COMPARIATIVE STUDY OF REFRACTIVE ERRORS IN SIMPLE CONGENITAL MYOGENIC PTOSIS AND CONTROL CHILDREN

ESTUDIO COMPARATIVO DE LOS DEFECTOS DE REFRACCIÓN EN NIÑOS CON PTOSIS MIÓGENICA CONGÉNITA SIMPLE Y NIÑOS CONTROL

PÉREZ-ÍÑIGO MA¹, GONZÁLEZ I¹, MAYORAL F¹, FERRER C², HONRUBIA FM³

ABSTRACT

**Purpose:** To study refractive errors in children with relatively serious congenital myogenic ptosis and to carry out a comparative study in relation to control children in our population.

**Methods:** We included 35 children with simple congenital myogenic ptosis, 27 of them had minor ptosis, 3 moderate ptosis and 5 serious ptosis. Thirty-five children were also in the control group. One eye of every subject was included, the worst eye in subjects of the ptosis group and an eye selected at random in control group subjects.

A comparative study of refractive data in every group was carried out, using the Student’s t-test, ANOVA and Chi square or Yates correction tests.

**Results:** We obtained significant differences between children with ptosis and controls in average spherical equivalent (3.08/1.49), in average absolute sphere (2.80/1.42) and in average absolute cylinder (0.81/0.31) (p<0.05).

We also observed a relation between the presence of astigmatism and the seriousness of ptosis ($\chi^2=6.88>5.99$), and between the need for optical correction and the presence of ptosis ($\chi^2=15.92>3.84$).

**Conclusions:** Children with simple congenital myogenic ptosis in our enviroment have greater refracti-
INTRODUCTION

Ptosis is the abnormally low position of the superior eyelid. This could be: myogenic, neurogenic, mechanic, aponeurotic and traumatic (1).

Myogenic Ptosis: Caused by myopathy of the elevator muscle or by involvement of the transmission of impulses in the neuromuscular union. It could be congenital or acquired. The acquired form is observed in myasthenia gravis, myotonic dystrophy and ocular myopathies (2). The congenital form comprises a simple form, which is the most frequent, a form associated to the weakness of the superior rectal muscle, an additional form included in the syndrome of blepharophymosis and the form included in the congenital fibrosis syndrome.

Simple congenital myogenic ptosis is due to a dysgenesia of the superior eyelid elevator. There is an alteration in the contraction to elevate the eyelid when looking upwards and a relaxation of the muscle deficit looking downwards. The less the muscle is developed the more serious is the ptosis. It expresses as from birth and remains constant throughout life.

75% of congenital ptosis is unilateral and pure. It is rare for amblyopia to appear solely due to pupilar occlusion; it is normally secondary to convergent strabismus, high astigmatism or anisometrope (1,3).

The remaining 25% of congenital ptosis are bilateral and sometimes asymmetrical.

The possibility of amblyopia and associated refractive defects make early detection and surgical treatment necessary when indicated. If the ptosis is very acute and provokes amblyopia it should be repaired as soon as possible.

The suspension techniques of the frontal and the resection of the elevator muscle are most used in children because they give the best functional results with minimum surgical risks. In the frontal suspension technique, the use of fascia lata is better than other materials (4,5).

The aim of this study is to compare the refractive data of children with simple congenital myogenic ptosis of different severity and control children.

SUBJECTS, MATERIAL AND METHODS

Sample selection

We included a total of 70 eyes, belonging to 70 children sent to pediatric ophthalmology consultations at our centre.

Thirty-five of them had simple congenital ptosis of varied severity, and were selected randomly from a list of children with this pathology. The other 35 children were sent to our consultations either for epiphora at birth or through emergencies for banal pathologies, and a complete refractive study was made on all those around the age of 3-4 years, who were used to recollect data.

We selected the worst eye in the children with ptosis, and the right/left randomly in the control patients.

A detailed anamnesis, a complete ophthalmological exploration, and refraction study under cyclopegia were carried out.

Demographic data

Sex, age (in months) at first visit, and who referred them to our consultations (pediatrician, district ophthalmologist or others).
Ptosis data

Affected eye (right, left or both), ptosis severity (low, moderate, severe), necessity for surgery, technique employed and complications if any.

We define

- Low ptosis: 2 mm below the normal position of the eyelid, at the level of the superior pupilar edge.
- Moderate ptosis: 3-4 mm below the normal position of the eyelid, pupil partially covered.
- Severe ptosis: More than 4 mm below, with pupil completely covered.

