



# Analysis of the cephalometric skeletal and dental characteristics of adult patients with cleft lip and palate who received orthopedic, orthodontic and/or surgical treatment during their childhood and adolescence

## *Análisis cefalométrico de las características esqueléticas y dentales que presentan pacientes adultos con fisuras labiopalatinas que recibieron tratamiento ortopédico, ortodóncico y/o quirúrgico durante su infancia y adolescencia*

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### ABSTRACT

**Background:** Cleft lip and palate is one of the most common congenital malformations that affect human faces in all ethnic, economic level, and educational groups. It may cause speech and psychological problems. This study presents the skeletal and dental characteristics of cleft lip and palate patients treated with maxillary orthopedics, orthodontics and surgery during their infant and adolescence years. **Method:** A retrospective cephalometric analysis study was performed in 2013 using the Dolphin Imaging System of 26 lateral head films and 26 posteroanterior X-rays of cleft lip and palate adult patients who received orthopedic, orthodontic and/or surgical treatment during their infancy and adolescence between 1969 and 1985. All X-rays were taken during 1995-2002. **Result:** Most of the subjects presented a mesofacial growth pattern, a skeletal Class III maxilomandibular relation, a large mandibular body length, an increase in the vertical growth of the maxilla, and an increase in the facial, maxillary, nasal, intermolar and intercanine width, with a normal *Overjet* and *Overbite* and retroclined upper incisors.

**Key words:** Cleft lip and palate, cleft lip, cephalometric analysis, orthopedic treatment, orthodontic and surgical treatment in adulthood, Dolphin Imaging System.

**Palabras clave:** Labio y paladar hendidos, fisura labial, análisis cefalométrico, tratamiento ortopédico, ortodóncico-quirúrgico en edad adulta, Dolphin Imaging System.

### RESUMEN

**Antecedentes:** De las malformaciones congénitas que afectan la cara del ser humano, la fisura labio-palatina es la más común, ya que se presenta en cualquier nivel socioeconómico, educativo, en todas las razas y causan gran repercusión psicológica por estar localizadas en la cara y pueden afectar el lenguaje del individuo. Este estudio define las características cefalométricas significativas en los patrones de crecimiento craneofacial y las características dentales de los adultos con fisuras labiopalatinas que recibieron tratamientos quirúrgicos y ortodóncicos durante la infancia y adolescencia. **Método:** Estudio cefalométrico retrospectivo para analizar en 2013 por medio del Programa de Dolphin Imaging System 26 radiografías laterales de cráneo y 26 radiografías posteroanteriores de pacientes adultos con fisuras de labio y paladar hendido que recibieron tratamiento ortopédico, ortodóncico y/o quirúrgico durante su infancia y adolescencia desde 1969 hasta 1985. Todas las radiografías fueron tomadas de 1995 a 2002. **Resultado:** La mayoría de los pacientes presentan: patrón de crecimiento mesofacial, relación maxilomandibular clase III, longitud mandibular larga, aumento del crecimiento vertical maxilar, aumento de la anchura facial, maxilar, nasal, intermolar e intercanina, sobremordida horizontal y vertical adecuada, y los incisivos superiores retroinclinados.

### INTRODUCTION

In each individual, specific characteristics of an ideal pattern about his or her physical configuration may be found; this «primitive underlying form», is frequently altered since the very moment of conception when the conflicts generated between the varied influences of

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genetic loads and those acquired by multiple intrinsic and extrinsic environmental factors become manifest in the pre- and postnatal periods. When an omission, error or neglect of the nature occurs, the possibility of balance and ideal harmony that is inherent in all life processes is substantially changed by this primary circumstance. All these variables interrelate secondarily in determining the conditions that form the characteristic attributes of this individual.

