upper lip (LSMx), the palatal plane and the anterior nasal spine-upper stomion plane formed the angle. For the lower lip (LIMd) the angle was formed by the mandibular plane and the pogonion-lower stomion plane. Both angles were compared with the nasolabial (NSL) and the mentolabial angles (MTL) respectively. **Results:** A statistical t-Student test was conducted. The proposed angles for the upper and lower lip had lower standard deviations from the mean in comparison to similar angles in all three classes, especially skeletal class I: LSMx: $105.5^\circ \pm 5.5$, LIMd: $88^\circ \pm 5.5$, NSL: $104.1^\circ \pm 11.3$ and MTL: $136.9^\circ \pm 12.4$. The angle proposed for the lower lip showed a smaller standard deviation and a statistically significant difference compared to the mentolabial angle in the ANOVA test ($p < 0.05$). **Conclusions:** The proposed angles for assessing lip position indicate that they have smaller deviations from the mean, in addition if there is an increase they show lip protrusion and a decrease indicates lip retrusion.

Key words: Lip position, nasolabial, mentolabial, cephalometry.

Palabras clave: Posición labial, nasolabial, mentolabial, cefalometría.

RESUMEN

El presente estudio se realizó para proponer dos ángulos para evaluar la posición anteroposterior de los labios superior e inferior, tomando como referencia de apoyo estructuras óseas estables, evitando así tener un apoyo de tejido blando que varía de acuerdo con la edad como es la nariz y el mentón. **Material y métodos:** Se trazaron 114 radiografías laterales de pacientes clase I, II y III esquelética. Se midieron los ángulos propuestos para el labio superior (LSMx) que se formaban por plano palatino y el plano espina nasal anterior-estomión superior. Para el labio inferior (LIMd) fue el ángulo formado por el plano mandibular y el plano pogonión-estomión inferior, a ambos se les comparó con los ángulos nasolabial (NSL) y mentolabial (MTL), respectivamente. **Resultados:** A tales medidas se realizó una prueba estadística de t-Student. Los ángulos propuestos para labio superior e inferior obtuvieron menores desviaciones estándar de la media a comparación de sus ángulos semejantes en las tres clases esqueléticas, sobre todo para clase I esquelética: LSMx: $105.5^\circ \pm 5.5$, LIMd: $88^\circ \pm 5.5$, NSL: $104.1^\circ \pm 11.3$ y MTL: $136.9^\circ \pm 12.4$. El ángulo propuesto para el labio inferior tuvo menor desviación estándar y una diferencia estadísticamente significativa frente al ángulo mentolabial en la prueba de ANOVA ($p < 0.05$). **Conclusiones:** Los ángulos propuestos para evaluar la posición de los labios indican tener menores desviaciones de la media, además, si presentan un aumento indican protrusión labial y una disminución es retrusión labial.

BACKGROUND

It is important to assess the position of the lips in the patient who seeks orthodontic treatment. The aesthetic appreciation of the lips will vary for each observer, but the indications, contours and proportions approximate to a mean or facial aesthetic standards indicate a more esthetic and harmonious facial appearance as indicated by Bergman et al.¹ The lips according to their development have a position in the face according to their thickness, size and length. These can be assessed by different means already proposed by several authors such as Ricketts' E line,² S1 line of Steiner,³ B line of

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Burstone,⁴ Sushner's S2 line⁵ and the Holdaway H line.⁶ These lines were evaluated by Buschang et al and they found that the profile planes only determine if the lip position is adequate to the face,⁷ but if these same planes were used to evaluate significant changes after orthodontic treatment or growth they would not allow a significant quantification of the changes in lip position.

