Factors influencing a Validated Return to Sport test (K-STARTS) after ACL Reconstruction: Retrospective Analysis of 676 Patients

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INTRODUCTION

• Passing RTS testing resulted in a decreased risk of ACL graft rupture and increased likelihood of return to Sport at pre-injury Level


• **K-STARTS**: composed of both functional and psychological tests

  Validation of a composite test for assessment of readiness for return to sports after ACL reconstruction: the **K-STARTS test**.

• **Objective:** to determine the **key factors** that influence the K-STARTS test score following ACL reconstruction
MATERIALS AND METHODS

3 Surgical techniques

- **Inclusion criteria:**
  - 1st ACL reconstruction (no revisions)
  - 15-60 y
  - K-STARTS at 6 months
  - Retrospective analysis: Patients who underwent surgery from March 2016 to May 2017
MATERIALS AND METHODS

Standard rehabilitation program:

• **6 weeks**: Recovery of quadriceps function, restore full knee extension and normal gait

• **6-12 weeks**: Posterior muscular chain and quadriceps strengthening

• **3 months**: Muscular strengthening and progressive return to sports:
  • Run, bike and swimming between 3 and 4 months
  • Pivoting no-contact sports: 6 months
  • Pivoting contact sports: between 6 months and 1y

• **6 months**: Isokinetic testing and K-STARTS score
Additional individualized RTS program (3months)

- 10 sessions

- Conditioning coaches

- Objective: to restore muscle function and sports-specific movement patterns
  - Maximal strength: knee extensors, hamstrings and hip muscles
  - Resistance strength, explosive strength and plyometric activity
  - Balance exercises, education on appropriate landing techniques
  - Pivoting, cutting and change of direction tasks
MATERIALS AND METHODS

Data collection

- Age, sex, BMI, Tegner score and frequency of pre-injury sports participation

- Delay injury-surgery, graft type, meniscal lesions and association of lateral tenodesis

- Specific RTS program participation
Results

**EPIDEMIOLOGICAL DATA**

<table>
<thead>
<tr>
<th>Patients</th>
<th>676</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>M70% / F30%</td>
</tr>
<tr>
<td>Age</td>
<td>27,6 (15-60)</td>
</tr>
<tr>
<td>BMI</td>
<td>23,8 (16,7-36,7)</td>
</tr>
<tr>
<td>Injury side (dom/non-dom)</td>
<td>53,7% / 46,3%</td>
</tr>
<tr>
<td>Delay Injury-Surgery</td>
<td>286 days (6-8036)</td>
</tr>
<tr>
<td>Preinjury sport frequency Casual / Regular/ Intensive/Pro</td>
<td>14%/62%/21%/3%</td>
</tr>
<tr>
<td>Graft</td>
<td>BPTB 8% / HT 92%</td>
</tr>
<tr>
<td>Meniscal lesions</td>
<td>47%</td>
</tr>
<tr>
<td>Lateral tenodesis</td>
<td>71%</td>
</tr>
<tr>
<td>RTS program</td>
<td>10%</td>
</tr>
<tr>
<td>Preop side-to-side AP laxity difference</td>
<td>270,9 (-2 ; 3)</td>
</tr>
<tr>
<td>Pre-injury Tegner</td>
<td>7,5 (7,3-7,6)</td>
</tr>
<tr>
<td>Postoperative Tegner</td>
<td>3,9 (3,8-4)</td>
</tr>
<tr>
<td>K-STARTS</td>
<td>13,5 (13,2-13,8)</td>
</tr>
</tbody>
</table>
### RESULTS

Factors influencing K-STARTS score

<table>
<thead>
<tr>
<th>Factor</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (M/F)</td>
<td>P &lt;0.001</td>
</tr>
<tr>
<td>Age (&lt;30/≥30)</td>
<td>P &lt;0.001</td>
</tr>
<tr>
<td>Graft (HT/BTPB)</td>
<td>p =0.03</td>
</tr>
<tr>
<td>RTS Program (Yes/No)</td>
<td>P &lt;0.001</td>
</tr>
</tbody>
</table>
Minimal Detectable Change (MDC)

Distinguishes statistically significant results from clinically relevant results.

In the study it was defined as the minimum change required to be 95% confident that real change has occurred.

**K-STARTS MDC: 3.3 points**

DISCUSSION

**RTS program** = the only criterion that influenced the K-STARTS score beyond the MDC threshold


  -> Complete rehabilitation = 8x more likely to RTS

  -> Failure to complete rehabilitation: much higher rates of failing RTS testing criteria
Conclusion

- **RTS program** (+ standard rehabilitation)

  -> Most important factor influencing the K-STARTS score
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