Does Cortical Non-Contact or Delayed Contact of an Adjustable-loop Femoral Button Affect Knee Stability after ACL Reconstruction?

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Conflict of interest

Kim CK, MD.
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Kim MS, MD.
Song KY, MD.
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We have no financial conflicts to disclose.
Femoral Graft Fixation in ACL-R & Soft Tissue Interposition

- **TightRope®**
  - Cortical suspensory devices
    - *Adjustable-length loops*
  - Comparable good outcomes
    - Biomechanical & Clinical
  - A number of use is increasing

- **TightRope®** has higher risk than Fixed-loop
  - Longer loop
  - No side trailing sutures

- Early necrosis of interposed tissue
  - Graft loosening : graft-tunnel motion
  - Graft-to-bone healing

*Sonnery-Cottet;2014, Harato;2016
*Nag;2012, Sonnery-Cottet;2014*
Cortical Non-contact

- Indirect evidence of soft tissue interposition
- Identifiable with radiograph
- Clinical relevance in single-bundle ACL reconstruction is not known yet
Purpose

To identify

Cortical Non-contact or Delayed contact of an adjustable-loop button for femoral fixation in anatomic single-bundle ACL reconstruction

Affects Tunnel widening, Knee stability and Functional outcomes at minimum 2 years postoperatively
Subject & Study Design

- Retrospective study / May 2013 – May 2016 / 80 Subjects

- Inclusion criteria
  • Primary autogenous hamstring graft ACL-R using TightRope®
    // Single-bundle & Anteromedial (AM) portal technique // Follow up > 2 years

- Exclusion criteria
  • Previous HTO (high tibial osteotomy) // Early Re-rupture of graft

< Comparison 1. >
Immediate postoperative Radiographs

Total
80

Contact
46
Non-contact
34

< Comparison 2. >
At 2-year postoperative Radiographs

Delayed Contact
19
Persisting Non-Contact
15
**Radiographic Evaluation**

< Comparison 1. > Contact vs Non-contact

<table>
<thead>
<tr>
<th>Contact</th>
<th>Non-Contact</th>
</tr>
</thead>
</table>

- Non-Contact: Gap distance > 1 mm

< Comparison 2. > Delayed contact vs Persisting Non-contact

<table>
<thead>
<tr>
<th>Delayed contact</th>
<th>Persisting Non-contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediate</td>
<td>Postop 2Y</td>
</tr>
<tr>
<td>Immediate</td>
<td>Postop 2Y</td>
</tr>
</tbody>
</table>
Radiographic Evaluation
Measurement of Tunnel Width

Average width of 2 point measurement
At Postoperative 2-year radiographs

Clinical Evaluation

- Knee stability
  - Side-to-side Difference: KT-1000 arthrometer (MEDmetric, San Diego, CA, USA)
- Functional outcomes
  - Lysholm score / International Knee Documentation Committee (IKDC) score

Statistical Analysis

- Independent t-test, chi-square test
- SPSS 21.0, p < 0.05
Results of Comparison 1
Contact vs Non-contact

Tunnel Width
No difference between two groups

Tunnel Widening
No difference between two groups

* Graft size, mm
Contact: 8.1 ± 0.7 (6 - 10)
Non-contact: 7.9 ± 0.9 (6 - 9)
(P-value: 0.490)
Results of Comparison 1
Contact vs Non-contact

Side-to-side Difference, mm
*No difference between two groups*

<table>
<thead>
<tr>
<th></th>
<th>Contact (n = 46)</th>
<th>Non-contact (n = 34)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side-to-side</td>
<td>1.6 ± 0.9 (0 - 4)</td>
<td>1.5 ± 0.9 (0 - 4)</td>
<td>.667</td>
</tr>
</tbody>
</table>

Functional scores
*No difference between two groups*

<table>
<thead>
<tr>
<th></th>
<th>Lysholm</th>
<th>IKDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact</td>
<td>94</td>
<td>83</td>
</tr>
<tr>
<td>Non-contact</td>
<td>95</td>
<td>86</td>
</tr>
</tbody>
</table>
Results of Comparison 2
Delayed Contact vs Persisting Non-contact

Tunnel Widening
No difference between two groups

Clinical Outcomes

<table>
<thead>
<tr>
<th></th>
<th>Delayed Contact (n=19)</th>
<th>Persisting Non-contact (n=15)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>KT-1000(difference), mm</td>
<td>1.5 ± 0.9 (0 - 4)</td>
<td>1.5 ± 1.1 (0 - 4)</td>
<td>.937</td>
</tr>
<tr>
<td>Lysholm score</td>
<td>94.6 ± 6.5 (75 - 100)</td>
<td>95.9 ± 4.7 (85 - 100)</td>
<td>.542</td>
</tr>
<tr>
<td>IKDC score</td>
<td>84.2 ±13.2 (48.3 - 98.9)</td>
<td>87.9 ±9.3 (72.4 - 100)</td>
<td>.359</td>
</tr>
</tbody>
</table>

* Gap distance
Delayed Contact : 1.8 ± 0.5 (1.1 - 3.4)
Persisting Non-contact : 2.1 ± 0.6 (1.2 - 3.4)
(P-value : 0.113)
Conclusion

- Cortical non-contact of the adjustable-loop button did not affect knee stability, radiographic outcomes, or clinical outcomes at a minimum follow-up of two years after surgery. Delayed contact patients were estimated to exhibit similar outcomes to Persisting non-contact patients.

- Surgeons should strive to obtain cortical contact of the adjustable-loop femoral button. Nevertheless, cortical non-contact with small gap distance (< 3 mm) may be tolerable following single-bundle autogenous hamstring ACL reconstruction.


