Return to sport and the risk of subsequent ACL injury in the younger patient

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La Trobe University, Melbourne Australia
Background

Younger age has become increasingly recognised as a risk factor for ACL graft rupture and contralateral ACL injury following ACL reconstruction.
Age a risk factor for re-injury

Incidence of Contralateral and Ipsilateral Anterior Cruciate Ligament (ACL) Injury After Primary ACL Reconstruction and Return to Sport

Mark V. Paterno, PT, PhD, SCS, ATC,§†‡‖§, Mitchell J. Rauh, PT, PhD, MPH,‖§, Laura C. Schmitt, PT, PhD,‡+, Kevin R. Ford, PhD,§ and Timothy E. Hewett, PhD*§†‡‖§§

Clin J Sport Med 2012
63 patients <25yrs
25.4% risk for subsequent ACL injury
12 month after returning to sport

Am J Sports Med 2015: 110 patients <20yrs
29% risk for subsequent ACL injury

Am J Sports Med 2015 78 patients <25yrs
29.5% risk for subsequent ACL injury

Younger Patients Are at Increased Risk for Graft Rupture and Contralateral Injury After Anterior Cruciate Ligament Reconstruction

Kate E. Webster,†§ PhD, Julian A. Feller,† FRACS, Warren B. Leigh,† FRACS, and Annika K. Richmond,† BSc(Hons)
Investigation performed at Epworth HealthCare and La Trobe University, Melbourne, Australia

Incidence of Second ACL Injuries 2 Years After Primary ACL Reconstruction and Return to Sport

Mark V. Paterno,§†‡‖§ PT, PhD, SCS, ATC, Mitchell J. Rauh, PT, PhD, MPH, FACSM, Laura C. Schmitt,†§ PT, PhD, Kevin R. Ford,†§ PhD, FACSM, and Timothy E. Hewett,†§§ PhD, FACSM
Investigation performed at the Cincinnati Children’s Hospital Medical Center, Cincinnati, Ohio, USA

Am J Sports Med 2016 316 patients <20yrs
35% risk for subsequent ACL injury

Exploring the High Reinjury Rate in Younger Patients Undergoing Anterior Cruciate Ligament Reconstruction

Kate E. Webster,†§ PhD, and Julian A. Feller,† FRACS
Investigation performed at OrthoSport Victoria and La Trobe University, Melbourne, Australia
Age a risk factor for re-injury

Fifteen-Year Survival of Endoscopic Anterior Cruciate Ligament Reconstruction in Patients Aged 18 Years and Younger

Matthew D. Morgan,* BAppSci(HMS), MBBS, Lucy J. Salmon,† BAppSci(Physio), PhD, Alison Waller,‡ BMedSc(Hons), BAppSci(Physio), Justin P. Roe,* MBBS, FRACS, and Leo A. Pinczewski,‡ MBBS, FRACS

Investigation performed at North Sydney Orthopaedic and Sports Medicine Centre, Sydney, Australia

Am J Sports Med 2016 242 patients <18yrs
31% risk for subsequent ACL injury

Approximately ONE IN EVERY THREE younger patients have a second ACL injury
All second (rupture and contralateral) ACL injuries categorized by sex and age

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
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</thead>
<tbody>
<tr>
<td>&lt;18 years at surgery</td>
<td>44%</td>
<td>32%</td>
</tr>
<tr>
<td>18 or 19 at surgery</td>
<td>31%</td>
<td>23%</td>
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Graft ruptures categorized by sex and age

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<td>&lt;18 years at surgery</td>
<td>28%</td>
<td>13%</td>
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<tr>
<td>18 or 19 at surgery</td>
<td>14%</td>
<td>10%</td>
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Young males: 56% ruptures occur in the first postoperative year
Why are younger patients at risk?

Multifactorial reasons- age a proxy for other factors

Return to strenuous sport

Younger patients more likely to return to **high risk** sports

*(Webster et al, AJSM 2014)*

- <20 yo: 88% return to strenuous sports
- >20 yo: 53% return to strenuous sports
## Sport participation profiles of younger patients

Percentage of patients participating in level of activity on a **weekly** basis for the preceding 12-month period (n=140)

<table>
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<tr>
<th>Activity Level</th>
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<th>Males</th>
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<tr>
<td>Level I (jumping, hard pivoting)</td>
<td>48</td>
<td>54</td>
</tr>
<tr>
<td>Level II (running, twisting)</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>Level III (no turning or jumping)</td>
<td>20</td>
<td>19</td>
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<tr>
<td>No sports</td>
<td>16</td>
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**Average follow up time:** 5 years (3-9)

**Mean age:** 22 years

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Level I= jumping, hard pivoting; Level II= running, twisting; Level III= no turning or jumping
• A high percentage of younger patients return to their pre-injury sport after ACL reconstruction
• Return to high impact sports with cutting, hard pivoting
• Further ACL injury
Problem

Growing number of younger patients with revision ACLR who still want to play sport/active lifestyle

Little data on outcomes of revision ACLR in younger patients

Return to sport rates in younger ACLR revision patients & determine the rates of a third ACL injury (graft re-rupture or contralateral ACL injury)
Methods

All revision ACL reconstructions by 2 surgeons (June 2007 - July 2014)

Inclusion criteria:
- 25 years or younger at the time of revision surgery
- First revision procedure
- Minimum 2 years post revision surgery

Exclusion criteria:
- Previous ACL injury or surgery to the contralateral knee
- Did not regularly participate in sport prior to original ACL injury
Patient Characteristics

154 eligible patients
131 (85%) participated at mean follow-up of 4.5 years (2-9)
106 (81%) males, 25 females
Mean age of $18 \pm 2.5$ years at primary ACL reconstruction and $21 \pm 2.7$ years at revision.
Avg time primary ACLR to graft failure 19.6 (1.3)mths
Avg time graft failure to revision 3.9 (6.9) mths
Results: Graft Rupture

Graft re-ruptures

- 20 patients (15%)
- Mean time 2.0 years (SD 0.9)
- 13 (16% of 83) PT grafts; 5 (11% of 45) HS grafts.
- 1 PT allograft ruptured; 1 Achilles tendon allograft ruptured
Results: Contralateral Injury

Contralateral ACL injuries

- 16 patients (12%)
- Mean time 3.5 years (SD 2.1)

Total number of patients with third ACL injury: 36 (27.5%)

Two patients also had a fourth ACL injury
Results: Return to Sport

Following **primary** ACLR:
- **83%** returned to their pre-injury level sport

Following **revision** ACLR
- **68%** returned to their pre-injury level sport
Results: Return to Sport

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<th>No further ACL injury (n=86)</th>
<th>Subsequent (3rd) ACL injury (n=36)</th>
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<td>Return rate primary ACLR</td>
<td>83%</td>
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N=122; Follow up 4.5 (1.5) years post revision surgery; 27.5% third ACL injury
## Results: Return to Sport

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<td><strong>Return rate</strong></td>
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<tr>
<td><strong>revision ACLR</strong></td>
<td>62%</td>
<td>83%</td>
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N=122; Follow up 4.5 (1.5) years post revision surgery; 27.5% third ACL injury
Conclusions

• ONE IN EVERY THREE younger patients have a second ACL injury (graft or contralateral knee)
• Of those who have revision ONE IN EVERY FOUR have a third ACL injury
• This high rate of multiple injuries presents a significant issue for future knee health in these young patients
• Efforts need to be made to reduce recurrent ACL injuries in younger patients, with particular attention paid to the danger of returning to high risk sports
Acknowledgements

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