A Novel Concept: Graft Reinforcement in Knee Ligament Reconstruction

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Advantages of Synthetics
- No graft site morbidity
- No disease transmission
- 'Off the shelf' availability
- Increased flexibility in multi-ligament reconstruction
- Improved strength – early return to activity

Ideal Scaffold / Augment
- Strong – allow early rehabilitation
- Shield from excessive stress during healing
- Encourage tissue integration
- Biodegrade – without adverse reaction
- Favorable manufacturing and handling characteristics

Disclosures
J Dabis (I have no financial conflicts to disclose)
SK Yasen (This individual reported nothing to disclose)
AJ Foster (This individual reported nothing to disclose)
MJ Risebury (Smith&Nephew: Paid presenter or speaker; Research Support)
AJ Wilson (Arthrex, Inc; IP royalties; Paid consultant; Paid presenter or speaker; Research Support; Newclip: IP royalties; Paid consultant; Paid presenter or speaker)

The Reality....
- Synthetic scaffolds popular in the 1980s & 90s
  - Nylon / Silver / Silk / Polypropylene / Teflon / Carbon / Polyanilamide / Dacron / Silicon / Polyester
- POOR BIO-COMPATIBILITY
  - Synovitis, recurrent instability, immunological response, particulate wear and lysis, chronic effusions
- Negative image of ligament augmentation
Aim

- We present the concept and technique of using a graft suture tape to ‘reinforce’ ligament reconstructions around the knee.
- This technique has been employed at our institution since 2011.
- We term this “graft reinforcement” and maintain this as a distinct entity to internal bracing for native ligament repair, or historical ligament augmentation.
- This series serves as validation of a proof of concept for ligament reinforcement, as well as reviewing the safety profile of such an approach in clinical practice.

What is FibreTape?

- 2 mm width non-biodegradable tape
- UHMW polyethylene terephthalate core with braided polyester jacket
- Proven track record in shoulder surgery
  - RC repairs
  - ACJ reconstruction

Safety Profile

- 1,586,369 units sold Jul 2003 - Jan 2016
  - Range of products and applications
- 27 ‘potential’ FibreTape reactions
  - 1.7 per 100,000
  - Likely lower

Patients and Methods

- All patients who underwent knee ligament reconstruction between June 2011 and June 2017 were identified from a prospectively maintained ligament database
- Patients who underwent ligament reconstruction which were reinforced (RLR) were included in the study
- Skeletally immature patients were excluded from the study
- The RLR cohort was then independently interrogated. Three separate cohorts were generated according to whether reinforcement had been used for intra or extra-articular reconstructions or combined
Group Analysis & Indications

- **Group 1** – Reinforced Intra-articular graft Ligament Reconstruction (RILR)
- **Group 2** – Reinforced Combined (Intra & Extra-articular) graft Ligament Reconstruction (RCLR)
- **Group 3** – Reinforced Extra-articular graft Ligament Reconstruction (RELR)

Graft reinforcement is used in the following settings:
- Hamstring tendon autograft for ACL reconstruction measuring less than 7.5mm in diameter
- Hamstring tendon autograft ACL reconstruction in patients over 50 years
- All allograft tendon reconstructions (intra and extra-articular)
- All grafts used for PCL reconstructions (autograft and allograft)
- Patients presenting with a collagen/connective tissue disorder
- Considered in elite athletes in pivoting sports

<table>
<thead>
<tr>
<th>Results</th>
<th>Group 1 (RILR)</th>
<th>Group 2 (RCLR)</th>
<th>Group 3 (RELR)</th>
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<tbody>
<tr>
<td>Total numbers in tables</td>
<td>120</td>
<td>151</td>
<td>11</td>
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<tr>
<td>Male patients</td>
<td>79</td>
<td>118</td>
<td>8</td>
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<tr>
<td>Autografts</td>
<td>95</td>
<td>130</td>
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<td>Allografts</td>
<td>23</td>
<td>65</td>
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<tr>
<td>Revisions</td>
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<td>Autografts with diameter of微创s</td>
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<tr>
<td>Surgical procedures</td>
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<td>64</td>
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<tr>
<td>Healing processes</td>
<td>7</td>
<td>7</td>
<td>3</td>
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<td>Late postoperative problems</td>
<td>52.8</td>
<td>58.7</td>
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<tr>
<td>Revisions rate (%)</td>
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<tr>
<td>Proximal rate (%)</td>
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<td>6.1</td>
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<tr>
<td>Autograft rate of Reinforced autograft primary ACL reconstructions (%)</td>
<td>3.6</td>
<td>6.9</td>
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PROMs

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<tr>
<th>Group 1</th>
<th>Pre-op</th>
<th>Post-op</th>
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<td>KOOS</td>
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<td>76.4</td>
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<tr>
<td>Lysholm</td>
<td>53.5</td>
<td>77.5</td>
<td>80.7</td>
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<tr>
<td>Tegner</td>
<td>2.1</td>
<td>3.7</td>
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<tr>
<td>Lysholm</td>
<td>48.3</td>
<td>78.8</td>
<td>80.0</td>
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<tr>
<td>Tegner</td>
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Hampshire Hospitals

3/25/19
Conclusion

We have demonstrated graft reinforcement is a concept which is safe, technically reproducible and may reduce graft failure rates, especially in complex multiligament knee reconstruction.

References
1 Arthroscopy. 2018 Feb;34(2):490-499.

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Allograft Anterior Cruciate Ligament Reconstruction Utilizing Internal Suture Augmentation. Smith PA, Bley JA.