Proprioceptive Neuromuscular Facilitation Training Effects on Hemiparetic Gait After Stroke

Appraised by: Amy Gee, Jessica Medros, Niles Ryan, Afsaneh Tafreshi, Alex Ventura
Peer reviewed by: Phil Alonzo, Patrick Harris, Rebecca Marino, Robert Meier, Inge Tagliareni
Clinical Bottom Line

1) There was significant improvement in clinical measures of functional ambulation with PNF
   a) Compared to other PT interventions
   b) In pts with hemiparesis following stroke within 1 yr

1) Efficacy of PNF techniques depends on:
   a) Pt. population
   b) Chronicity of neurological injury
   c) Duration, intensity & functional context of PNF
Clinical Scenario

1) Hemiparetic gait is a common impairment developed after stroke

1) Main goal of PT: increase functional independence

1) No consensus on whether PNF is the most appropriate Tx for hemiparetic gait dysfunction as compared to other forms of PT
Clinical Question

In adult patients with hemiparesis due to stroke within the past year, does PNF improve scores on clinical outcome measures specific to gait compared to other forms of PT?
# Search Terms

<table>
<thead>
<tr>
<th>Databases</th>
<th>Search Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>PubMed</td>
<td>hemiplegia and gait and rehabilitation and physical therapy and proprioceptive neuromuscular facilitation&lt;sup&gt;1&lt;/sup&gt;; hemiplegia and gait and rehabilitation and physical therapy and stroke and pilot&lt;sup&gt;2&lt;/sup&gt;; gait and stroke and rehabilitation and PNF&lt;sup&gt;3&lt;/sup&gt;</td>
</tr>
<tr>
<td>CINAHL</td>
<td>stroke and PNF&lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
<tr>
<td>Google Scholar</td>
<td>acute stroke and proprioceptive neuromuscular facilitation and gait&lt;sup&gt;5&lt;/sup&gt;; PNF treatment trunk gait&lt;sup&gt;6&lt;/sup&gt;; PNF training and compared and stroke&lt;sup&gt;7&lt;/sup&gt;; hemiplegic gait stroke PNF&lt;sup&gt;8&lt;/sup&gt;; hemiplegic gait stroke PNF&lt;sup&gt;9&lt;/sup&gt;; neuromuscular re-education PNF&lt;sup&gt;10&lt;/sup&gt;</td>
</tr>
</tbody>
</table>
Summary of Studies

1) Khanal\(^6\) & Seo\(^8\) top 2 studies
   a) RCTs addressed all components of PICO question
   b) Level 2b evidence,\(^11\) PEDro\(^12\) scores of 6/10
   c) Concluded PNF was more effective than control Tx & significantly improved gait parameters

2) Khanal
   a) PNF pelvic patterns vs conventional PT
   b) Trunk function, ROM & gait changes with Tinetti

3) Seo
   a) Ramp training with PNF LE patterns vs without PNF
   b) Spatial & temporal parameters of gait with GAITRite system & force plate
Summary of Studies

1) Kyochul\(^4\) & Stephenson\(^7\)
   a) RCTs addressed components of PICO with exception of stroke within 1 yr
   b) Level 2b evidence\(^{11}\)
   c) PEDro\(^{12}\) scores of 7/10

2) Kyochul\(^4\)
   a) PNF ground gait vs. PNF stair training
   b) PNF stair training: significantly greater gains in TUG

3) Stephenson\(^7\)
   a) PNF pelvic & LE patterns vs. BWTT vs. no intervention
   b) PNF: significant differences in outcome measures compared to control but not compared to BWTT
      - Gait velocity, cadence & Wisconsin Gait Scale
Summary of Studies

1) Remaining studies
   a) Quasi-experimental
   b) Evidence 2b\textsuperscript{11} with PEDro\textsuperscript{12} of 5/10, to 2c\textsuperscript{11} with PEDro\textsuperscript{12} of 3/10\textsuperscript{5,10}

1) Overall consensus
   a) PNF improved hemiparetic gait deviations
   b) Dickstein\textsuperscript{3} measured improvements in ADLs & not gait
   c) Kyochul\textsuperscript{4} & Trueblood\textsuperscript{5} found ground gait PNF patterns\textsuperscript{4} & supine pelvic patterns\textsuperscript{5} did not significantly improve gait on level ground
   d) Trueblood\textsuperscript{5} findings were weighed down due to one Tx session, whereas the next fewest amount of sessions in the other studies was twelve\textsuperscript{3,6,9,10}
Summary of Studies

1) Overall, original PICO not definitively answered
   a) Four studies\(^1,3,4,9\) did not include participants with stroke within one year of the experiment
   b) Five studies\(^1,4,5,9,10\) did not offer a comparison Tx
   c) 80\% of studies supported PNF as improving gait in this population \((p<0.05)^{3,4,6,7-10}\)
   d) PNF was more beneficial than BWTT,\(^3,7\) ramp training\(^8\) & conventional PT\(^2\)
Comments

1) PICO question affirmed by key studies\textsuperscript{6,8} with high levels of evidence & internal validity

2) Conclusions about PNF vs. other forms of PT are limited to IVs in the key studies\textsuperscript{6,8}
   a) Muscle strengthening & non-PNF gait

3) Use of PNF recommended in this population
   a) Dosage & functional context affected significance of change in clinical outcome scores
References


