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Patients with cleft lip and palate have a several number associated of dento-maxillary anomalies, including displaced dental midline, so its centralization is a complex objective of orthodontic treatment. The aim of this article is to assess the degree of deviation of the midline in patients with unilateral cleft lip and palate with orthodontic treatment completed. In addition, a brief review of the literature on this area, focusing primarily on the outcome of the final treatment and maintenance over time.

ABSTRACT

Introduction: The dental midline is a vertical imaginary line between the contact area of the two central incisors. There is an upper dental midline and a lower dental midline for the teeth of the upper and lower arches, respectively. Ideally, both midlines coincide with each other and with the facial midline and conferring symmetry, harmony and aesthetics.

When the integrity of the dental arch, both, maxillary and mandibular, is preserved, a similar dissipation of the anterior component of the forces (caused by occlusal forces) on both sides, keeps the symmetry of the arc. But, if this continuity is interrupted due the lack of dental alignment (2), the transmission of force is not equal on both sides, resulting in the arch: mesialization of teeth, midline deviation, rotations and aggravation of dental crowding (2). In many cases, there is also maxillary compression and the loss of arch form present(1). Patients with alveolar-palate cleft often have these features, so it is necessary to correct both: the shape of the arch and center midlines to reduce the factors affecting occlusal stability and facial harmony.

The aesthetic ideal  
The aesthetic ideal, according to the articles found in the literature, is the coincidence of the two maxillary midlines with the facial midline, although there is an acceptable average deviation of the facial and dental midline. In the study of Jayalakshmi NS (2013), 200 young people, between 18 and 30 years old, with full front dental alignment were observed. The dental midline was measured and compared with the facial midline. The results showed that 44.4% of men and 55% of women had a midline deviation between 0-1mm, while a 54% of men and 33% of women showed a deviation between facial and dental midline of 1-2mm. 80% of the study population, did not match maxillary and mandibular midlines. Most of the study population showed deviation of the facial and dental midline, within a range of 0-1 mm. (3)

KEYWORDS  
cleft lip and palate, midline, orthodontics

1. Description of cleft patients  
Patients with cleft lip and/or palate (L / P) constitute a significant fraction of all human birth defects. The etiology is complex and has a significant morbidity throughout life. Its global frequency is 1 per 1,200 live births. In Chile, it affects about twice the global rate, with an incidence of 1.78 per 1,000 live births in hospitals in the metropolitan region and 1.66 per 1,000 live births in the rest of the country's hospitals, allowing an estimate of about 450 new cases annually. (4)

Patients with cleft L/P present significantly more teeth abnormalities than those individuals without cleft. These abnormalities can be attributed to the cleft itself or early surgical correction of the defect (4). This relates with Tang's prevalence study (1992), which concluded that there is a high percentage of severe malocclusions in cleft patients, 92.3% in men and 71.5% in women, where 69.2% of men and 57.1% of women had the following set of signs: molar mesioclusion, posterior crossbite, midline diastema and deviation of midlines, where the deviation average was 2.2 mm. (5)

That is, these patients have a deficit in the growth of the maxilla both: sagittal and transversed. Also there are developmental disorders of dentition, so many patients with cleft L/P require a long multidisciplinary treatment, where orthodontic treatment is essential (6-7), see figure 1, 2 and 3.

Figure 1: Patient with unilateral cleft on the right side. Figure 2 and 3: Patient with unilateral cleft on right side and upper and lower dental midline deviation.
2. Midline in cleft patients after surgical-orthodontic treatment

According to Schultes G (2000), 25 out of 30 patients with unilateral cleft, cleft lip and alveolar ridge after 1.5 years after satisfactory orthodontic treatment, there was a displacement in the maxillary and mandibular dental midline. We also found a displacement of midline on 19 of 30 patients with isolated cleft palate. Schultes attributes this to the specific dysfunction of the maxillary growth in these patients, particularly in patients with cleft palate, and alveolar ridge. This coincides with the Gaggl's study (1999), which followed, from 2 to 4 years, after orthodontic treatment, patients with bilateral cleft lip and palate. We established that 15 of 20 patients had a deviation of the maxillary and mandibular midline. However, these patients showed a better morphology of the anterior maxillary arch than patients with unilateral cleft.

According Ramstad T (1997) this may be due to a constant recurrence of the maxillary expansion, mainly in the side of the cleft. This, despite the use of restraints, due to the lack of maxillary lateral stability for long term in these patients (10).

