Thigh Muscle and Patient-Reported Function Early After ACLR: Clinical Cutoffs Unique to Graft Type and Age

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Introduction

• Patient-reported function is an important outcome in ACL rehabilitation.
• Hamstrings muscle function is a drastically underrepresented variable throughout recovery.
• Identifying which metrics of thigh muscle function are indicators of normal patient-reported knee function in the first 9 months post-op can help guide treatment.

Purpose

• To identify which metrics of thigh muscle function can discriminate between patients who meet and fail to meet age-sex-matched normative values of patient-reported knee function.
• To establish cutoffs for clinical assessment specific to graft type and sex subgroups in the first nine months after ACLR.

Methods

IKDC subjective knee evaluation scores:
• IKDC is “Met” if ≥15th percentile of age-sex-matched norms

Bilateral isokinetic torque and power:
• Mass-normalized peak torque and average power, limb symmetry indices (LSI), and hamstring-to-thigh muscle function in predicting age-sex-matched IKDC norms, and participant’s in the early post-operative period (<9 months).
• Allometric values: PT, peak to peak torque, H, hamstrings torque; IKDC, international knee documentation committee subjective knee evaluation scores; LSI, limb symmetry index; LSI, PT, H, hamstrings to quadriceps ratio; CI, confidence interval; n, number; t test, t-test; sd, standard deviation; OR, odds ratio; CI, confidence interval

Logistic regression

• To determine which metrics predict IKDC classification while holding co-variates (age, sex, graft type, and time from surgery) constant.

ROC Analysis

• To determine ability to classify for total cohort, and by age and graft type subgroups.
• Calculated cutoffs and odds ratios.

Results

Table 1: Demographics

<table>
<thead>
<tr>
<th>Variable</th>
<th>PT Graft Type</th>
<th>HT Graft Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>28</td>
<td>60</td>
</tr>
<tr>
<td>Sex, n (%)</td>
<td>113</td>
<td>71</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>172.7</td>
<td>172.5</td>
</tr>
<tr>
<td>Body mass (kg)</td>
<td>76.4</td>
<td>73.6</td>
</tr>
<tr>
<td>Hamstrings peak torque LSI</td>
<td>31 (21-45)</td>
<td>31 (21-45)</td>
</tr>
<tr>
<td>Quadriceps peak torque LSI</td>
<td>31 (21-45)</td>
<td>31 (21-45)</td>
</tr>
</tbody>
</table>

Table 2: Cutoffs Predicted by Subgroup with Sensitivity, Specificity, Likelihood Ratios, and Odds Ratios

<table>
<thead>
<tr>
<th>Cutoff Value</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Cohort</td>
<td>&gt; 69.4%</td>
</tr>
<tr>
<td>PT Graft Type</td>
<td>&gt; 61.6%</td>
</tr>
<tr>
<td>HS Graft Type</td>
<td>&gt; 71.8%</td>
</tr>
<tr>
<td>Age &lt; 18 years</td>
<td>&gt; 74.3%</td>
</tr>
</tbody>
</table>

Discussion

• Quadriceps PT LSI, hamstrings PT, and quadriceps power LSI are the most meaningful metrics of thigh muscle function in predicting age-sex-matched IKDC classification.
• Cutoff values differed by graft type and age.
• Adds to existing knowledge by presenting cutoff values using isokinetic assessment, age-sex-matched IKDC norms, and participants in the early post-operative period (<9 months).

Conclusions

Establishing cutoff values that are unique to graft type and age using sex-age specific subjective normative values sets an important clinical benchmark that should be achieved early after ACLR.

References


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