Refractive data

Visual acuity, value of the spherical equivalent, absolute value of the sphere, presence of astigmatism, absolute value of the cylinder, type of cylinder (direct = +90° with standard deviation (SD) 10° o –180° SD 10°, indirect = +180° SD10° o –90° SD 10°, and oblique = rest of cases), necessity for optical correction (the same or greater than +3 diopters or the same or less than –1.5 diopters of sphere, absolute value of the cylinder and/or anisometropy the same or greater than 1.5 diopters) and the presence of amblyopia (2 or more lines of difference between both eyes).

Statistics

To graphically represent the frequencies of nominal variables «pastel» diagrams have been used.

To compare quantitative data between more than two groups the ANOVA test was employed.

To compare quantitative data between 3 groups the t for Student was employed.

To study the association between nominal variables contingency tables, the χ² y χ² statistic with Yates correction in indicated cases were used.

Differences encountered with a level of significance p<0.05 were considered significant.

RESULTS

We evaluated a total of 70 eyes, of which 35 had associated ptosis, and 35 control children. We could find no significant differences in average age or in visual acuity between the two groups (table I).

In the group with ptosis, there was a total of 13 girls (37.1%) and 22 boys (62.9%). 14 (40%) had the right eye affected and 21 (60%) the left. 8.6% were referred by the pediatrician, 68.6% by the district ophthalmologist and 22.9% by other ways. Of all the cases, 77.1% (27 cases) were low forms, 8.6% (three cases) moderate forms and 14.3% (five cases) severe forms.

Five surgeries were performed. In all the cases a frontal suspension was made. There were complications in two of the cases, one of them a low residual ptosis and the other a localized abscess that were resolved with no adverse consequences.

With respect to refractive data, we found astigmatism in 21 cases (60%), in seven cases it was (20%) direct, in five cases (14.3%) indirect and oblique in nine cases (25.7%). Eyeglasses were necessary in 21 cases (60%) and five cases were classified as amblyopias (14.3%), having 28 cases (80%) normal visual acuity and two cases (5.7%) difficult to evaluate due to age <1 year (fig. 1). The patients with amblyopia had an average age at the first visit of 39 months. These children had visual acuities of 0.4 in one case, 0.6 in three cases and 0.8 in another case. Of the five children with amblyopia, three had low ptosis, one moderate and one severe. The rest of the ptosis cases had acuities of 0.8, 0.9 and 1. The average visual acuity of the children with ptosis was 0.91.

Of all the children with ptosis, five had severe ptosis, of which four had an acuity of 1 and 1 or 0.8 (the only one with amblyopia in this subgroup).

Of the patients with severe ptosis, five patients were operated, and four were optically corrected. In

Table I

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean VA</th>
<th>St. Dev.</th>
<th>p</th>
<th>Mean age months 1st visit</th>
<th>St. Dev.</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>35</td>
<td>0.98</td>
<td>0.10</td>
<td>0.05</td>
<td>42.97</td>
<td>10.06</td>
<td>0.10</td>
</tr>
<tr>
<td>Ptosis</td>
<td>33</td>
<td>0.91</td>
<td>0.15</td>
<td>0.05</td>
<td>34.14</td>
<td>29.79</td>
<td>0.10</td>
</tr>
</tbody>
</table>

N: Number of children in each group; VA: Visual acuity; p: Significance level of the t for Student test.
In the control group there was a total of 19 girls (54.3%) and 16 boys (45.7%). 18 were right eyes (51.4%) and 17 (48.6%) left. 31.4% were referred by the pediatrician, 5.7% by the district ophthalmologist and 62.9% through other channels.

With respect to the refractive data, we found stigmatism in 13 boys (37.1%), with it being direct in 8 cases (22.9%), in four cases (11.4%) indirect and in one case (2.9%) oblique. Eyeglasses were needed in four cases (11.4%) and there was no case of amblyopia (fig. 2).

Statistically significant differences were found (p<0.05) among both groups in the mean of the spherical equivalent: control = +1.49; ptosis = +3.08, in the mean of the sphere: control = 1.42; ptosis = 2.80 and in the average absolute cylinder: control = 0.31; ptosis = 0.81.

No statistically significant differences were found between the types of ptosis according to their severity or spherical equivalent, or the sphere, or the absolute cylinder (table II).