In Mexico, we have the data provided by the RYVEMCE (Registration and Epidemiological Surveillance of External Congenital Malformations by its initials in Spanish), that indicates a rate of 1:1,200 live newborns and it increases to 1:800 when considering abortions and deaths.<sup>1</sup> The cleft lip and palate represents one of the most common malformations and is susceptible to structural correction, and functional rehabilitation through the work of a medical (Genetics, Pediatrics, Plastic Surgery, Otolaryngology, Speech Therapy, etcetera) and dental (Pediatric dentistry, Orthodontist, Prosthetist, etcetera) interdisciplinary team.

The cleft lip may be unilateral or bilateral; when unilateral it is most commonly seen on the left side (70%). Approximately 85% of bilateral fissures and 70% of the unilateral ones are associated with a cleft palate. The cleft lip associated with cleft palate is more common in men, while the isolated cleft palate is more frequent in women. In general, the bigger the defect, the higher is the proportion in males. The isolated palatal fissure is a completely different entity to the cleft lip associated with cleft palate. The cleft palate may be complete of soft palate or secondary and incomplete of primary palate. The submucosal is an incomplete form of cleft palate difficult to detect visually during the immediate postnatal review, its frequency is 5 to 10% of all the palatal fissures.<sup>2</sup> When minimal, it may go unnoticed, especially when language is considered to be adequate or normal, and when it is not compensated by a pharyngeal constriction mechanism.

It has been shown that siblings born from parents with cleft lip and cleft palate have a higher prevalence of the same anomaly, but not of isolated cleft palate. In 60% of children with cleft palate it is associated with another congenital malformation.<sup>3</sup> Complete cleft palate is more frequent than a soft palate cleft.<sup>4</sup>

Green and col. observed that the age of the parents has an impact on the presence of cleft lip and palate.<sup>5</sup> They reported that the parents of patients with this malformation are older than the parents of healthy children.

Saavedra, Yudovich and col. have demonstrated a probable relationship between patients with clefts and a facial morphology with an increased facial width of the parents.<sup>6</sup>

Ochoa and Vinageras in 1987, mentioned that on the basis of anatomical cleft lip-palate studies performed in corpses of children with these congenital malformations, it has been possible to obtain information about the anomalies of the muscular, nerve and bony structures.<sup>7-10</sup>

In the presence of a cleft lip, the muscle fibers of the orbicularis muscle do not intertwine on the maxilla, but continue in parallel with the margin of the cleft lip and in this way its integrity is divided causing the sphincter mutilated by the division to be unable to avoid the traction of the antagonistic muscles that insert into the commissure and produce lifting and distortion of the lip elements.

Fara in 1965,<sup>8</sup> dissected and described the anatomy of the orbicularis muscle of lips that was later corroborated by other authors.<sup>9</sup> He stated that the muscle at philtrum level on the cleft side is hypoplastic and does not extend to the entire length of the lip margin as it happens in the opposite side; this suggests a limitation of the muscle fibers to grow towards the midline.

Novoselov and Lavrentiev<sup>10</sup> pointed out that they had found less differentiated, wide and large muscles in the superficial layers and narrow in the deep; the division of the orbicularis of the lips was due to the shift in its fiber's direction and to the lack of union of its main bundles in the deep surface. The most powerful bundle inserts on the base of the nose wing and plays an important role in the movement of the base of the nose wing of the cleft side, as well as the nasal septum on the healthy nasal side.

Many studies have been conducted to understand the anatomy of the velopharyngeal area in normal conditions as well as in palatal clefts.<sup>11-16</sup> These structures are involved in the production of language in such a way that when an alteration of their anatomy exists dysfunction and abnormal language occur. In normal anatomy, the muscular structures of the velopharyngeal area form a ring that is found to be broken in the cleft palate; the muscle fibers are directed from its lateral insertion towards the palate bone in the shape of a fan and form a raphe when they join in the middle portion.

In the cleft palate there are alterations in their insertion, distribution and muscle insertion; these are located and directed along the margins of the fissure, eventually finding sites for insertion in the posterior margin of the bony palate and may become hypoplastic.<sup>11</sup>

The pioneer work of Ortiz Monasterio in 1959 about the cephalometric evaluation of facial growth patterns in adult non-surgically treated individuals with cleft

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