A Biomechanical Comparison of Suture Anchor vs. Interference Screw Technique for Medial Patellofemoral Ligament Reconstruction

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Disclosures

• None of the authors have any conflicts or disclosures.
Introduction

• Multiple studies have demonstrated that MPFL is the primary soft tissue restraint at 0-30 degrees of knee flexion.
• Frequency primary patellar dislocation: 5.8 per 100,000.
• 5 x greater in adolescent population.
• Surgical advancements in technique and implant selection have increased incidence of MPFL reconstruction for recurrent patellar instability.
Purpose

• Compare the stiffness of two common MPFL reconstructions techniques:
  
  Interference screw reconstruction VS. Suture anchor reconstruction.

• Measure the failure loads for the two reconstructions types investigated.
Methods

• 8 pairs of cadaveric knee divided into 2 groups: SA vs IS
• Knees were harvested from mid-femur to mid-tibia. All skin and subcutaneous tissues were removed.
• A load was applied through the single quadriceps tendon based on previously published literature.
• The specimens were then instrumented using a custom built apparatus attached to the Instron 8500.
Methods

• Testing was performed on each of the knees at 0, 30, 60, and 90 degrees of flexion for the native anatomy with the intact MPFL.
• The medial capsulo-retinacular tissue and the MPFL were transected and testing was repeated.
• The MPFL reconstruction was then performed using either interference screw (n = 8) or suture anchor (n = 8) with hamstring autograft.
  - SA: (3) 1.7 mm SA spread 15 mm apart
  - IS: (2) 4.75 mm biocomposite interference screw spread 25 mm apart
• Then we tested the stiffness of the construct and load to clinical failure; this was defined as lateral translation of > 26 mm based on past studies demonstrating native ligament failure at 26mm.
Figure 1: The testing setup with rigidly fixed femoral end, rotationally free tibial end, and 90-degree ball-joint patellar attachment with load applied to the quadriceps tendon.
Figure 2: Demonstrating the suture anchor reconstruction (left) and Interference screw fixation (right) using semitendinosus autograft.
## Results

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Force in Newtons (N) (Mean± SD) Required to Displace the Patella Laterally by 1 cm</th>
<th>Knee Flexion Angle (deg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>Native MPFL</td>
<td>105.57 ± 55.89</td>
<td>104.58 ± 42.38</td>
</tr>
<tr>
<td>Transected MPFL</td>
<td>49.78 ± 22.06</td>
<td>74.45 ± 26.46</td>
</tr>
<tr>
<td>Suture Anchor Reconstruction</td>
<td>107.60 ± 32.07</td>
<td>114.87 ± 17.85</td>
</tr>
<tr>
<td>Interference Screw Reconstruction</td>
<td>122.66 ± 57.70</td>
<td>137.94 ± 49.75</td>
</tr>
</tbody>
</table>
Results

Figure 1: Shows the stiffness of MPFL under four different testing conditions (Mean±SEM). Suture anchor technique provided results more closely related to the native MPFL in terms of stiffness than interference screw technique.

Figure 2: Average loads at 26 mm of lateral displacement, considered as clinical failure (Mean±SD).
Results

• The clinical failure load for the suture anchor technique at $256.57 \pm 54.1$ N and interference screw technique at $237.81 \pm 23.82$ N exceeded the 208 N load to failure of native MPFL determined in prior studies.

• Suture anchor fixation provided nearly identical stiffness to native MPFL at 0 degrees of flexion and was close to that of native MPFL at 30 degrees of flexion.
Discussion

• The primary finding of our study were that there was no significant difference in stiffness between the suture anchor and interference screw techniques.

• Additionally, there was no significant difference between the suture anchor and interference screw reconstruction for clinical load to failure.

• The small diameter and relatively shallow depth of suture anchors (18mm depth) decreases the chance of iatrogenic patellar fracture, cortical or subchondral penetration, and symptomatic hardware
References