Evaluation of body proportions in children with precocious or delayed puberty

Anaëlle Wagner¹, F. Phan-Hug², S. Stoppa-Vaucher², E. Elowe-Gruau², S. Pichard², A. Dwyer³, N. Pitteloud², M. Hauschild²

Background

Over the past 20 years there is growing evidence that onset of puberty and changes in body proportions occur at an earlier age, especially in girls. Several studies have suggested this trend is linked to increasing rates of overweight and obese children. However, data on delayed pubertal trends are scant.

Objectives

- To evaluate for a trend in pubertal onset.
- To characterize body proportions of children evaluated for pubertal disorders.
- To define anthropometric markers associated to the need for treatment.

Methods

- Retrospective cohort study from a Swiss tertiary hospital (1996-2013).
- Anthropometric data were collected: height, weight, upper to lower body segment (ULS) ratio, body mass index (BMI).
- Clinical outcomes were reviewed and analyzed.

Results

1. Clinical characteristics of patients presenting for pubertal disorders (1996-2013)

<table>
<thead>
<tr>
<th></th>
<th>Girls</th>
<th>Boys</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precocious puberty referrals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>262</td>
<td>42</td>
</tr>
<tr>
<td>age at first visit (mean ±SD yrs)</td>
<td>7.6 ± 1.8</td>
<td>8.5 ± 3.1</td>
</tr>
<tr>
<td>mean bone age at first visit</td>
<td>9.6 ± 2.0</td>
<td>11.3 ± 2.6</td>
</tr>
<tr>
<td>Diagnosis (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>idiopathic central precocious puberty</td>
<td>72.1</td>
<td>52.2</td>
</tr>
<tr>
<td>precocious adrenarche</td>
<td>10.6</td>
<td>16.7</td>
</tr>
<tr>
<td>precocious thelarche</td>
<td>8.8</td>
<td>-</td>
</tr>
<tr>
<td>tumoral precocious puberty</td>
<td>3.1</td>
<td>-</td>
</tr>
<tr>
<td>congenital adrenal hyperplasia</td>
<td>4.6</td>
<td>14.4</td>
</tr>
<tr>
<td>ovarian hyperandrogenism</td>
<td>0.8</td>
<td>-</td>
</tr>
<tr>
<td>Patients treated</td>
<td>33%</td>
<td>36%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Girls</th>
<th>Boys</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delayed puberty referrals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>116</td>
<td>231</td>
</tr>
<tr>
<td>age at first visit (mean ±SD yrs)</td>
<td>13.8 ± 1.6</td>
<td>14.6 ± 1.2</td>
</tr>
<tr>
<td>mean bone age at first visit</td>
<td>11.6 ± 1.9</td>
<td>12.6 ± 1.3</td>
</tr>
<tr>
<td>Diagnosis (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>constitutional delay of puberty</td>
<td>73.9</td>
<td>91.8</td>
</tr>
<tr>
<td>hypergonadotropic hypogonadism</td>
<td>17.2</td>
<td>4.3</td>
</tr>
<tr>
<td>hypogonadotropic hypogonadism</td>
<td>8.9</td>
<td>3.9</td>
</tr>
<tr>
<td>Patients treated</td>
<td>33%</td>
<td>28%</td>
</tr>
</tbody>
</table>

2. Number of referrals/year (1996-2013):

Precocious puberty patients (n=304) vs Delayed puberty patients (n=347)

(A) We observed a trend of ↑ numbers of referrals for early onset of puberty. (B) Referrals for evaluation of delayed puberty remained relatively stable.

3. Body proportions at initial evaluation

4. Anthropometric factors associated with treatment indication

Discussion & conclusions

- We observed ↑ trend for referral/evaluation of early puberty while delayed puberty referrals remained stable.
- Body proportions (BMI & sitting height) differ significantly in children referred for precocious vs. delayed puberty.
- The only factor associated with starting treatment was BMI z-score among girls with early puberty.
- Long-term clinical follow-up of pubertal disorders remains essential.

References

1. Kapronczay et al., Earlier onset of puberty in girls: relation to increased body mass index and race, Pediatrics, 2011.
2. Wagner et al., Diagnosis Work-up of 46 Consecutive Girls Who Were Referred to be Evaluated for Precocious Puberty, J Clin Endocrinol Metab, 2011.