In terms of the associations existing between the distinct conditions, an association was found between the presence of stigmatism and the severity of the ptosis, as well as between the presence of ptosis and the necessity of optical correction (tables III and IV).

No association was found between the presence of astigmatism and the presence of ptosis, nor the between the presence of ptosis and the type of astigmatism, nor between the severity of ptosis and the type of astigmatism nor between the necessity of optical correction and the severity of the ptosis, nor between the presence of amblyopia and the presence of ptosis or the presence of amblyopia and the severity of ptosis.

**DISCUSSION**

In the environment of the study, children with simple congenital myogenic ptosis had more spherical and cylindrical dioptries than the control children, and they needed optical correction with greater frequency. Merriam W already observed this circumstance on comparing the refraction of the eye with ptosis with the contralateral eye (3,7,8).

As well as studying a group of control children, it could be compared with the refractive study of the
contralateral eye and evaluate the possible differences.

In our group, the more serious the ptosis the greater the possibility of having astigmatism.

It is probable that the low number of cases of moderate or serious ptosis is the reason why there is no association between the severity of ptosis and amblyopia or that no differences have been found in dioptres according to severity. It is possible that early action in the cases of severe ptosis were fundamental in avoiding an evolution towards amblyopia.

In the cases of amblyopia the detection and correction of the corresponding emmetropy was a little later (average age 39 months).

It is noteworthy that the type of astigmatism is indifferent in our environment from the existence and severity of ptosis.

We have found no association between the presence of ptosis and the presence of amblyopia either, perhaps because amblyopia is frequently due to other associated factors (1). The presence of ptosis entails a greater need for optical correction and its severity involves a greater presence of astigmatism but, adequately corrected, there were no significant differences in the visual acuity with the control population. Perhaps the deficient macular stimulation in the eye with ptosis could produce a greater cylindrical emmetropization in comparison with the control group. It is possible that the inexistence of an significant anisometrope between the eye with ptosis and the contralateral partly explains the absence of more amblyopias in this group, to compare it we should make a comparative study with the contralateral eye.

Ptosis is a relatively frequent and highly relevant pathology in children. Its correct evaluation and an early and adequate evaluation of the associated refraction defects and its correction are of great importance, as well as the indication for surgery when necessary. The most frequently used technique in our environment is frontal suspension because it gives good functional results and few risks (4).

We have not studied the variation of the refraction defects after surgical intervention due to the low number of cases, but the literature on the topic sometimes suggests a greater development of astigmatism and amblyopia in some patients operated on in the first years of life (3,9).

### Table II

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean spherical equivalent</th>
<th>St. Dev.</th>
<th>p</th>
<th>Mean absolute sphere</th>
<th>St. Dev.</th>
<th>p</th>
<th>Mean absolute cylinder</th>
<th>St. Dev.</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>35</td>
<td>1.49</td>
<td>1.35</td>
<td>0.000</td>
<td>1.42</td>
<td>1.32</td>
<td>0.001</td>
<td>0.31</td>
<td>0.58</td>
<td>0.018</td>
</tr>
<tr>
<td>Ptosis</td>
<td>33</td>
<td>3.08</td>
<td>1.93</td>
<td>0.000</td>
<td>2.80</td>
<td>1.80</td>
<td>0.001</td>
<td>0.81</td>
<td>0.18</td>
<td>0.018</td>
</tr>
</tbody>
</table>

N: Number of children in each group; St. Dev: Standard Deviation; p: Significance level of the t for Student test.

### Table III

<table>
<thead>
<tr>
<th>Astigmatism</th>
<th>Slight ptosis</th>
<th>Moderate ptosis</th>
<th>Severe ptosis</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>yes</td>
<td>13</td>
<td>3</td>
<td>5</td>
<td>21</td>
</tr>
<tr>
<td>no</td>
<td>14</td>
<td>0</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>3</td>
<td>5</td>
<td>35</td>
</tr>
</tbody>
</table>

χ² = 6.88 > 5.99.

### Table IV.

<table>
<thead>
<tr>
<th>Optical correction</th>
<th>Optical correction no</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ptosis yes</td>
<td>21</td>
<td>14</td>
</tr>
<tr>
<td>Ptosis no</td>
<td>4</td>
<td>31</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
<td>45</td>
</tr>
</tbody>
</table>

χ² = 15.92 > 3.84.

REFERENCES