There are other ways to assess lip position such as the true vertical,⁸ the mentolabial and nasolabial angles⁹ and a more accurate way through projections to the pterigomaxillary vertical line, exposed by Nanda et al.¹⁰ But regarding the abovementioned references most studies have been performed in adolescents up to the age of 18, without considering that lips vary with age. Studies by Pecora et al.,¹¹ Genecov et al.,¹² Nanda et al.,¹⁰ Foley et al.¹³ and Bergman et al¹ have shown significant changes that happen in the maturation of lips, nose and chin, as well as a significant variation in the mentolabial and nasolabial angles.

Soft tissues are constantly changing, more than the facial skeleton and into adulthood there is an increase in length and a decrease in lip thickness.¹⁴ However Bishara et al indicated that there is soft tissue stability at 25 years of age, and from the age of 30 years the chin and nose move further down and forwards.¹⁵

Therefore the question was raised as to whether it is possible to develop new angles to assess the position of the upper and lower lip with respect to a stable bony point, without the intervention of a secondary soft tissue reference point that may suffer changes through the course of life. These proposed angles should have less variability or standard deviation from the norm unlike the commonly used angles: the nasolabial and mentolabial angles, which were included in the study in order to make a comparison.

MATERIAL AND METHODS

This analysis was conducted by means of a transverse observational study, which consisted in hand tracing and measuring lateral head films obtained from the archive of the Orthodontics Specialty of the Division of Post-Graduate Studies and Research at the National Autonomous University of Mexico. The inclusion criteria for this study were: lateral head films taken in the Radiology Department of the same institution and recorded on a compact disc using with Cliendent Software during the period from November 2013 to February 2015, then printed on

coated paper in a 1:1 proportion; lips at rest position; patients between the ages of 18 to 30 years; patients diagnosed as skeletal class I, II and III through the following cephalometric measurements: Jarabak's ANB, Wits of Jacobson, facial convexity of Downs and convexity of Ricketts. Exclusion criteria were: patients who have had extractions of teeth with the exception of the third molars; patients who had undergone previous orthodontic treatment and that at least one skeletal measurement did not match.

The angles proposed to evaluate the anteroposterior position of the upper and lower lips were: for the upper lip (LSMx), it would be through the lower inner corner formed by the palatal plane (ANS-PNS) and the plane formed by the points from the anterior nasal spine to estomion of upper lip (Ustm). This proposed angle was compared to the nasolabial angle (NSL). For the lower lip (LIMd) the proposal was to measure the internal top angle formed by the mandibular plane and the plane that goes from bone pogonion point to estomion point of the lower lip (Lstm), so this was compared with the mentolabial angle as well (*Figure 1*).

A pilot test was conducted in which out of 55 lateral head films, 15 were within the parameters of

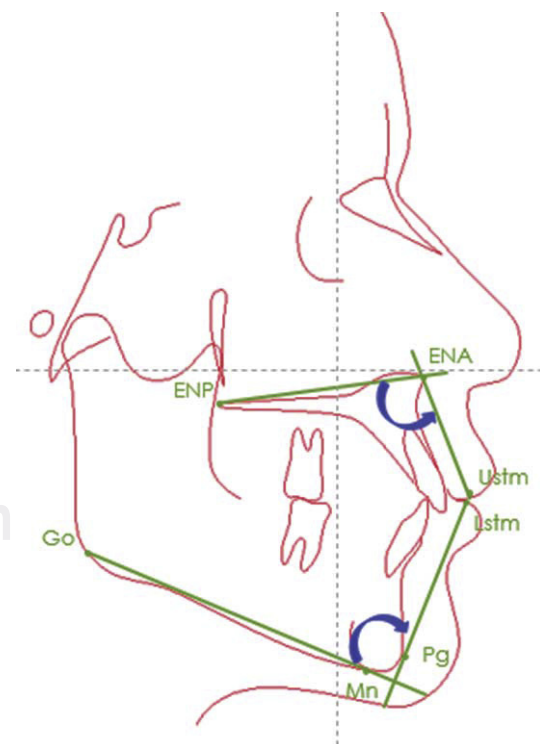


Figure 1. Proposed angles to assess the anteroposterior position of the upper and lower lip.

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