Two-Tunnel Transtibial Repair of Radial Meniscus Tears Produces Comparable Results to Inside-Out Repair of Vertical Meniscus Tears

Jorge Chahla MD, PhD; Mark E. Cinque, MS; Andrew G. Geeslin MD; Grant J. Dornan MSc; Robert F. LaPrade MD, PhD

Introduction

Background
Radial meniscus tears are oriented perpendicular to the circumferential fibers, leading to impairment of the meniscal ability to transmit circumferential hoop stresses during load bearing.
- Common in active individuals and frequently associated with ACL and multifilament knee injuries.
- The incidence of radial tears has been reported to be 14-15% of all meniscus tears, with the majority involving the junction of the middle and posterior third of the medial and lateral meniscus.

Natural History
Due to their detrimental effect on the menisci’s ability to maintain meniscal hoop stresses, complete radial tears have been described as functionally similar to a total meniscectomy, predisposing patients to early osteoarthritis and rapid joint degeneration when left untreated.

Literature Gap
Historically, radial tears were often treated with meniscectomy because of an incomplete understanding of the biomechanical consequences of these tears, limited information regarding the biomechanical performance of repair, and the technical difficulty associated with repair.
- There is a paucity of studies reporting outcomes following repair of radial meniscus tears.

Methods

Study Design
Cohort study: Level of evidence, 3
- Patients who underwent 2-tunnel transtibial pullout repair for a radial meniscus tear were included in this study and compared with patients who underwent inside-out repair for a vertical meniscus tear.

Surgical Technique
A 2.4-mm tunnel was drilled from the anterior tibia to the posterior aspect of the radial tear location using an aiming guide if the desired location was achieved for the first tunnel, the sheath was left in place, and a 5-mm parallel offset drill guide was used to position the second tunnel. Each end of the radial tear was treated like a meniscal root tear repair.
- No. 2 nonabsorbable suture was first passed through the peripheral corner of the anterior and posterior meniscus segments using a self-capturing suture-passing device (Fishtape, Smith and Nephew).
- A ringed grasper was used to shuttle the sutures in a crossed fashion through the tibial tunnels.
- Finally, the sutures were tied over a button on the anteromedial tibial cortex for medial meniscus tears and on the anterolateral cortex for lateral meniscus tears.

Results
27 patients underwent 2-tunnel transtibial repair for radial meniscus tears and 33 underwent inside-out repair for vertical meniscus tears.
- Follow-up at a mean of 3.5 years (range, 2.0-5.4 years).
- No preoperative outcome score significantly differed between the groups (p=0.766).
- There were no significant group differences for any of the 2-year postoperative outcomes.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Radial Repair Group</th>
<th>Median (Range)</th>
<th>Vertical Repair Group</th>
<th>Median (Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WOMAC</td>
<td>55 (48-57)</td>
<td></td>
<td>56 (46-58)</td>
<td></td>
</tr>
<tr>
<td>SF-12 PCS</td>
<td>4 (1-13)</td>
<td></td>
<td>7 (1-12)</td>
<td></td>
</tr>
<tr>
<td>Lysholm</td>
<td>34 (74-96)</td>
<td></td>
<td>83 (73-95)</td>
<td></td>
</tr>
<tr>
<td>Tegner</td>
<td>6 (5-7)</td>
<td></td>
<td>6 (4-6)</td>
<td></td>
</tr>
</tbody>
</table>

Discussion
- The most important finding of this study was that patients treated with 2-tunnel repair of radial meniscus tears had excellent outcomes that were comparable with the outcomes of the repair of vertical meniscus tears at a mean of 3.5 years (range, 2.0-5.4 years).
- These findings, combined with established biomechanical evidence of the deleterious effects of meniscectomy, support the repair of radial meniscus tears with similar consideration to that given for the repair of vertical meniscus tears.