MRI STUDY OF THE LIGAMENTIZATION OF ACL GRAFTS IN CHILDREN WITH OPEN GROWTH PLATES

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**Objective**: *MRI descriptive study of graft compared to normal ACL*

**Question**: *Does the ligamentization of the graft lead to a normal MRI signal?*
## METHODS

<table>
<thead>
<tr>
<th>Normal ACL</th>
<th>ACL grafts</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 patients</td>
<td>65 patients</td>
</tr>
<tr>
<td>16.3 years (15-19)</td>
<td>12.9 years (7-16)</td>
</tr>
<tr>
<td>10 males</td>
<td>50 males</td>
</tr>
<tr>
<td>10 females</td>
<td>15 females</td>
</tr>
<tr>
<td>16.7 years (15-19)</td>
<td>15.9 years (15-18)</td>
</tr>
<tr>
<td>13.2 years (7-16)</td>
<td>12.1 years (9-14)</td>
</tr>
</tbody>
</table>

20 MRI

127 MRI
METHODS

- MRI analysis

  The intensity value of the ROI (Region of Interest, 16 mm²):
  - Proximal third of ACL
  - Middle third ACL
  - Distal third ACL
  - PCL
  - Noise
METHODS

- Calculation of SNQ (Signal-to-Noise Quotient) for the 3 parts of ACL

\[
SNQ = \frac{ACL \text{ Intensity} - PCL \text{ Intensity}}{Noise \text{ Intensity}}
\]

SNQ close to 0 = ACL black

High SNQ = LCA white

Decrease of resistance

Weiler A, 2001
METHODS

- MRI analysis
  - Intra-articular Howell grade
    - Grade 1: complete hypointense signal
    - Grade 2: more than 50% hypointense signal
    - Grade 3: more than 50% hyperintense signal
    - Grade 4: complete hyperintense signal

Howell S, 1991
RESULTS: NORMAL ACL

Mean SNQ of ACL

Proximal: 2.28
Middle: 3.61
Distal: 5.97

p < 0.05

ACL signal is inhomogeneous
RESULTS: NORMAL ACL

- Intra-articular Howell grade
  - Howell II: 25%
  - Howell III: 55%
  - Howell I: 20%

Heterogeneous aspect of ACL different from PCL

Very few Howell I
RESULTS: ACL GRAFTS

SNQ

- No significant difference between the 3 zones regardless of the delay.

- Significant difference between 6 and 12 months and between 6 and 24 months.

\[ p < 0.05 \]
RESULTS: ACL GRAFTS

- Intra-articular Howell grade

<table>
<thead>
<tr>
<th>Time</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 months</td>
<td>Grade 3</td>
</tr>
<tr>
<td>24 months</td>
<td>Grade 2</td>
</tr>
</tbody>
</table>

Decreasing Howell’s grade with time
CONCLUSIONS

- The normal ACL aspect is heterogeneous

- While the signal from the graft is more homogeneous

- Evolution of the signal and graft maturation up to 2 years p. op

Watch out for early return to sports
