Incidence of Total Knee Replacement in Patients with Previous Anterior Cruciate Ligament Reconstruction

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Disclosure

I, Jarret Woodmass, declare that in the past 3 years:

I have not received support from any companies

I have not done consulting work for any companies

I have not done speaking engagements for any companies

I do not hold individual shares any companies
Introduction

- Anterior cruciate ligament (ACL) injury left untreated can lead to premature joint degeneration from the initial injury as well as recurrent episodes of instability that can lead to further damage.

- Total Knee Replacement (TKR) is a procedure performed for end stage arthritis.

- TKR can be used as a surrogate measure to gauge clinical severity of knee degeneration after ACL-R.
Objective

1. Determine the rate of total knee replacement (TKR) after anterior cruciate ligament reconstruction (ACL-R)

2. Determine if there are risk factors that increase risk of TKR after ACL-R
Methods

- Retrospective review of data stored in the Manitoba Center for Health Policy (MCHP)
- Codes for anterior cruciate ligament reconstruction were searched from 1980 - 2015
- Patient factors included age, gender, geographic area of residence, and neighbourhood income quintile
- Based on the number of ACL-R, a population match of 5:1 was performed
Results

8500 ACL-R
42497 Match

263 TKR
- 156 Case
- 107 Match
Results

Male – 64.3%
Urban – 67.9%

4th and 5th Quintile – 48%

Average age at ACL-R for patients later requiring TKR – 36.9
Average age of ACL-R for patients not requiring TKR later – 29.2
## Cumulative Incidence

<table>
<thead>
<tr>
<th>Years Since ACL-R</th>
<th>Cumulative Incidence of TKR (%)</th>
<th>Cumulative Incidence Ratio (Case:Match)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Case</td>
<td>Match</td>
</tr>
<tr>
<td>2</td>
<td>0.05</td>
<td>0.02</td>
</tr>
<tr>
<td>5</td>
<td>0.18</td>
<td>0.06</td>
</tr>
<tr>
<td>10</td>
<td>0.75</td>
<td>0.15</td>
</tr>
<tr>
<td>15</td>
<td>1.98</td>
<td>0.39</td>
</tr>
<tr>
<td>20</td>
<td>4.72</td>
<td>0.70</td>
</tr>
<tr>
<td>25</td>
<td>7.66</td>
<td>1.36</td>
</tr>
<tr>
<td>30</td>
<td>12.22</td>
<td>2.43</td>
</tr>
</tbody>
</table>
## ACL CASES ONLY: Adjusted Hazard Ratios of Total Knee Replacement

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Hazard Ratio</th>
<th>95% Confidence Interval</th>
<th>Pr &gt; ChiSq</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Hospital vs. Teaching Hospital (HSC, SBGH, Pan-Am)</td>
<td>0.72</td>
<td>0.52 – 1.01</td>
<td>0.0550</td>
</tr>
<tr>
<td>Age</td>
<td>1.09</td>
<td>1.07 – 1.10</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Female vs. male</td>
<td>1.34</td>
<td>0.96 – 1.86</td>
<td>0.0884</td>
</tr>
<tr>
<td>Year of ACL surgery</td>
<td>1.01</td>
<td>0.98 – 1.04</td>
<td>0.5927</td>
</tr>
<tr>
<td>Rural vs. Urban</td>
<td>1.04</td>
<td>0.75 – 1.45</td>
<td>0.8024</td>
</tr>
<tr>
<td>Q1 vs. Q5</td>
<td>1.18</td>
<td>0.69 – 2.01</td>
<td>0.5498</td>
</tr>
<tr>
<td>Q2 vs. Q5</td>
<td>1.33</td>
<td>0.81 – 2.18</td>
<td>0.2591</td>
</tr>
<tr>
<td>Q3 vs. Q5</td>
<td>1.20</td>
<td>0.74 – 1.95</td>
<td>0.4489</td>
</tr>
<tr>
<td>Q4 vs. Q5</td>
<td>1.24</td>
<td>0.76 – 2.00</td>
<td>0.3930</td>
</tr>
<tr>
<td>RUB Low Morbidity vs. Healthy User/Non-User</td>
<td>0.76</td>
<td>0.23 – 2.53</td>
<td>0.6484</td>
</tr>
<tr>
<td>RUB Moderate Morbidity vs. Healthy User/Non-User</td>
<td>1.07</td>
<td>0.34 – 3.40</td>
<td>0.9079</td>
</tr>
<tr>
<td>RUB High Morbidity vs. Healthy User/Non-User</td>
<td>1.44</td>
<td>0.42 – 4.90</td>
<td>0.5572</td>
</tr>
<tr>
<td>RUB Very High Morbidity vs. Healthy User/Non-User</td>
<td>1.15</td>
<td>0.19 – 7.04</td>
<td>0.8800</td>
</tr>
</tbody>
</table>
**Discussion**

**Cumulative Incidence**
- 30 years – 12.2%, 20 years – 4.72%, 10 years – 0.75%
- Lower risk of TKR at 10 and 20 years after ACL-R should not be equated to low risk of arthritis; some patients may be too young to be considered for TKR

**Likelihood**
- Overall, 4.85x more likely to undergo TKR with ACL-R than general population

**Risk Factor**
- Age was the only significant predictor of TKR after ACL-R after controlling for hospital type, sex, year of surgery, urban/rural, income quintile and comorbidity
Strengths and Limitations

Strengths
- 35 year data set
- Capture rate for TKR since 2001 is 97%

Limitations
- Database study
- Techniques for ACL-R has changed in the last 35 years
- Younger patients with OA are less likely to be offered TKR
Conclusion

Cumulative incidence of TKR at 30 years is high at 12.2%

4.85x more likely for TKR after ACL-R

Age is the only risk factor