It has been observed that the tendency to relapse in patients with cleft L/P also occurs in patients with surgery Le Fort I. According to Saltaji's H (2012) review, of a total of 10 studies there was a recurrence of 20-30% in 4 studies, and 30-40% in 3 studies in horizontal direction. In vertical direction, recurrence was more than 50% in 5 studies. So it was concluded that in patients with cleft L/P with surgical treatment of Le Fort 1, there is a moderate recurrence in horizontal direction and a high rate of relapse in the vertical direction (11).

Materials and methods

The degree of deviation of the dental midline in patients with complete orthodontic treatment of the Craniofacial Malformations Unit of University of Chile was measured.

The study analysed 38 patients with a diagnosis of cleft lip and unilateral velopatal cleft whose surgery and orthodontic treatment had been completed. Through model analysis, the coincidences of the dental midlines were measured. In case of a mismatch, the deviation degree, in millimeters (mm), and the direction of this deviation were measured. Figure 2

![Figure 2: Case treated, note the midline centered](image)

Results

Of a total of 38 patients with cleft lip, unilateral velopatal cleft and complete orthodontic treatment, 12 patients, corresponding to 32%, obtained centricity of the midlines. In 26 patients, corresponding to 68% centricity of midlines was not achieved, obtaining different degrees of deviation. See Table 1

<table>
<thead>
<tr>
<th>Deviation (mm)</th>
<th>Nº of patients</th>
<th>Percentage</th>
<th>Deviation Side od mandibular midline</th>
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<tbody>
<tr>
<td>0</td>
<td>12</td>
<td>32%</td>
<td></td>
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<tr>
<td>1</td>
<td>8</td>
<td>21%</td>
<td>+ Right(R*)</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
<td>11%</td>
<td>- Left(L*)</td>
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<tr>
<td>2</td>
<td>3</td>
<td>8%</td>
<td>(R*)</td>
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<tr>
<td>2</td>
<td>6</td>
<td>16%</td>
<td>(L*)</td>
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<tr>
<td>3</td>
<td>3</td>
<td>8%</td>
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<td>4</td>
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Table 1: Deviation of mandibular midline (mm) of the 38 patients with cleft lip, unilateral velopatal cleft and completed orthodontic treatment.

Regarding these results, it can be established that the median corresponds to 1 mm and the average was 1.21 mm. In addition, 33 patients, equivalent to 87% of patients, had 2mm or less deviation. Also, of 26 patients with varying degrees of deviation: 15 (57%) had a deviation of the mandibular midline to the right side and 11 to the left (47%).

Conclusion

Surgical and orthodontic treatment for long periods is essential in cleft patients, to correct the high percentage of severe malocclusions and transverse maxillary deficiency, and also the deviation degree of midlines. This will help in providing proper functional stability and appropriate esthetics, improving the quality of life of this type of patient.

According to available evidence, fewer patients with midline deviation is observed in those with isolated cleft palate, followed by bilateral cleft and finally the unilateral lip, palate and alveolar ridge cleft.

The likely explanation for the major stability of the midline, would be the preservation of the shape and dimensions of the arc, and the stability of the proximal contacts, which are greater in patients with isolated cleft palate, than in those with bilateral cleft and finally with complete unilateral cleft.

Cardash's et al (2004) research, about the ability of dentists and people not related to dentistry, to recognize midline deviation, found that in people with less than 1 mm of midline (ML deviation, observers recognized MD deviation in 14% of the photographs. In deviations of 1-2 mm, in 37% of the photographs, and on deviations greater than 2 mm, in 83% of the photographs. They concluded that about half of the observers of this research were unable to detect midline deviation lower than 2 mm. (12)

The results obtained by Cardash et al (12), are very positive in regarding to the results of this study, considering that the deviation average obtained was 1.21 mm. and 87% of patients had deviation lower or equal to 2 mm.

Also, it has been studied that in most of the population with complete anterior alignment, midline deviation present is between 0 and 1 mm, which is considered an acceptable average by facial aesthetics parameters.

Most studies about surgical orthodontic treatment results, are focused on the effects on the facial and jaw growth. There aren't any longitudinal updated studies to enable us to assess in the esthetics results in patients with cleft, after orthodontic treatment finalization. Also, in the existing studies, there isn’t any specification if containment was used, what kind of it was used, or which was the period of use.

Conflict of Interest
The authors do not present any conflict of interest.

REFERENCES