Morphologic Examination of Quadriceps Tendon for Anterior Cruciate Ligament Reconstruction Using Living Knee

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I have no financial conflicts to disclose.
Quadriceps tendon (QT) for ACL reconstruction has recently gained popularity.

✓ More collagen fibrils\(^1\)
✓ Large cross sectional area\(^2\)
✓ Better mechanical property\(^2, 3, 4\)
✓ Low donor site morbidity\(^5\)
✓ Good clinical outcome\(^5, 6, 7\)

Concerns about the adequate size of QT for ACLR in “Small” Japanese population…
✓ To determine whether the QT has the anatomic characteristics to produce the adequate and reproducible graft
✓ 53 patients
   underwent total knee arthroplasty

✓ 9 male, 44 female
✓ Mean age 74 years (48-86)
✓ Mean height 154 cm (138-173)
Methods

QT length

width

proximal
45mm
30mm
distal

thickness

ACL length @90 flexion
### Results

#### QT length

<table>
<thead>
<tr>
<th>Case</th>
<th>Width (mm)</th>
<th>Width (mm) ± 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>proximal</td>
<td>9.1</td>
<td>0.3</td>
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<tr>
<td>45mm</td>
<td>13.6</td>
<td>1.1</td>
</tr>
<tr>
<td>30mm</td>
<td>22.1</td>
<td>1.9</td>
</tr>
<tr>
<td>distal</td>
<td>40.5</td>
<td>1.6</td>
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</table>

#### QT thickness

<table>
<thead>
<tr>
<th>QT thickness</th>
<th>Width (mm)</th>
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</thead>
<tbody>
<tr>
<td>proximal</td>
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<tr>
<td>45mm</td>
<td>13.6</td>
<td>1.1</td>
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<tr>
<td>30mm</td>
<td>22.1</td>
<td>1.9</td>
</tr>
<tr>
<td>distal</td>
<td>40.5</td>
<td>1.6</td>
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</tbody>
</table>

#### QT width

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<th>Width (mm) ± 95% CI</th>
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<td>7</td>
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<tr>
<td>8</td>
<td>8.6 ± 0.4</td>
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<td>9</td>
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<tr>
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<td>10.1</td>
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[Graphs and images of measurements]
Discussion

Native QT morphology

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<tr>
<th>author</th>
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<th>journal</th>
<th>method</th>
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<th>length</th>
<th>width</th>
<th>thickness</th>
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<tbody>
<tr>
<td>Harris$^{8}$</td>
<td>1997</td>
<td>AJSM</td>
<td>Cadaver (preserved)</td>
<td>20</td>
<td>$61 \pm 10$</td>
<td>21-37</td>
<td>7</td>
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<td>Xerogeanes$^{9}$</td>
<td>2013</td>
<td>AJSM</td>
<td>MRI</td>
<td>60</td>
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<td>current study</td>
<td>2019</td>
<td></td>
<td>living knee</td>
<td>53</td>
<td>$53.1 \pm 2.5$</td>
<td>9.1-40.5</td>
<td>8.6</td>
</tr>
</tbody>
</table>

ACL length

Current study 21.3mm vs 22-39mm$^{10-13}$

Height correlates strongly with ACL and quadriceps tendon$^{9,14}$

(Current study 154cm)
Individual QT length assessment for each case

15mm for each tunnel\(^{15}\)
totally 30mm

\[
(QT \text{ length}) > (ACL \text{ length}) + 30\text{mm}(15\text{mm} \times 2)
\]
\(\Rightarrow\) **adequate** length for ACLR

31/53 cases (58%)

42% cases need to harvest QT tendon with bone to ensure adequate length for ACLR
✓ Aged patients and short in height

✓ Small sample number

✓ Measured ACL length @ 90 flexion
✓ Based on the sufficient graft length with 15 mm in each bone tunnel, QT could be an alternative graft for ACL reconstruction.

✓ Some cases need to harvest QT with bone.
References


