Immediate effects of neurodynamic versus muscle stretching on hamstring flexibility in subjects with short hamstring syndrome

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Background/Significance

• Hamstring injuries continue to affect active individuals and although inadequate muscle extensibility remains a commonly accepted factor, little is known about the most effective method to improve flexibility.
• Decreased hamstring flexibility as evidenced by limited range in the passive straight leg raise test (SLR) could be due to altered neurodynamics affecting the sciatic, tibial and common fibular nerves.
• Altered posterior lower extremity neurodynamics could arguably influence resting muscle length and lead to changes in the perception of stretch or pain.
• Providing movement or stretching could lead to changes in the neurodynamics and modification of sensation, and help to explain the observed increase in flexibility.
• Neurodynamic sliding interventions are thought to decrease neural mechanosensitivity and it is possible that the inclusion of these interventions in the management of hamstring flexibility would be beneficial.

Methods and Materials

• Subjects with SHS were randomized to 1 of 3 groups: Neurodynamic sliding (n=40), hamstring stretching (n=40) and placebo control (n=40).
• Each subject’s dominant leg was measured for SLR range of motion (ROM) pre- and post-interventions.
• Subjects received interventions as per group allocation for 3 minutes.
• Main outcome measure was range of hip flexion examined by passive SLR measured at baseline and again following interventions.
• Data were analyzed with a 3 (intervention: neurodynamic, stretching, control) X 2 (time: pre and post) mixed model ANOVA followed by simple main effects analyses.

Results

• A significant interaction was observed between intervention and time for hamstring extensibility, F(2,117)=313.715, p<.001.
• There was no difference between the 3 groups at the start, p=.893.
• Mean change in range of hip flexion was 9.9° (95% CI: 9.1 – 10.7°) in the Neurodynamic group and 5.5° (95% CI: 5.0 – 6.0°) in the Stretching group.
• Post hoc analysis demonstrated the Neurodynamic and Stretching groups to be significantly different to the Control group (p<.001); and the Neurodynamic group to be significantly different to the Stretching group (p=.006).

Conclusions

While both interventions resulted in a significant increase in hamstring flexibility, the neurodynamic sliding technique increased hamstring flexibility to a greater degree than static hamstring stretching. Future research should look at longer term results and assess the effect of combining neurodynamic techniques with other interventions.

Take home point:

• Using a neurodynamic sliding technique will increase hamstring flexibility as measured by the passive SLR to a greater degree than static hamstring stretching in healthy subjects with SHS.

Baseline sample characteristics

<table>
<thead>
<tr>
<th>Group</th>
<th>Gender (female)</th>
<th>Age (years)</th>
<th>Weight (kg)</th>
<th>Height (cm)</th>
<th>BMi (kg/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stretching Group (n=40)</td>
<td>20 (50%)</td>
<td>33.9 ± 7.4</td>
<td>69.8 ± 12.3</td>
<td>170.9 ± 7.7</td>
<td>23.7 ± 2.63</td>
</tr>
<tr>
<td>Neurodynamic Group (n=40)</td>
<td>20  (50%)</td>
<td>33.7 ± 7.68</td>
<td>68.9 ± 11.0</td>
<td>171.4 ± 7.17</td>
<td>23.3 ± 2.10</td>
</tr>
<tr>
<td>Control Group (n=40)</td>
<td>20 (50%)</td>
<td>32.7 ± 7.08</td>
<td>68.4 ± 10.98</td>
<td>170.7 ± 6.46</td>
<td>23.3 ± 2.28</td>
</tr>
</tbody>
</table>

Values are expressed as mean ± standard deviation
* Chi-square
** ANOVA
BMI = Body Mass Index

Take home point: