Return to Sport after cartilage surgery in athletes

Stefano Della Villa

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ICRS Sports Injuries and Rehabilitation Committee

FIFA Medical Assessment and Research Centre

Laboratory of Biomechanics, Rizzoli Institute

Educational and Research Department, Isokinetic Medical Group

Wide vision of Return to Play
Systematic review

- 20 studies
- 1363 patients

Return to Sports Participation After Articular Cartilage Repair in the Knee

Scientific Evidence

Kai Mithoefer,*† MD, Karen Hambly,*‡ PT, MCSP, Stefano Della Villa,*§ MD, Holly Silvers,*¶ MPT, and Bert R. Mandelbaum,*‖ MD

From the *ICRS Sports Injury and Rehabilitation Committee, International Cartilage Repair Society, Zollikon, Switzerland, †Harvard Vanguard Orthopedics and Sports Medicine, Harvard Medical School, Boston, Massachusetts, the ‡University of Kent, Kent, United Kingdom, the ¶Isokinetic Rehabilitation Center, Bologna, Italy, and the ‖Santa Monica Orthopedic and Sports Medicine Foundation, Los Angeles, California

Surgical technique and Return to Sport (at pre-injury level)

- Microfracture 68% 8 months
- Osteochondral Autograft Transfer 70% 7 months
- Autologus Chondrocyte Implant 71% 18 months

Mithoefer K et al, AJSM 2009
In ACI sports patients we could have a faster RTP using a specific “on field rehab program” without jeopardizing functional outcome

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>mean age</th>
<th>pre op</th>
<th>IKDC 1 y</th>
<th>IKDC 5 y</th>
<th>Return to team</th>
<th>Return to competition</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFR</td>
<td>31</td>
<td>23.5 ± 5.7</td>
<td>44.4</td>
<td>84.7</td>
<td>90.7</td>
<td>8.6 months</td>
<td>10.6 months</td>
</tr>
<tr>
<td>No OFR</td>
<td>34</td>
<td>25.1 ± 5.8</td>
<td>34.3</td>
<td>71.3</td>
<td>75.7</td>
<td>10.6 months</td>
<td>12.4 months</td>
</tr>
</tbody>
</table>

Della Villa S et al, AJSM 2010
Micro fractures guarantees faster recovery time but ACI offers more durable good clinical result

Kon et al, AJSM 2011
Recent systematic review and meta-analysis

2016 Apr, Campbell AB: Return to Sport After Articular Cartilage Repair in Athletes' Knees: A Systematic Review

2016 Aug, Krych AJ: Return to sport after the surgical management of articular cartilage lesions in the knee: a meta-analysis
Return to Sport After Cartilage Repair in Athletes’ Knees: A Systematic Review
Campbell AB, Pineda M, Harris JD, Flanigan DC

**Systematic review**
- 20 studies
- 1117 patients

**Surgical technique and Return to Sport**
- Osteochondral Autograft Transfer 89%
- Osteochondral Allograft 88%
- Autologus Chondrocyte Implant 84%
- Microfracture 75%

*Campbell AB et al, Arthroscopy 2016*
Return to sport after the surgical management of articular cartilage lesions in the knee: a meta-analysis.
Krych AJ, Pareek A, King AG, Johnson NR, Stuart MJ, Williams RJ

Meta-analysis

- 44 studies
- 2549 patients

**Surgical technique and Return to Sport**

<table>
<thead>
<tr>
<th>Technique</th>
<th>Success Rate</th>
<th>Recovery Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Osteochondral Autograft Transfer</td>
<td>93%</td>
<td>5.2 months</td>
</tr>
<tr>
<td>Osteochondral Allograft</td>
<td>88%</td>
<td>9.6 months</td>
</tr>
<tr>
<td>Autologus Chondrocyte Implant</td>
<td>82%</td>
<td>11.8 months</td>
</tr>
<tr>
<td>Microfracture</td>
<td>58%</td>
<td>9.1 months</td>
</tr>
</tbody>
</table>

Krych AJ et al, KSSTA 2016
Surgery

Return to play
Return to play

- Surgery
- Post surgical management
- Recovery of A.D.L.
- Strengthening phase
- Fitness reconditioning
- Sport skill restoration
- Re-injury prevention
20% Recovery sessions done on the field
It is useful to see the knee as Scott Dye theory: a biologic transmission with an envelope of function

Dye SF - Clin Orthop Relat Res 1996
An envelope with a complex system of knee stabilizers and shock adsorbers
The system plays with a 4-4-2 scheme like a football team
The team
(4-4-2 scheme)

Articular structures (static stabilizers)

- Cruciate ligaments
- Collateral ligaments
- Joint capsule
- Menisci and cartilage

Muscular structures (dynamic stabilizers)

- Medial hamstring
- Lateral hamstring
- Triceps sural
- Quadriceps

Nerve structures (neuro-motor coordinators)

- Proprioceptive receptors and effectors
- Cortical and subcortical control
If we’d like to complete our treatment we must consider all the players on the field.

Defense

Mid-field

Forward
New evidences are stressing the crucial role of the neuro-muscular control to complete the treatment and to prevent the re-injury.
Incidence of Second ACL Injuries 2 Years After Primary ACL Reconstruction and Return to Sport

Mark V. Paterno, Hill 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

- 78 ACLR patients
- Mean age 17.1 years
- 8.9% ipsilateral ACL graft rupture
- 20.5% controlateral ACL rupture

29.5%
new ACL injury

Paterno MV et al. AJSM 2014
Tim Hewett studies

There is something ... between ... our surgical/rehab strategy and the final outcome
CHANGE
Step 1: advice the patient to perform a complete movement analysis test.

Step 2: correct movement dysfunction to help preventing knee injuries.

Step 3: perform a control test to check the neuromuscular improvement.
Christopher Powers model

- Motion analysis with high speed cameras
- Frontal and lateral frames
- Qualitative evaluation
- Quantitative evaluation (score out of 100)
Data to be published, Isokinetic Medical Group
Take home message

Biology and surgery are the basement of cartilage repair

Always remember the 4-4-2 team of knee stabilizers

Use neuromuscular training to complete the job
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